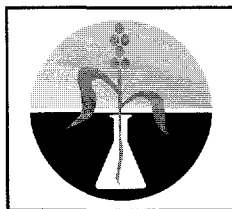


Consultative Group on International Agricultural Research

Technical Advisory Committee and CGIAR Secretariat

Report of the
Fourth External Programme and Management Review
of the
International Institute of Tropical Agriculture
(IITA)



TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

This report comprises:

- (a) Extract from "Summary of Proceedings and Decisions", CGIAR International Centers Week 1995, Washington, D.C.
- (b) Letter from TAC Chairman and CGIAR Executive Secretary, transmitting the Report of the Fourth External Programme and Management Review
- (c) TAC Commentary on the Fourth External Programme and Management Review of IITA
- (d) IITA's Response to the Report of the Fourth External Programme and Management Review
- (e) Transmittal Letter from Panel Chairman to TAC Chairman and CGIAR Executive Secretary
- (f) Report of the Fourth External Programme and Management Review of the International Institute of Tropical Agriculture (IITA)

Consultative Group on International Agricultural Research
Technical Advisory Committee and CGIAR Secretariat

Report of the
Fourth External Programme and Management Review
of the
International Institute of Tropical Agriculture
(IITA)

TAC SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

March 1996



From: The Secretariat

January 1996

**CGIAR International Centers Week
Washington, D.C.
October 30 - November 3, 1995**

IITA External Program and Management Review 1/

The fourth External Program and Management Review of IITA was completed in April 1995 by a panel led by Mr. Eduardo Venezian of Chile. The report and response of IITA's board of trustees was discussed by TAC at its 67th meeting in Rome. The *Ad Hoc* Evaluation Committee endorsed the recommendations of the EPMR and TAC's commentary on the Panel's findings. The review report was positive and optimistic about IITA. The Center has been substantially strengthened over the past five years, which the Panel attributed to IITA's board and management, especially its Director General. IITA is well regarded by the research community in Africa, especially with respect to its research on germplasm and plant health management and leadership in emerging ecoregional initiatives. IITA has broadened the geographic scope of its activities to include parts of eastern and southern Africa, decentralized research responsibilities, completed the transfer of rice research responsibilities, completed the transfer of rice research to WARDA, and reorganized its management structure. The internal work environment has improved notably.

The Panel recommended that research on resource and crop management as well as on socioeconomic activities be strengthened. IITA should also strengthen its collaboration and strategic partnerships with NARS, other Centers (especially the tree crop Centers), advanced research institutions, and, increasingly, NGOs and the private sector. On governance and management, the EPMR suggested that project-based management, planning, and resource allocation would make IITA an even more cost-effective institution by improving the efficiency of resource utilization. This approach should be implemented incrementally.

The Group endorsed the recommendations of the Panel based on the counsel of the *Ad Hoc* Evaluation Committee.

1/ Extract from "Summary of Proceedings and Decisions - Report from the *Ad Hoc* Evaluation Committee", CGIAR International Centers Week, Washington, D.C.

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE

Donald L. Winkelmann
Chair

31 August 1995

Dear Mr. Serageldin,

We are pleased to submit to you the Report of the Fourth External Programme and Management Review of IITA which was completed in April 1995 by a Panel chaired by Dr. Eduardo Venezian of Chile. The Report and the response of the IITA Board of Trustees and Management were discussed by TAC at its 67th meeting, held in Rome, 11th - 17th July 1995. IITA was represented at the meeting by the Board Chair and the Director General.

We also attach IITA's response to the Report together with the TAC Commentary which summarized the Committee's reactions both to the Panel's Report and to IITA's response to the Report. TAC's Commentary incorporates the CGIAR Secretariat's views on the management sections of the review.

We are pleased to note that the Panel is positive about IITA. It is clear that IITA has been substantially strengthened over the past five years, and that the Institute is well structured to address its future research challenges. We would like to draw your attention to a number of important and beneficial developments at the Institute, which reflect the positive and effective leadership provided by IITA's Board and Management. These include, the broadening of the geographic and regional scope of activities to embrace parts of the mid-altitude humid and subhumid areas of East and Southern Africa; completion of the transfer of rice research to WARDA; further decentralization of research including a restructuring of the Institute's management organization and procedures, and notable improvements in the internal work environment.

We also draw your attention to the impact IITA has made, particularly through its work on plant breeding and plant protection. We hope that in the future, impact will also be obtained through IITA's research on natural resources management.

We recommend continued strong support to IITA by the CGIAR. IITA has important goals to accomplish, not only in commodity improvement research, but also in the rapidly evolving area of natural resources management.

Yours sincerely,

A handwritten signature in dark ink, appearing to read 'D. Winkelmann', written in a cursive style.

Donald L. Winkelmann
Chair, TAC

A handwritten signature in dark ink, appearing to read 'A. von der Osten', written in a cursive style.

Alexander von der Osten
Executive Secretary, CGIAR

TAC COMMENTARY ON THE FOURTH EXTERNAL PROGRAMME AND MANAGEMENT REVIEW OF IITA

TAC expresses its thanks to the Panel for its Review Report covering, in a comprehensive manner, a large and complex Institute such as IITA. It wishes, in particular, to place on record its appreciation of Dr. Eduardo Venezian, Panel chair, for handling the Panel's work and interactions with IITA with objectivity and transparency. TAC offers the following commentary, prepared with inputs from the CGIAR Secretariat, to supplement the Panel's Report.

The Review Report is positive and optimistic about IITA. It is clear that IITA has been substantially strengthened over the past five years, and that the Institute is now well poised to proceed with its research. TAC commends IITA's Board, Management and staff for their sustained delivery of research results and collaborative activities with the NARS, achieved while the Centre was adjusting to new directions and organizational modes and at the same time strengthening its management and scientific staff.

The changes made by IITA include broadening of the geographic or regional scope of activities to include aspects of the mid-altitude humid and subhumid areas of East and Southern Africa; further decentralization of research; completion of transfer of rice research to WARDA; restructuring the Institute's management organization and procedures; and notable improvements in the internal work environment. In addition, IITA has reorganized its research programme into Divisions, as recommended in the last EPMR, and has made changes in the programme planning, budgeting and management system. As noted by the Panel, these changes have been very beneficial, and demonstrate the leadership provided by IITA's Board and Management.

TAC notes that the Review Report has made recommendations in many areas, so as to improve IITA's effectiveness even further. In general, TAC endorses the recommendations of the Review Report. However, while it is not appropriate for TAC to comment on each of the Panel's recommendations and the follow-up actions planned by the Institute, TAC notes that the quality of science in the plant health management and commodity improvement divisions meets the standards of an international institute, but, based on its level of impact, the research undertaken by the resource and crop management division needs to be strengthened.

In this context, TAC notes that although IITA's mandate emphasises an eco-regional orientation, its past successes have largely emerged from its commodity improvement and plant health management research. TAC trusts that in the future, the high standards achieved in IITA's more "traditional" commodity improvement research will also be achieved in sustainability-oriented research such as on resource management. TAC therefore urges IITA Management to strengthen its resource and crop management research, and its socio-economic studies, both of which, as pointed out by the Panel, are of vital interest both to IITA and the System as a whole, particularly in relation to Centres' ecoregional research initiatives.

The benefits of stronger relationships with other CGIAR Centres and the NARS are likely to increase in the future, as the System moves towards a more explicit "program"

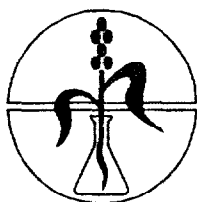
orientation, and begins to more forcefully implement its agreed Research Agenda. TAC notes IITA's strong relationships with CGIAR Centres such as CIAT, and expects that equally strong links will be developed in the near future with other Centres. TAC, in particular, points to the suggestion made in the Report on CGIAR Commitments in West Africa that IITA develop stronger relations with tree crop centres. In addition, TAC recommends increased attention to the NARS partnerships that are so essential to the success of every Centre within the CGIAR System.

With regard to the Review Report's recommendations on Governance and Research Management, TAC notes with satisfaction that the Panel assessed IITA's governance, structure, management style and research leadership positively. It is pleased, in particular, that the Institute has developed a culture of collegiality, fostered by the consultative processes encouraged by the Board and Management, and the straightforward manner of the Director General. It is encouraged by the Board's response to the Panel's recommendations to improve Board operations; and to the receptivity shown by the Institute to further examine such issues as the structure of research leadership, project-based research management, human resource management (HRM), and budgeting and financial reporting requirements.

TAC recognizes that both the research coordination function and the effective management of IITA's internationally- and nationally-recruited staff, are vital to the continued success of the Institute and is pleased that the Review Report has focused Management's attention to these issues. TAC notes that for the past few years the Director General has personally provided research leadership in IITA, and that his hands-on style of managing research has been much appreciated by the scientists at IITA. However, TAC also notes the Panel's view that the research management task at an institute such as IITA - which has a large and complex mandate, and undertakes research in several countries and various field locations - cannot easily be managed on a part-time basis, particularly since the research programs are being further decentralized, and the Divisional Directors operate from different countries.

On other research management-related matters - such as project-based research management; processes for planning, priority setting and resource allocation; and procedures for budgeting and financial reporting, etc. - it is TAC's view that the Panel's recommendations are sound, and should be implemented over the next few years by IITA's Management team. It is expected that implementation of these various recommendations will make IITA an even more cost-effective institution than it is today, and will further improve the efficiency of resource utilization. TAC also concurs with the "incremental" approach adopted by Management in recent years, and is pleased that a similar approach has been recommended by the Panel for the future as well, particularly in relation to the "pilot testing" of project-based research management in selected areas before extending its coverage to the entire research programme and research-related areas.

Finally, TAC is pleased that the External Review Panel confirms the positive findings of the report on CGIAR commitments in West Africa regarding the management and impact of IITA's research there. The Committee encourages IITA to continue to explore opportunities for devolving some of its production systems research to national research systems in the region.



International Institute of Tropical Agriculture

Oyo Road, PMB 5320, Ibadan, Nigeria • Telephone: (234-02) 2412626, 2412169 • Fax (INMARSAT): 874-1772276
Telex: 31417 or 31159 TROPIS NG • Email: Dialcom 157:CGI072; Internet IITA@CGNET.COM

5 May 1995

Dr. Donald Winkelmann, Chair
Technical Advisory Committee
Consultative Group on International Agricultural Research
Food & Agriculture Organization
00100 Rome, Italy

Mr. Alexander von der Osten
Executive Secretary
Consultative Group on International Agricultural Research
World Bank
1818 H Street N.W.
Washington, D.C. 20433
USA

Dear Dr. Winkelmann and Mr. von der Osten:

It is our pleasure to send you IITA's response to the Fourth External Programme and Management Review of the International Institute of Tropical Agriculture. We are particularly pleased that the review panel was very positive about IITA's present and future capacity to address its mandate. We strongly feel that it has been a very rewarding and constructive process which provides a sound basis for IITA's future evolution.

The review process has been fully open and as a consequence the Panel received wide-ranging views, particularly in the area of human resource management. The review has identified certain areas where strengthening of the Institute's capacity would allow it to better address its complex task. In our opinion the Panel has made every effort to arrive at well-balanced conclusions and recommendations.

The report has been reviewed extensively by the Board of Trustees and the staff of IITA. In accordance with the Panel's findings that there is much to commend IITA on with respect to its research and international cooperation achievements, the Board's attention focused on organizational issues that would enhance and improve the Institute's performance. It has requested IITA management to engage in a consultative process with staff and to prepare appropriate proposals. These will be reviewed by the Board as soon as possible in order to decide on the necessary follow up action.

Based on the outcome of the review, IITA looks forward to the future with confidence. The Institute is in an excellent position to move agriculture forward in sub-Saharan Africa. It will continue to focus its attention on improving the well-being of low-income people through the improvement of agricultural production in a sustainable manner.

Sincerely,

Lukás Brader
Director General

Pierre Dubreuil
Chairman of the Board of Trustees

RESPONSE TO THE
FOURTH EXTERNAL PROGRAM AND MANAGEMENT REVIEW REPORT OF
IITA

PART I: GENERAL COMMENTS

IITA appreciates the conscientious and effective manner in which the Review Panel has addressed its complex task. The Panel has produced a very extensive analysis of the activities carried out over the last five years. The review has been undertaken in a very open manner allowing access to the widest range of information and opinions.

IITA notes the very positive outcome of the review. It is particularly pleased with the Panel's findings of the continued high quality of the research and achievements in the areas of crop improvement and plant health management. In the course of the review period, IITA had to redirect its research programs for resource and crop management. The Institute welcomes the Panel's conclusion "that the new leadership (of the Division) is instilling a spirit of teamwork and is formulating revised research programs better suited to IITA's mandate." IITA is confident that the current strong basis of its research programs allows it to face the future with confidence.

The Panel, through country visits and analysis of the replies to the questionnaires circulated earlier, has received very positive comments from NARS about effective cooperation with IITA. It also noted the increased cooperation with sister institutes. This places IITA in an excellent position to be a productive partner in the CGIAR renewal process. In this respect, IITA wants to recognize the strong support it receives from the governments of Nigeria and the other countries in which it works. The Institute intends to consolidate its international cooperation activities further through changes that will enable it to address new partnership requirements in the best ways.

The Panel calls upon IITA to continue providing leadership to the massive international effort required to move African agriculture forward and—as explained in Chapter 8 of its report—the Institute has a sound basis to address this task. IITA will continue to review and adapt its activities to meet the challenges on this front.

The Panel has developed 35 recommendations. In addition it has forwarded a variety of useful suggestions. IITA will systematically review these suggestions in the coming months in order to decide on specific actions to be taken. Several recommendations refer to strengthening of specific activities. All have implications for expansion in staff numbers. Meeting these needs will undoubtedly be restricted by budget. IITA would have welcomed the Panel's views on how they would rank priorities for the several areas of strengthening which they specified.

The recommendations which refer to research management and to human resource management need considerably more analysis, as the issues that are addressed by these recommendations are of special significance for the future development of the Institute and are based on common concerns. Follow-up action on these recommendations will affect the current structure of the Institute and will also have implications for the

implementation of other recommendations. The Institute, in consultation with the various staff associations, will seek to improve its understanding of the concerns that emerged during the review. This will form the basis for the development of proposals for further action, in particular with respect to research and human resource management.

With respect to research management, IITA wishes to highlight the fact which has not been raised by the Panel, that the decentralization of its research activities has also resulted in the decentralization of research management. Consequently any changes would have to take account of this.

In the following pages, IITA comments on the Panel's recommendations. Of necessity, certain answers are preliminary in character.

PART II: RESPONSES TO SPECIFIC RECOMMENDATIONS

Recommendation 1

The Panel recommends that rigorous review of all aspects of work on cowpea improvement at IITA be undertaken in 1998, with the participation of an external assessor(s), to determine whether the current lines of work will then have shown sufficient progress to justify their continuation.

Response

IITA agrees with the Panel. The recommendation endorses what was already planned. A rigorous review of progress will be required as severe pest problems are being tackled. However, the research has gathered momentum over the last years and there is expectation of successes in breeding and plant health.

Recommendation 2

The Panel recommends that IITA increase its effort on producing improved soybean germplasm for the moist savanna and midaltitudes of sub-Saharan Africa, either by redeployment of existing resource or by seeking additional resource.

Response

IITA agrees with the Panel. Based on IITA's past experience in West Africa and that of other soybean-producing countries, attention to postharvest technology will need to go hand in hand with improvement of field production. Implementation of this recommendation will require additional inputs by plant health scientists. When the program expansion takes place, the midaltitudes will have priority.

Recommendation 3

The Panel recommends that IITA review the scale of its activity in cassava improvement in the Humid Forest Program, particularly with respect to Central Africa, and formulate a proposal to enhance the uptake of its technology by the national programs for cassava improvement in this region.

Response

IITA agrees with the Panel, on the assumption that Humid Forest Program should read Humid Forest Zone. IITA has been trying to increase its scale of activity with cassava in Central Africa, but budget constraints combined with political instability have been restrictive. IITA agrees that emphasis should be on the spread of existing technologies, with some selective adaptation to suit local circumstances. IITA still needs to work out the modalities of implementation, but notes that Recommendation 8 has a bearing on the successful implementation of this recommendation.

Recommendation 4

The Panel recommends that IITA maintain its work on yam improvement at the current level, while seeking every opportunity to devolve more of the applied work progressively to NARS, possibly by subcontracting.

Response

IITA is pleased to have the Panel's endorsement of the current level of work on yam improvement, but considers that it applies to its work on yam systems improvement.

With respect to subcontracting, IITA works with NARS in various ways in all areas of its research agenda. For example, IITA assists NARS to obtain bilateral funding for work to complement that of IITA. Acting on the NARS' request, IITA has assisted the African Yam Network to prepare research proposals. When funding is secured, a regional research program on yam will be implemented in which NARS of West and Central Africa will participate. In sharing research responsibilities, NARS will handle the more applied aspects. Full devolution of research responsibility will have to be considered in the longer term.

Recommendation 5

The Panel recommends that IITA, in its continuing reorganization of the Maize Improvement Program, seek ways of devolving more of its work on genetic improvement of maize to NARS in the region.

Response

IITA agrees with the Panel and is already addressing what is proposed.

Recommendation 6

The Panel recommends that IITA secure the continuity of staffing of the Biosystematics Unit by maintaining its core funding.

Response

IITA agrees that it is essential to secure the staffing of the Biosystematics Unit, since its functioning meets one of the basic requirements of IITA's characterization work in plant health.

Recommendation 7

The Panel recommends that appropriate measures be taken to ensure that the data on characterization of the pest and patho-agroecosystems are kept in a form that is readily accessible to future generations of scientists.

Response

IITA agrees with the Panel's recommendation and has taken some initial steps to develop such a database.

Recommendation 8

The Panel recommends that IITA increase its strength in phytopathology at Ibadan.

Response

IITA welcomes this recommendation. There is a definite need to increase international staff strength in phytopathology. This strengthening also links with Recommendations 2, 3 and 14. The required specialization is bacteriology. With this addition, the Institute would be in a position to cover all fields of phytopathological research that are essential to its research agenda.

Recommendation 9

The Panel recommends that IITA emphasize the establishment of strategic institutional research alliances (such as consortia) to address adequately the complexity of sustainable resource management research.

Response

IITA welcomes the Panel's recommendation. It is agreed that natural resource management is a wide and complex area of research. To assist the Institute to fulfil its

research goals, linkages with a range of institutions are of great importance and current efforts to establish such linkages will be increased.

Recommendation 10

The Panel recommends that the Resource and Crop Management Division core efforts be concentrated on the comprehensive attention to one benchmark area each for the Moist Savanna and Humid Forest Programs.

Response

IITA agrees with the Panel's recommendation with one proviso. While the importance of concentrating on Moist Savanna and Humid Forest is fully appreciated, some flexibility should be allowed, in order that some inputs might be made in other agroecologies; e.g., the midaltitudes.

Recommendation 11

The Panel recommends that the Resource and Crop Management Division apply rigorous priority setting to its research portfolio in order to concentrate efforts on research areas of highest possible impact.

Response

IITA agrees that rigorous priority setting is needed in deciding its resource and crop management research agenda. However, at the current stage of decision-making, it is thought that assessment of the "highest possible impact" should be based on judgment rather than quantitative methods. Impact with respect to this research is complex. It can be taken both from a productivity standpoint and/or natural resource conservation standpoint. We would therefore qualify "highest possible impact" by referring to natural resource and welfare benefits and stress that it would rely mainly on qualitative judgments and less on quantitative methods.

Recommendation 12

The Panel recommends that the Resource and Crop Management Division put greater emphasis on on-farm research in its program.

Response

The Panel considered that on-farm research would be the means for improving focus and re-balancing the current research portfolio of the Resource and Crop Management Division. IITA concurs with this general assessment and will increase emphasis on this area of research.

Recommendation 13

The Panel recommends that IITA conclude an agreement with CIMMYT to ensure that the collection and conservation of Africa maize germplasm is undertaken.

Response

IITA has taken steps to collect and conserve African maize germplasm but not along the lines proposed in the recommendation. CIMMYT has specified that it has no plans to collect African germplasm. IITA has approached CIRAD (in the framework of CORAF) to seek their support for a joint exploration. When accomplished, the African materials would be available to CIMMYT.

Recommendation 14

The Panel recommends that IITA strengthen the capacity and increase the authority of the Seed Health Unit in matters relating to the movement of germplasm by the Center.

Response

This is agreed. This recommendation together with Recommendations 2, 3, and 8, all concern the same need (one person for phytopathology, preferably in bacteriology).

Recommendation 15

The Panel recommends that IITA review its policies and strategies relating to networks to ensure that these are adequately integrated with, and receive support from, the Center's research and training programs.

Response

Networks play an important part in both technology transfer and in implementation of core research on a regional basis. The Panel's recommendation underemphasizes the way in which the International Cooperation Division interrelates with the research divisions. IITA's research and training programs already actively participate in the various networks. The Panel has identified some impediments to the effectiveness of networks. However, in all networks there are effective linkages with core research and training programs, through frequent liaison, technical backstopping, information flow, regular attendance at Steering Committee meetings and field visits.

At a policy level, IITA, together with other IARCs that manage networks in sub-Saharan Africa, is ready to devolve implementation responsibilities when NARS are in a position to manage them. For example, it was agreed at a recent ASARECA meeting that "The IARCs will be happy to pass over financial management of the donor funds to ASARECA as soon as proven mechanisms for management and accountability are in place."

Recommendation 16

The Panel recommends that the International Cooperation Division undertake a review of its priorities, strategies and activities, in order to respond effectively to the emerging opportunities for increased partnership with NARS and other collaborators.

Response

IITA agrees that it is an appropriate time to review this Division. The scope of the review should not be restricted to the International Cooperation Division in its present form and should include the integration of Information Services, the relationship to the Technology Transfer and Training Unit in the Plant Health Management Division, and the role and affiliation of the Research Liaison Scientists.

Recommendation 17

The Panel recommends that the IITA Board develop and implement a more systematic and structured process for evaluating the Director General's performance and use the results for making future BoT decisions on Director General contract terms and conditions.

Response

The BoT agrees with the recommendation and had already begun discussion of this issue. It has developed a set of criteria against which to evaluate the Director General's performance in a structured and systematic manner.

Recommendation 18

The Panel recommends that the Program Committee utilize more proactive and participatory methods in determining research strategies and review policies, including those for internally managed external reviews, to enable the BoT to provide effective oversight of the scope and quality of the research programs of IITA.

Response

IITA agrees with the recommendation and will take steps to implement it.

Recommendation 19

The Panel recommends that the Terms of Reference of the Audit Committee (AC) include oversight responsibility for management systems, personnel policies and administrative procedures. The AC should also provide guidance in undertaking internally managed external reviews in these areas as appropriate.

Response

The Institute agrees with this recommendation. At the same time it wants to emphasize that both management and the Board must be careful not to encroach on each other's duties and prerogatives. In addition, it agrees with the view that the AC should take the necessary steps to organize internally managed external reviews, ensuring provision of appropriate input from external reviewers as necessary. However, it holds that the Executive Committee should also be involved in some of these initiatives.

Recommendation 20

The Panel recommends that the Director General re-examine with the IITA Board, the appointment of a Deputy Director General (Research) to ensure that top research leadership can be provided in a continuous and sustained manner without distorting relationships in the management structure.

Response

Appointment of a Deputy Director General (Research) has on various occasions been reviewed by the Board of Trustees. IITA acknowledges indeed that "the structure of scientific direction at IITA is unusual, if not unique in the CGIAR system." It emphasizes that this structure is closely linked with the direct involvement of the Director General in research management and the strengthening of the position of the Research Directors. As the report clearly states, it has resulted in a much improved research environment in the Institute. IITA notes that implementation of this recommendation would again centralize its research decision-making and would therefore conflict to a certain degree with the decentralization process which has been taking place. IITA agrees that there are opportunities to improve research coordination. In seeking to improve its performance, IITA will review various options, including those proposed by the Panel.

Recommendation 21

The Panel recommends that the head of international cooperation should continue to be appointed at the Deputy Director General level and have additional responsibilities including information services.

Response

The Institute had already begun to take steps to integrate the activities of Information Services within the International Cooperation Division, given the important role played by Information Services in the relationship with NARS and donors. The level of the position of the head of International Cooperation will be considered in the light of the overall changes to be implemented following a further analysis as discussed in the Part I.

Recommendations 22 and 30

The Panel recommends that IITA develop an integrated, project-based planning, resource allocation, and implementation system in the next few years and pilot test it in selected areas before extending its coverage to the entire research program and to research-related activities.

The Panel recommends that IITA develop an integrated program/project planning, budgeting and financial reporting system to support the transition to project-based research management.

Response

The Institute notes that the Panel concurs with the Institute's decision to maintain the current divisional structure and with the proposed use of time-based standard costing techniques as an appropriate control mechanism for project-based research management. IITA accepts the Panel's recommendation and will aim to evolve fully to project mode in the future. Pilot testing will be utilized because it is realized that a careful development of this system will be needed and its implementation will not be straightforward. A key aspect is considered to be the development of project log-frames, after which IITA will introduce project-based budgeting.

Recommendation 23

The Panel recommends that IITA further develop its priority-setting methodology and processes for routine screening of new projects, including ex ante impact assessment, irrespective of their funding source. It should also ensure compatibility with the formal strategic planning process of IITA.

Response

IITA is in the process of refining its priority-setting methodology. Once this process has been finalized, it will apply this methodology in the screening of new projects. Procedures are already in place to ensure that new projects are reviewed by the Program Committee to ensure that they are in line with the Institute's Medium-Term Plan objectives. IITA agrees with the thrust of this recommendation, but considers that other methods of priority setting may be more appropriate and less time-consuming than the use of ex ante impact assessment.

Recommendation 24

The Panel recommends that IITA establish a formal and transparent system for ensuring that NARS are routinely consulted in planning the Center's annual research program and research-related activities.

Response

As noted by the Panel, IITA has a variety of mechanisms in place for consulting with NARS, with respect to research planning in a wide range of areas. A highly effective, formal mechanism for determining its program priorities for the East and Southern African Regional Center (ESARC) has been established. New opportunities for priority setting are further facilitated by the plans formulated by ASARECA for the region. The Institute looks forward to developing similar arrangements in West and Central Africa and hopes that not too far in the future it can make appropriate use of the mechanisms established by CORAF and SPAAR. In the meantime, the development of the ecoregional initiatives in West and Central Africa and the establishment of the relevant task force will already considerably facilitate the overall research planning process.

Furthermore, within the above framework, IITA also intends to work closely with all other centers working in sub-Saharan Africa, in order to promote a harmonious research planning process.

Recommendation 25

The Panel recommends that IITA take steps to improve the uniformity, transparency and due process of the current Performance Evaluation System.

Response

While IITA accepts the thrust of this recommendation, it wishes to emphasize that the performance evaluation system has to be adapted to the specific categories of staff to which it applies.

The current evaluation of international staff and national management staff is based on a standard set of criteria, weighting of which is agreed upon by the staff member concerned and his/her supervisor. This is used as the basis for the appraisal at the end of the year which is then discussed again with the Director General to ensure uniformity between the divisions. The Institute notes the Panel's concern and will keep it under close review to eliminate inconsistencies and enhance objectivity. In staff evaluations, increased attention will be given to training needs and career development concerns.

Recommendation 26

The Panel recommends that IITA rescind the "11-year rule", limiting the tenure of scientists at IITA and delete it from the personnel policies applicable to internationally recruited staff.

Response

As noted in the EPMR report, the fixed-term policy was established at the recommendation of the last EPMR. In this policy, it is noted that extension beyond 11

years requires an in-depth review of staff members' performance and approval by the Board. IITA will revise its policy to ensure that the 11-year clause will not be a deterrent to international staff employment.

Recommendation 27

The Panel recommends that the Personnel Policies and Procedures Manual for Internationally Recruited Staff include the Institute's Salary Structure for all classes of internationally recruited posts, indicating the pay ranges, incremental steps and criteria for the placement of staff at each level.

Response

The Institute fully accepts the panel's concerns that it should provide clarity with respect to its salary structure and the criteria for changes. Classes of international staff are clearly defined in IITA's Personnel Policy Manual. The Institute's salary ranges for the various staff categories, as well as the range of increases to be applied in a given year, are annually approved by the Board of Trustees. This information will be made available to all internationally recruited staff. The Institute does not believe it is appropriate to publish these particular salary ranges in the Personnel Policy Manual. The salary ranges and the benefits of international staff are based on comparative studies done across the centers.

Recommendation 28

The Panel recommends that IITA prepare comprehensive and updated Personnel Policies and Procedures Manuals for nationally recruited staff at all field stations.

Response

IITA accepts the recommendation and steps have already been taken to implement it.

Recommendation 29

The Panel recommends that IITA appoint a professionally qualified, internationally recruited specialist in human resources management as Head of Human Resources, reporting to the Deputy Director General (Management).

Response

The Institute's experience with the management of human resources has certainly shown the complex character of this activity. It had recently decided that this responsibility would be carried out by the Deputy Director General (Management) with the assistance of the Office of the Director General. The Institute has considered the concerns highlighted in the Panel's report and concludes that new arrangements will indeed be needed. These

concerns are mainly based on interpersonal communications problems. At this stage, IITA is not yet convinced that the concerns expressed by the Panel would best be addressed through the appointment of a Head of Human Resources per se. The Institute will undertake in the coming months a consultative process with the staff associations in order to determine precisely how to overcome the shortcomings in the most efficacious way.

Recommendation 31

The Panel recommends that a Publications Policy for IITA be established, and that an Advisory Committee monitor its implementation.

Response

The Institute accepts this recommendation and will look into implementing it in a way that best reflects the needs, after Information Services has been integrated into the International Cooperation Division. (See also recommendation 21.)

Recommendation 32

The Panel recommends that a comprehensive review of Information Services be undertaken as soon as possible.

Response

A comprehensive review of Information Services was carried out in 1992. In the proposed merger with the International Cooperation Division, the Institute intends to further review the various responsibilities of Information Services.

Recommendation 33

The Panel recommends that IITA maintain an effective capacity in social science research and recruit to fill the positions approved in the Medium-Term Plan as soon as possible.

Response

IITA agrees in principle and will strive to attain the staffing level specified in the MTP. Whether this constitutes an "effective" capacity is a debatable issue, that will be addressed again in the preparation of the next Medium-Term Plan.

Recommendation 34

The Panel recommends that IITA decide on the appropriate approach to impact assessment and identify specific areas/topics on which work should initially be concentrated.

Response

IITA agrees and already has advertised for a person with qualifications and experience in this area.

Recommendation 35

The Panel recommends that IITA appoint a short-term consultant for gender issues on a periodic basis to help sensitize/train/advise IITA research scientists in gender-related methodologies in order that gender concern is institutionalized.

Response

IITA is in agreement with the need to institutionalize gender issues in research planning and implementation. It considers that short-term consultancies on a periodic basis would be one means of institutionalizing gender issues. However, there are alternatives and IITA would like to retain flexibility.

Prof. Eduardo Venezian Leigh
Dean, Faculty of Agriculture
Pontificia Universidad Catolica de Chile

Casilla 6177, Santiago
Chile
Telephone: (56-2) 5522375

Dr. Donald Winkelmann
Chair
Technical Advisory Committee
Consultative Group on International Agricultural Research
1050 Mansion Ridge Road
Santa Fé, New Mexico 87501, USA

Mr. Alexander von der Osten
Executive Secretary
Consultative Group on International Agricultural Research
The World Bank
1818 H. Street, N.W.
Washington, DC 20433, USA

29 April 1995

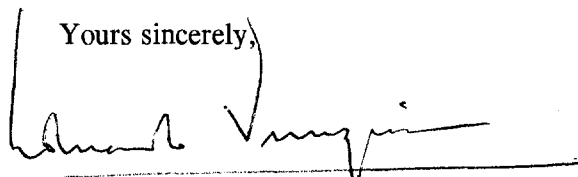
Dear Dr. Winkelmann and Mr. von der Osten,

It is with pleasure that I transmit to you the Report of the Fourth External Programme and Management Review Panel which was appointed to evaluate the accomplishments and prospects for the International Institute of Tropical Agriculture (IITA). The Panel has reviewed, as requested, both the programme and management aspects of IITA's work.

The Panel has been fortunate in receiving help and support from many sources. We are grateful to IITA's Board, management and staff for giving us every assistance and enabling us to carry out our task smoothly and agreeably. We would like to thank the government officials and agricultural scientists who shared with us, in many parts of Africa, their perceptions of IITA and its activities. This is particularly true for those who extended their courtesies and kindness during the Panel's visits to Nigeria, Benin, Ghana, Côte d'Ivoire, Cameroon, Kenya and Uganda.

I would like to thank you for assembling an able and experienced team for the challenging task of conducting this Review. The Panel has worked remarkably well together, with dedication and commitment to the task. On behalf of myself and the Panel, I would like to express our sincere appreciation for the excellent assistance and contributions made by Bill Carlson, Panel Consultant, and by the resource persons assigned to the IITA external review team: Amir Kassam (Panel Secretary), from the TAC Secretariat, and Pammi Sachdeva (Management Specialist), from the World Bank/CGIAR Secretariat.

Yours sincerely,



Eduardo Venezian, Chair
External Review Panel

CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE AND CGIAR SECRETARIAT

REPORT OF THE
FOURTH EXTERNAL PROGRAMME AND MANAGEMENT REVIEW
OF THE INTERNATIONAL INSTITUTE OF TROPICAL AGRICULTURE
(IITA)

Panel: Eduardo Venezian (Chair)
Charles Cambridge
Graham Jenkins
Samuel Jutzi
Henri Maraite
David Norman
William Wapakala

William Carlson (Consultant)

Paramjit Sachdeva (CGIAR Secretariat)
Amir Kassam (TAC Secretariat)

TAC SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

April 1995

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PREFACE

This is the Report of the External Review Panel appointed to review the programme and management of the International Institute of Tropical Agriculture (IITA). The Panel members and their backgrounds are listed in Appendix I.

The detailed Terms of Reference for this Fourth External Programme and Management Review of IITA (main phase in April 1995) are shown in Appendix II. The Panel's approach to the Review has been open, participatory, and forward-looking. In conducting the Review, the Panel has followed the general guidelines for the CGIAR review process.

The information on which the Panel based its assessments and conclusions was gathered in a number of ways. The Panel spent a week at IITA from 26 November to 1 December 1994 and three weeks in April 1995, in each case interviewing and meeting with the management and many members of the staff and some spouses. During the first visit the Panel received presentations from management and staff and interacted with the Board. During the main phase, the Panel received further presentations, and held informal briefing sessions with management on several occasions. The Panel Consultant on governance and finance visited IITA from 24 November to 4 December 1994, at which time all the Trustees were interviewed individually.

In groups or individually, the Panel members visited agricultural scientists, government officials and others knowledgeable about IITA's activities in Nigeria, Benin, Ghana, Côte d'Ivoire, Cameroon, Kenya and Uganda. The panel members also met with, in various locations, representatives of ICRAF, WARDA, CIP, ICIPE, ICRISAT, CIMMYT, ILRI and CIAT. A list of institutions and persons visited is shown in Appendix III.

In addition to the above country field visits, the Panel gathered information through several ways: a questionnaire sent to a wide cross-section of agricultural scientists, administrators and policy makers in countries of sub-Saharan Africa (the results are summarized in Appendix IV); responses to a letter sent to other CGIAR Centres, international organizations and advanced institutions collaborating with IITA; a survey of IITA international and national staff asking their views on programme and management issues; responses to a letter sent to all CGIAR members and regional representatives and discussions with agricultural scientists familiar with IITA in some industrialized countries. Finally, the Panel had access to a large array of documents and data made available by IITA. Additional documents were provided by the TAC and CGIAR Secretariats. A list of documents made available to the Panel is shown in Appendix V.

Altogether, we believe we were able to obtain sufficient information to enable us to respond with confidence to our terms of reference. We certainly do not claim to be fully informed on every aspect of IITA's work and circumstances. But we consider that we have sound evidence on which to base the analysis, conclusions and recommendations presented in this Report. We hope that the Report will be useful to TAC, to the CGIAR, and most of all to IITA itself.

SUMMARY AND RECOMMENDATIONS

IITA has made remarkable changes over the past five years. The Review Panel has found the Centre noticeably stronger both scientifically and managerially than it was at the time of the 1990 External Review. We believe IITA is now well positioned to catalyze further agricultural research in sub-Saharan Africa in its mandated responsibility.

The Panel summarizes, hereunder, its main findings and recommendations which confirm IITA's performance and achievements and which could help to chart the Centre's strategic role in the region's future development.

Recent Evolution

The last External Review was conducted when the Centre was just in the second year of its 1989-93 Medium-Term Plan. In many respects the Institute was still in transition - it was the Centre's first MTP after it had formulated its 1989-2000 Strategic Plan. As can be seen in this Report, the Panel considers that, taken together, the recommendations of the last External Review were far-reaching, particularly since they further encouraged IITA's continuing efforts towards a leaner operating structure, greater organizational cohesiveness and further decentralization.

We have been impressed by the dedication and energy with which the Board, management and staff of IITA have responded to the recommendations of the last External Review. Although the results of some of the changes have not yet been fully realized, the Panel notes the considerable progress achieved. The Panel considers that IITA has benefitted significantly from these changes, which have been "incrementally" introduced.

Programmes

IITA currently has three research divisions: the Crop Improvement Division (CID), the Plant Health Management Division (PHMD) and the Resource and Crop Management Division (RCMD). For some of the mandate crops handled by CID, emphasis is shifting from the Humid Forest to the Moist Savanna Zone, notably in the case of cassava, maize and yam, because the crops are in reality moving in that direction and the potential for maize production, in particular, is greater in the moist savanna. The Panel is generally supportive of this shift in focus. However, the Panel believes that the scale of CID activity in the Humid Forest Zone is less than optimal, particularly in relation to cassava in Central Africa. The situation needs to be reviewed to see how this effort may be increased. The banana/plantain work is justifiably considered to be one of the conspicuous successes of IITA, displaying a good mix of innovative science and practical achievement. The Panel confidently expects that further advances will be made on the sound basis already established. Cowpea is pre-eminently a crop of the drier savanna, but some attention has been given to meeting the requirements listed in the MTP for the more humid cultivation zones. The Panel has drawn attention to its view that soybean is, at the present time, an under-researched crop at IITA.

The structural changes which have taken place in PHMD are viewed very positively by the Panel. There is now better communication among scientists sharing a common discipline and an improved awareness of the advantages of interdivisional collaboration. At the Divisional headquarters in Cotonou, Benin, the cohesion and team spirit are very encouraging. PHMD has also retained sufficient flexibility to cope with unpredictable but urgent pest problems as they have arisen. The Division has a good balance of disciplines, except for a deficiency in phytopathology. As a centre of excellence for the development of IPM strategies for Africa, IITA is well placed, through the work in PHMD, to respond to future threats from pests and diseases to the food supply of resource-poor farmers.

It is disappointing to record that the period of review was not a happy one for the broad sweep of IITA's work now contained within the RCMD. Because of the complex nature of this activity, the demonstration of a tangible and transferrable product will always be more difficult. Problems of sustainability are addressed more evidently in this Division than in CID and PHMD, but the degree to which success can be attained is more constrained by political and macro-economic factors. In the recent past, the work of RCMD has clearly suffered from problems of leadership, high turnover of key staff and ensuing demoralization. Happily, the new leadership is instilling a spirit of teamwork and is formulating revised research programmes better suited to IITA's mandate.

The International Cooperation Division (ICD) is responsible for strengthening collaborative research and training activities between IITA and NARS. The Panel recognizes that the Institute's role in this area will remain important in the future and foresees a stronger institutional role for ICD both within IITA and with its external collaborators.

Governance and Management

IITA today is a significantly different institution - in many ways a reconstituted one - in terms of governance, structure, management style and research leadership.

The BoT is composed of well-qualified Trustees who are committed to the Institute and its mission. They have developed a sound structure of committees, and the goodwill, trust and mutual respect that currently exists between the BOT and management in IITA can be expected to provide a sound basis for working out any adjustments that may be needed in the future.

The Panel is impressed with the dynamic leadership and commitment shown by the Director General (DG). His informal and straightforward manner and approachability on research-related issues make him a popular research leader both with the BoT of IITA and with the scientists. The Panel saw considerable evidence of a culture of collegiality, of consultative processes and of bottom-up flows of ideas, fostered by the DG. IITA staff who met the Panel during the review process were appreciative of these changes and the DG deserves special recognition for the progress IITA has continued to make in implementing a difficult mandate in a complex institutional environment.

Most of the scientists at IITA are content with the new divisional groupings. There is much merit in grouping similar disciplines together, provided an effective "matrix" ensures interdisciplinary collaboration and an agroecological focus. At present, such collaboration at IITA is patchy and is not assisted by the geographical separation of the heads of the three Divisions. For this reason, the informal working groups which have been established in a "bottom-up" manner are to be commended, that for *Striga* research being particularly noteworthy. The evolution of a system which fosters interdisciplinary research within the Centre is probably the greatest challenge in scientific management facing IITA over the next five years.

We have found IITA to be committed to the planned introduction of a project-based research management system. While we have recommended several measures for improving the recent initiatives, we have no reservations about the general thrust of the changes that have taken place or are planned in research management.

Despite the funding cuts over the past few years, IITA has further decentralized its operations and has made considerable progress in establishing stations in the Cameroon, Côte d'Ivoire and Uganda. Whereas the Centre has invested substantial effort in implementing its decentralization policy, the Panel believes that it must also strengthen its capacity in human resources management to meet the needs of its remarkably heterogeneous staff communities in different countries, particularly if it is to attract and retain quality international and national staff and realize their full potential. The Panel has made several proposals in this regard in order to improve further the Institutes' participatory culture and to ease the stress that can emanate from working and living within IITA's "artificial" campus environments.

Quality and Achievements

IITA has an extremely broad remit for much of its work and has to cope with the immense practical problems of deficient agricultural production in the region. The quality of scientific work at IITA is uneven, as might be expected in a wide-ranging research programme, but is mostly sound. Some activities, e.g. banana/plantain improvement, *Striga* research, and IPM strategies, are breaking new scientific ground and making a very practical contribution. The Panel concludes that, in general, IITA is well served by its research scientists and their support units, who are committed to make an impact, and it commends them for their dedication.

Historically, IITA has achieved its most conspicuous successes in two principal areas: biological control of major insect pests and genetic improvement of key crops in its mandate. These have resulted in the distribution throughout the region of planting material with better disease and pest resistance, improved yield potential with greater stability of performance over diverse environments, and better quality of products for the end user.

The Panel is pleased to note the considerable and significant research contributions made by IITA since the last external review, and the demonstrated impact that IITA has had in some areas of its mandated responsibility. We note in particular IITA's recent success in banana research for which it received the King Baudouin Award

in 1994. The Panel is also pleased to note that IITA is very well regarded by the research community in Africa, especially with regard to its germplasm collections, its plant health management activities, and its leadership role in the emerging ecoregional initiatives.

Future of IITA

The Panel has concluded that IITA's relevance to agricultural development in Africa remains as valid today as it was when it was created in 1967. The Institute has a strategic, critical role in international agricultural research for its mandated crops and agroecological regions. IITA's research agenda reflects a balance between activities aiming at immediate and medium-term productivity gains, including postharvest research, and long-term sustainability of the agricultural resource base used for production. The Centre is aware that although it can play an important role in addressing issues of food security and sustainability, it is not the only actor. To be fully effective and to maximize its multiplier effect, it is critically important that IITA continues to strengthen its collaboration and strategic partnerships with NARS, and increasingly with NGOs and the emerging private sector, as well as with other IARCs and advanced research institutions. This is particularly important given IITA's primary focus on the small family farm which is so dominant in sub-Saharan Africa, and is necessary for addressing the twin issues of sustainable production and equity simultaneously.

IITA is likely to continue to operate in an environment where the general economic development prospects in the immediate and longer-term future are not very encouraging. This means that the non-agricultural sector would continue to be unable to provide gainful employment for the rapidly rising population. Thus, in the meantime, the onus will be on the agricultural sector to be one of the main contributors to economic growth, while national economies diversify and regional markets grow. In the coming years, as agriculture in the region begins to change, from the present "rough and ready" subsistence operation, towards more market-driven enterprise, IITA will face increasingly multifaceted challenges and opportunities arising from a mix of production expansion and intensification and related socioeconomic environments. The Panel considers the Centre to be well positioned to address, in collaboration with NARS and others, the future needs for improved technologies and knowledge to sustain the inevitable developmental change envisaged in agriculture and the rural space.

The CGIAR investment in IITA constitutes a unique asset for the peoples of sub-Saharan Africa. Given IITA's track record of scientific achievements and its unique position in the international agricultural research community, the Panel believes that IITA will continue to play a critical, strategic role in addressing the growing challenge of food security and sustainability as land-use expansion and intensification accelerates. IITA's "heyday" lies in the future and we believe that the Institute does not intend to be complacent as it moves forward into the next century - a century which will see Africa's population increase some fivefold before reaching a stable "plateau". Continued support for IITA's work would therefore be a wise policy for all those interested in the Institute's mandate areas and future achievements and impact.

LIST OF RECOMMENDATIONS

Grain Legume Improvement Programme (Section 2.1.1.)

1. The Panel recommends that a rigorous review of all aspects of work on cowpea improvement at IITA be undertaken in 1998, with the participation of an external assessor(s), to determine whether the current lines of work will then have shown sufficient progress to justify their continuation.
2. The Panel recommends that IITA increase its effort on producing improved soybean germplasm for the moist savanna and mid-altitude areas of sub-Saharan Africa, either by redeployment of existing resource or by seeking additional resource.

Root and Tuber Improvement Programme (Sections 2.1.2.)

3. The Panel recommends that IITA review the scale of its activity in cassava improvement in the Humid Forest Zone, particularly with respect to Central Africa and formulate a proposal to enhance the uptake of its technology by the national programmes for cassava improvement in this region.
4. The Panel recommends that IITA maintain its work on yam improvement at the current level while seeking every opportunity to devolve more of the applied work progressively to the NARS, possibly by subcontracting.

Maize Improvement Programme (Section 2.1.4.)

5. The Panel recommends that IITA, in its continuing reorganization of the Maize Improvement Programme, seek ways of devolving more of its work on genetic improvement of maize to NARS in the region.

Biological Control Programme (Section 2.2.2.)

6. The Panel recommends that IITA secure the continuity of staffing of the Biosystematic Unit by maintaining its core funding.

Host Plant Resistance and Habitat Management Programmes (Section 2.2.3.)

7. The Panel recommends that appropriate measures be taken to ensure that the data on characterisation of the pest and patho-agroecosystems are kept in a form that is readily accessible to future generations of scientists.
8. The Panel recommends that IITA increase its strength in phytopathology at Ibadan.

Resource and Crop Management Research (Section 2.3.)

9. The Panel recommends that IITA emphasize the establishment of strategic institutional research alliances (such as consortia) to address adequately the complexity of sustainable resource management research.
10. The Panel recommends that the Resource and Crop Management Division core efforts be concentrated on the comprehensive attention to one benchmark area each for the Moist Savanna and Humid Forest Programmes.
11. The Panel recommends that the Resource and Crop Management Division apply rigorous priority setting to its research portfolio in order to concentrate efforts on research areas of highest possible impact.
12. The Panel recommends that Resource and Crop Management Division put greater emphasis on on-farm research in its programme.

Support Services (Section 2.5.)

13. The Panel recommends that IITA conclude an agreement with CIMMYT to ensure that the collection and conservation of African maize germplasm is undertaken.
14. The Panel recommends that IITA strengthen the capacity and increase the authority of the Seed Health Unit in matters relating to the movement of germplasm by the Centre.

International Cooperation (Sections 3.2. and 3.4.)

15. The Panel recommends that IITA review its policies and strategies relating to networks to ensure that these are adequately integrated with, and receive support from, the Centre's research and training programmes.
16. The Panel recommends that the International Cooperation Division undertake a review of its priorities, strategies and activities, in order to respond effectively to the emerging opportunities for increased partnership with NARS and other collaborators.

Management of the Board (Section 4.1.4.)

17. The Panel recommends that IITA Board develop and implement a more systematic and structured process for evaluating the Director General's performance and use the results for making future BoT decisions on Director General contract terms and conditions.

Research Policy and Programme Oversight (Section 4.1.6.)

18. The Panel recommends that the Programme Committee utilize more proactive and participatory methods in determining research strategies and review policies, including those for internally managed external reviews, to enable the BoT to provide effective oversight of the scope and quality of the research programmes of IITA.

Management Policy and Operations Oversight (Section 4.1.7.)

19. The Panel recommends that the Terms of Reference of the Audit Committee (AC) include oversight responsibility for management systems, personnel policies and administrative procedures. The AC should also provide guidance for undertaking internally managed external reviews in these areas as appropriate.

Structure of Scientific Leadership (Section 4.2.4.)

20. The Panel recommends that the Director General re-examine with the IITA Board, the appointment of a Deputy Director General (Research) to ensure that top research leadership can be provided in a continuous and sustained manner without distorting relationships in management structure.

Structure of International Cooperation (Section 4.2.5.)

21. The Panel recommends that the head of international cooperation should continue to be appointed at the Deputy Director General level and have additional responsibilities including information services.

Research Management (Section 4.3.)

22. The Panel recommends that IITA develop an integrated project-based planning, resource allocation and implementation system in the next few years and pilot test it in selected areas before extending its coverage to the entire research programme and to research-related activities.
23. The Panel recommends that IITA further develop its priority-setting methodology and processes for routine screening of new projects, including *ex-ante* impact assessment, irrespective of their funding source. It should also ensure compatibility with the formal strategic planning process of IITA.
24. The Panel recommends that IITA establish a formal and transparent system for ensuring that NARS are routinely consulted in planning the Centre's annual research programme and research-related activities.

Management of Human Resources (Section 5.1.)

25. The Panel recommends that IITA take steps to improve the uniformity, transparency and due process of the current Performance Evaluation System.
26. The Panel recommends that the IITA rescind the "11 year rule", limiting the tenure of scientists at IITA, and delete it from the personnel policies applicable to internationally recruited staff.
27. The Panel recommends that the Personnel Policies and Procedures Manual for Internationally Recruited Staff include the Institute's Salary Structure for all classes of internationally recruited posts including the pay ranges, incremental steps and criteria for the placement of staff at each level.
28. The Panel recommends that IITA prepare comprehensive and updated Personnel Policy and Procedures Manuals for nationally recruited staff at all field stations.
29. The Panel recommends that IITA appoint a professionally qualified, internationally- recruited specialist in human resource management as Head of Human Resources, reporting to the Deputy Director General (Management).

Integrated Planning and Budgeting (Section 5.2.4.)

30. The Panel recommends that IITA develop an integrated programme/project planning, budgeting and financial reporting system to support the transition to project-based research management.

Information Services (Section 5.3.1.)

31. The Panel recommends that a Publications Policy for IITA be established, and that an Advisory Committee monitor its implementation.
32. The Panel recommends that a comprehensive review of Information Services be conducted as soon as possible.

Socioeconomics (Section 7.1.)

33. The Panel recommends that IITA maintain an effective capacity in social science research and recruit to fill the positions approved in the Medium-Term Plan as soon as possible.

Impact Assessment (Section 7.2.)

34. The Panel recommends that IITA decide on the appropriate approach to impact assessment and identify specific areas/topics on which work should initially be concentrated.

Gender (Section 7.3.)

35. The Panel recommends that IITA appoint a short-term consultant for gender issues on a periodic basis to help sensitize/train/advise IITA research scientists in gender-related methodologies in order that gender concern is institutionalized.

CHAPTER 1 - BACKGROUND AND CONTEXT

1.1. Challenge of Food Security and Sustainability in Tropical Sub-Saharan Africa

Any cursory look at the biophysical and socioeconomic data for sub-Saharan Africa immediately gives rise to two fundamental conclusions. The first is the degree of heterogeneity that exists in the region in terms of resource endowment (climate, soils, population, etc.), institutional and infrastructural development, political stability and maturity, and commitment to development (including agricultural and rural development). The second is that, in terms of some human development indicators and almost any economic development indicator, SSA as a whole is continuing to deteriorate. Of course, given the diversity in SSA there are promising signs of progress in agricultural and economic development in a few countries, but in general the immediate and longer-term prospects are not encouraging.

Together with people in South Asia, people in SSA remain the poorest in the world. Unfortunately, in contrast to some progress in South Asia, the proportion living in poverty in SSA continues to increase. In fact, according to the World Bank, the number living in poverty increased almost 1.5% per annum between 1985-92. Although in recent years there have been modest increases in gross domestic product (GDP), partly as a result of structural adjustment policies being implemented by many countries, including currency devaluation, the result in *per caput* terms has been negative (because of continuing high population growth rates in excess of 3%). Between 1989-92, 23 out of 43 countries experienced negative *per caput* growth rates and only five countries had *per caput* growth rates of more than 2%.

The continuing inability of the non-agricultural sector to provide gainful employment for the rapidly rising population of SSA means the proportion of the population living in rural areas is still very high and on a par with that in South Asia (i.e. 72% compared with 75%). However, there the similarity ends. The success of the Green Revolution in many parts of Asia contrasts with the much poorer performance of agriculture in SSA. All indicators of improved productivity (e.g. crop yields, use of fertilizer, percentage of land irrigated) compare unfavourably. As a result, food production per caput in SSA continues to show a declining trend while food self-sufficiency ratios are low. The continuing lack of success of agriculture has contributed to an average income per caput that in SSA is only about 67% of that in South Asia.

Because of the high population growth rates and the lack of absorptive capacity in the non-agricultural sector, the total size of the rural population will increase by over 80% between 1980 and 2010, although the proportion of the population living in rural areas will continue declining.¹ The rapid increases in the rural population dependent on agriculture, combined with a lack of adoption of improved technologies, helped to make

¹ This situation is somewhat paradoxical in the sense that, partly because of the lack of success in developing agriculture, a disproportionate share of the younger able-bodied population is likely to migrate to the urban areas, thereby increasing the relative shortage of labour in rural areas.

SSA the region of the world with the highest annual rate of deforestation between 1980 and 1990.

Efforts in expanding food and other biological production are increasingly resulting in intensification of land use. With reference to this there is obviously potential for greater use of irrigation. However, it is also apparent that most farmers will have to continue relying on rainfed agriculture, including the hydromorphic inland valleys. Although the output per unit of land in rainfed agriculture sometimes increases in the short term, indicators of environmental and resource base degradation have also manifested themselves through deforestation and consequent loss of organic matter, nutrient depletion, greater weed infestation and increased soil erosion as a result of increasingly shorter fallows. Food "security" in the short term must not be achieved at the expense of food security in the long term.

Thus, issues relating to both food security and sustainability are becoming increasingly important. Using the projected fertility levels, the World Bank estimates that by the year 2020 the food gap (i.e. the difference between food requirement and food production) would amount to an annual deficit of 243 million tonnes if food production increases at 2% per year. If food production increases at 4% per year, an annual surplus of 49 million tonnes would be produced. However, based on past performance, increases at the latter rate are unlikely. Thus, problems of attaining food security and sustainability will become increasingly serious unless population growth is reduced substantially and the non-agricultural sector develops rapidly and generates significant foreign exchange earnings to permit substantial imports of food - also unlikely developments.

Although expansion of the non-agricultural sector and the associated agroindustrial and agrobusiness activities, is critically important in the economic development process, in the meantime, the onus will continue to be on the agricultural sector as one of the main contributors to economic growth, as national economies diversify and regional markets grow. Relevant improved technologies and policies provide the ingredients necessary for the agricultural sector to contribute effectively to national development. However, many other factors such as infrastructure, delivery (including extension) and marketing institutions together with political commitment and support, determine how well those ingredients are used and exploited.

1.2. Origin and Evolution of IITA

The justification for establishing the International Institute of Tropical Agriculture (IITA) in 1967 (and its sister Institute, the Centro Internacional de Agricultura Tropical - CIAT in Cali, Colombia) and later incorporating it in the Consultative Group on International Agricultural Research (CGIAR) System, was based on the following rationale.

In the tropical and subtropical areas of the world, food production was barely keeping pace with population growth, and in tropical SSA, annual *per caput* food production was actually declining. Hunger and malnutrition were recurrent problems, in particular during the African dry season against the background of a population which was mainly rural, poor, and growing rapidly in size. To alleviate hunger, reduce poverty, generate income for the small-holder farmers, and engender general economic growth, food production needed to increase at an unprecedented rate.

IITA was officially established under a Federal decree on 24 July 1967 in Ibadan, where the Nigerian government had donated a 1,000 hectare piece of land for the Institute, as an autonomous, non-profit corporation, to address the above challenges. Ford and Rockefeller Foundations were mainly responsible for the planning and original funding of IITA. Research work started in 1970 and in 1971, when the CGIAR was created, IITA became one of the four centres of the CGIAR System together with the International Rice Research Institute (IRRI), the Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) and CIAT.

The original mandate of the Institute was aimed at sustainable alternatives to shifting cultivation in the lowland humid tropics in Africa, and was based on the improvement of a basket of crops. In 1974, the Centre was working on a wide variety of legumes: cowpea, soybean, lima bean, African yam bean and velvet bean. Research on root and tuber crops covered cassava, yam, sweet potato and cocoyam and that on cereals: maize and rice. In addition work had been initiated on banana and plantain, vegetables, forage legumes and grasses, and multipurpose trees. According to the IITA 1971 Annual Report, the lowland humid tropics was interpreted as follows:

The environment of the total agricultural system of concern to IITA is the humid tropics at less than 600 meter elevation between 23°27'N or S of the equator and in which evaporation is less than precipitation for at least six months of the year.

The farming systems programme interpreted its objectives as follows:

The farming systems programme's broad objective is to provide adequate food of good quality, fibre, housing and living standards at the highest level compatible with the resources available and the competing objectives for the people of the environment.

Thus, unlike IRRI and CIMMYT which had been established with only commodity improvement mandates, IITA (and CIAT) had a mixed mandate that included a responsibility for commodity improvement as well as for the development of production systems for the lowland humid tropics. This mixed and "broad" mandate, interpreted as described above, proved far too complex and difficult to implement smoothly for several reasons:

- The mandated crops were not confined to the production systems of the humid tropics in Africa, but were also important food crops in the humid tropics of other developing regions of the world.
- Crops such as maize, sweet potato, cassava and banana/plantain were not confined to the lowland tropics, but were also important crops in the higher altitude areas.
- With some crops such as rice, maize and cassava, IITA's crop improvement mandate overlapped with those of other CGIAR centres; i.e. IRRI, CIMMYT and CIAT, which had crop improvement mandates for rice, maize and cassava, respectively.
- A number of the mandate crops such as cowpea, maize, sweet potato and cassava were also grown in the lowland subhumid and semi-arid areas of SSA, and were not confined to the production systems of the lowland humid tropics as defined by IITA above.
- Some mandate crops such as cowpea were mainly produced in the semi-arid areas of West Africa and maize, soybean and cowpea, as grain crops, had a much higher agronomic potential outside the lowland humid tropics.
- Other mandate crops such as yams were important mainly in West Africa, with most of the production located in Nigeria.

In 1992, the Institute celebrated its 25th anniversary. During its 25 years, IITA saw its mandate modified, partly as a result of the recommendations of the external reviews, to achieve greater cohesiveness and focus. The main modification of the commodity mandate was the reduction of the commodity portfolio first to eight crops (i.e. maize, rice, cowpea, soybean, cassava, sweet potato, yam and banana/plantain), and then to six (i.e. maize, cowpea, soybean, cassava, yam and banana/plantain). Responsibilities for sweet potato were transferred to CIP in 1987, and for rice to WARDA in 1990.

As the Institute approached its 20th anniversary in 1987, it developed its first Strategic Plan which was adopted by its Board in 1988. From IITA's long and complex formal mandate, the Board of Trustees distilled the following four operational programme objectives:

- "To develop systems of management and conservation of natural resources for sustainable agriculture in the humid and subhumid tropical zones."
- "To increase the performance of selected food crops that can be integrated into improved and sustainable production systems."
- "To strengthen national agricultural research capabilities in order to accelerate the generation and utilization of improved technologies by means of training, information and other outreach activities."

- "To improve the quality characteristics and postharvest technologies in order to realize the more complete utilization of food crops within IITA's mandate."

In addition to IITA's interests in the humid and subhumid tropics of SSA, the Institute is involved in crop improvement work related to cowpea, maize and cassava in the "moist" parts of the semi-arid zone (i.e. parts of the northern Guinea savanna and the Sudan savanna) for which the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has a primary responsibility for production systems and natural resource management research. IITA has maintained that its interest in the semi-arid areas arises only from a commodity viewpoint.

The Strategic Plan called for a reduction in geographical coverage, to West and Central Africa, of its primary emphasis on improving farming systems of lowland humid and subhumid tropics. This limitation did not apply to its Africa-wide commodity improvement work except for maize. Also, in addition to targeting the upland agroecosystems in the humid and moist savanna zones, the inland valleys in those zones remained an explicit target agroecosystem both because of the Institute's production systems mandate and because at that time rice was a mandate crop of the Institute.

1.3. Current Mandate and the Role of IITA

1.3.1. IITA's Operational Mandate

IITA's founding mandate embraced agroecological and regional concerns as well as crop improvement concerns. While the mandate has been modified several times during the past 25 years, it has retained its basic characteristics which are: the promotion of the development of sustainable production systems through improved resource management, by devoting special attention to problems of environmental degradation and by developing more productive, stress-resistant varieties of the region's key crops. IITA's research mandate therefore refers to genetic improvement of maize, cowpea, soybean, cassava, yam and banana/plantain, to plant health management and to the development of systems for the sustainable use and management of natural resources in subhumid and humid African agriculture.

To reflect growing global concerns over food self-reliance, food security, equity and sustainability within the sub-Saharan region and in response to the revised CGIAR mission statement in 1990, the IITA Board of Trustees updated the Institute's mandate as stated in its current mission statement:

IITA aims to improve the nutritional status and well-being of low-income people in the humid and subhumid zones of sub-Saharan Africa by carrying out research and related activities for increasing agricultural production in a sustainable manner, in cooperation with national and international systems and institutions.

For the period 1994-1998 of the current Medium-Term Plan (MTP), the Strategic Plan was revised in 1993 to include a gradual expansion of IITA's geographical coverage into the humid and subhumid tropical areas of East and Southern Africa. Initial expansion is envisaged through an extension of the commodity improvement work on cassava and banana/plantain, to be followed later by production systems work as resources become available. Also, IITA no longer considers the inland valley agroecosystem to be a separate target agroecosystem and has oriented its research programme activities towards the Humid Forest Zone with a focus on West and Central Africa, the Moist Savanna Zone with a focus on West Africa, and the Mid-altitude Savanna with a focus on East and Southern Africa. This is complemented and supported by activities across agroecosystem.

In October 1993, IITA was designated as a convening centre for the CGIAR ecoregional programme for humid and subhumid SSA. The Institute is currently involved with potential partners in designing suitable initiatives for the ecoregional programme and has initially proposed work in three agroecosystems: the humid forest and the moist savanna to be coordinated by IITA, and the inland valleys, to be coordinated by the West Africa Rice Development Association (WARDA). Also, IITA was recently designated as the convening centre to facilitate the development of a Systemwide initiative in integrated pest management (IPM) through inter-centre collaboration.

1.3.2. Role and Relevance of IITA

The role of IITA in sub-Saharan Africa is defined in general terms by the Institute's mission statement given earlier. The corresponding research agenda is made to reflect a balance between activities aiming at immediate and medium-term productivity gains, including postharvest research and at ensuring long-term sustainability of the resource base used for such production. In directing these research and related activities, account is also to be taken of the need for food self-reliance and equity in order for IITA to contribute to poverty alleviation and economic development within the mandate area. The Panel concurs with this general definition of IITA's role in the mandate region.

The Panel notes that IITA's crop research mandate is broad. One consequence is that, in its role as an International Agricultural Research Centre (IARC), IITA relates to a correspondingly large array of partners, stakeholders and clients within and outside the region, ranging from National Agricultural Research Systems (NARS), other IARCs, other research institutions active in the same region, to non-governmental organizations (NGOs) and farmers.

The research-related activities mentioned in IITA's mission statement are those in training and information; these activities are essential for progress in research and contribute to the strengthening of the NARS's research capability. These are also activities for which IITA is receiving much recognition in the region. For a large proportion of the agricultural research community in SSA, in particular in West and Central Africa, IITA is performing the role of a scientific and professional reference base.

As mentioned earlier, IITA has been designated as the convening centre within the CGIAR for the development and oversight of an ecoregional programme for the warm humid and subhumid tropics in SSA. Ecoregional initiatives are designed to bring about a new quality of IARC-NARS interaction which crucially involves the design and use of well-structured innovative modes of consultation and collaboration. From the earlier conception of this relationship, as a process of transfer of technology, generated in a chain ranging from advanced research institutions and IARCs doing basic and applied research, over NARS performing adaptive research to extension and ultimately to the farmer, IITA is advocating a move to a new concept of collaboration in research. This new concept of IITA's role involves "the continuum that proceeds from the onset of the research process to its resolution" in which "national and international researchers and farmers are partners in a joint venture" where "collaboration achieves a collegial balance with effectively matched contributions at every stage" (IITA Annual Report 1993). Key features of this new approach to the definition of IITA's role in the region's agriculture are participatory modes of appraisal, priority setting, research implementation and technology testing. Distinctions between strategic, applied and adaptive research and extension and utilization phases are no longer as clear-cut as they were previously believed to be.

The Panel believes that this approach is the basis for the successful establishment of IITA's new role as an international ecoregional institution, with continental (cassava, soybean) and global (cowpea, yam, plantain/banana) commodity responsibilities as well as for the necessary integration of research on commodity improvement and resource sustainability.

The Panel further believes that while IITA can influence only part of the general development challenge, its contribution to the development of relevant improved technologies continues to be critically important. This continued relevance of IITA to the future development of SSA can be justified on the following grounds:

- The six crops included in the mandate of IITA, namely cassava, yam, maize, plantain/banana, cowpea and soybean¹ are, in addition to rice, millet, sorghum, groundnut, Phaseolus beans and sweet potato, which are under the mandates of WARDA, IRRI, ICRISAT, CIAT and the Centro Internacional de la Papa (CIP), the major food crops in SSA.
- The complexity of many of the problems in the humid and subhumid areas of SSA is likely to be beyond the expected capacity of the NARS to solve by themselves. In any case most of the NARS are becoming increasingly vulnerable to economic forces. According to the International Service for National Agricultural Research (ISNAR), although the number of researchers in NARS has expanded dramatically in recent years, with 36% still having B.Sc. degrees, the number of farmers per research worker has tripled during the last 30 years. Further, research expenditures as a percentage of agricultural GDP

1 Actually soybean is currently not a major dietary item of the rural population but is rapidly increasing in importance as a cash crop.

has decreased from a peak of 0.84% in 1981 to 0.55% in 1991. Relative support of the total research budget of NARS by external donors increased from 35% in 1986 to 43% in 1991 but this did not compensate for declining governmental funding and such high levels of international support are unlikely to be maintained.

- The consequence has been a reduction in operating expenses per researcher, resulting in their underemployment. Thus their effectiveness in technological development is in many countries being eroded. Consequently, it is increasingly unlikely that NARS will be in a position adequately to meet the agricultural research requirements even in adaptive and applied research, let alone at the strategic end of the research spectrum. Consequently, international agricultural research institutes such as IITA will increasingly have to take this undesirable trend into account.
- The commodity and regional mandate of IITA provides the Centre with the opportunity for facilitating scientific inter-country communication and material exchange, thereby potentially avoiding duplication of research effort and increasing the multiplier/payoff effect of research efforts.
- The agroecological mandate of IITA provides it with a unique opportunity to address sustainability issues through exploiting the biological relationships within farming systems. Given the budgetary crises in many NARS, it is likely that the limited research resources will have to continue focusing on productivity gains. However, in the long run, given the probability that governmental resources will continue to be limited, the only realistic way of incorporating sustainability issues will have to be through bringing about convergence between the short-term production needs of farmers (i.e. who understandably are concerned with maximizing profit, together with producing enough food to survive until the next production cycle) and the long-term sustainability of the farming system through exploiting the biological relationships within the systems. The need for strategic research to address sustainability issues under increasingly land-intensive farming systems is obvious and is something in which IITA has a comparative advantage.

A final point is in order. Although, as indicated above, IITA can continue to play an important role in addressing issues of food security and sustainability, it is not the only actor. To be fully effective and to maximize its multiplier effect, it must continue to collaborate with NARS and increasingly with NGOs and the emerging private sector, as well as with other IARCs and advanced institutions. This is particularly important given IITA's primary focus on the small family farm which is so dominant in SSA, and helps the issues of sustainable production and equity to be addressed simultaneously.¹ Institutions within national programmes can make particularly important contributions to production systems and management research, although given the current state of many of

¹ Following a meeting with NGO's in 1993 the Board Approved the establishment of a NGO liaison office

the NARS the Panel urges increased collaboration, rather than the immediate devolution of such activities to such institutions, as was recommended in a recent TAC review of CGIAR commitments in West Africa (McIntire and Ouayogode, 1994: p. 2).¹

1.4. IITA Today

The staff who carry out IITA's work are organized as shown in Figure 1.1. IITA operates three Research Divisions: Resource and Crop Management Division (RCMD), Crop Improvement Division (CID) and Plant Health Management Division (PHMD), each headed by a Divisional Director and an International Cooperation Division (ICD), headed until recently by a Deputy Director General (DDG), International Cooperation. These four Divisions are supported by the Management Division (MD), headed by a DDG (Management). Research at the institute level is managed by the Research Directors' Committee (RDC) comprising the Director General, the three Heads of the Research Divisions and the DDG (International Cooperation). Moreover, inter-divisional research groups exist for *Striga*, cowpea wide crosses and biotechnology; postharvest technology and multipurpose legumes.

1.4.1. IITA Headquarters and Other Main Locations

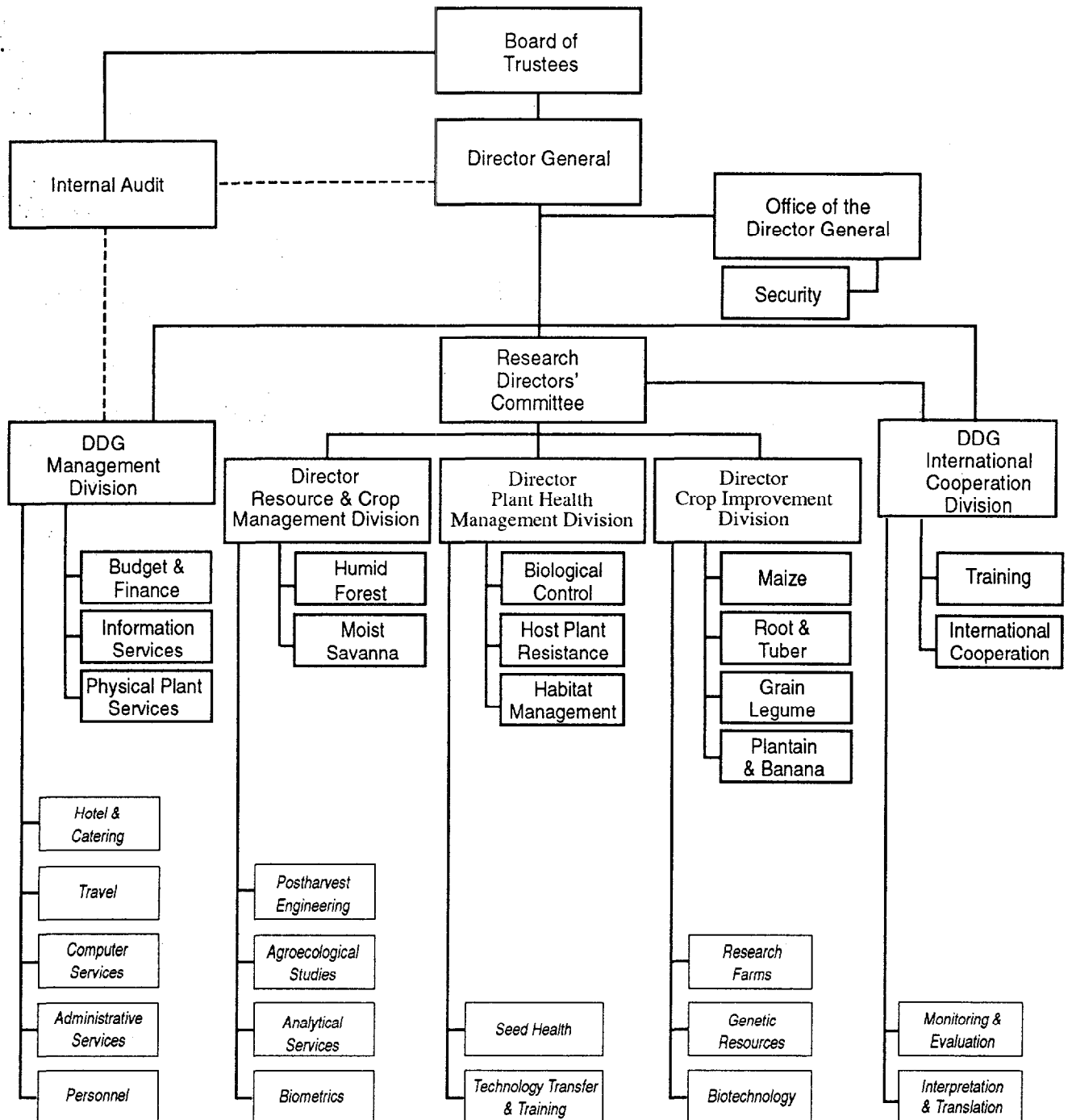
IITA has been implementing a policy to decentralize its operations in the region. IITA's operations are located in several countries in West, Central and East Africa (Figure 1.2.). IITA's Headquarters is located at Ibadan in the humid forest/derived savanna transition zone. Most of the Crop Improvement Division, the International Cooperation Division, the Management Division, the Moist Savanna Programme of the Resource and Crop Management Division, and the Host Plant Resistance Programme of PHMD are located at the Headquarters. During 1988, all biological pest control research, part of insect mass rearing and related training were transferred from Ibadan to Cotonou in Benin. Most members of the Plant Health Management Division and the Division's Director are now located at the Cotonou facility.

Since 1976, IITA has conducted research from the Onne station near Port Harcourt in Nigeria in the humid forest and coastal zone where plantain is a major food staple. After initial emphasis on plantain production systems, a breeding programme commenced in 1987. This initially focused on Black Sigatoka (BS) resistance with some related epidemiological research. As a result of major progress in developing BS-resistant hybrids, the breeding programme now addresses a wider remit for plantain improvement.

¹ Obviously, if increased funding could be provided for national programmes to shoulder such responsibilities effectively, then this would need re-evaluation. However, the mission recommended that savings resulting from such devolution should be allocated to other research activities in IITA (McIntire and Ouayogode 1994; p. 51)

Figure 1.1.

IITA Organization Chart



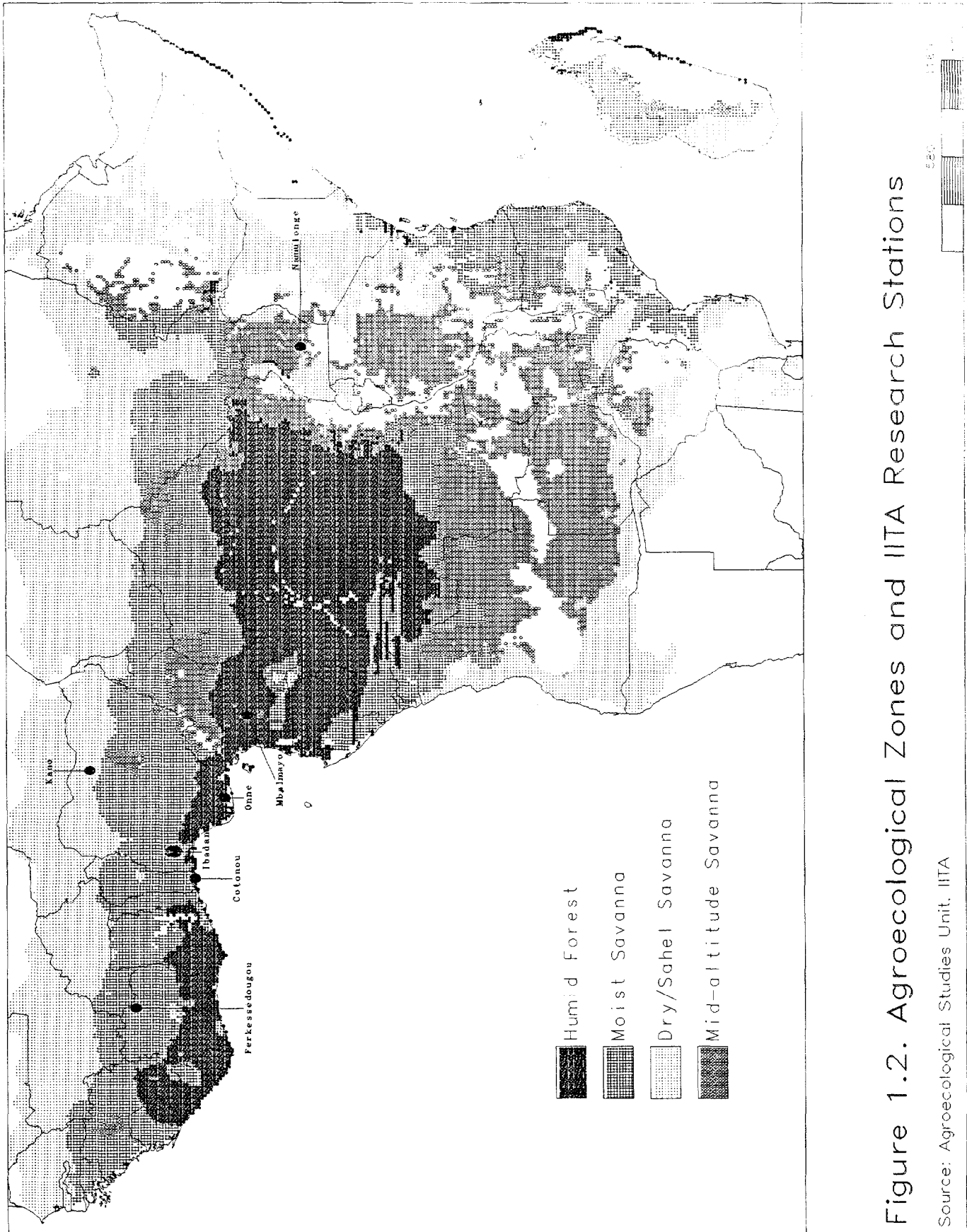


Figure 1.2. Agroecological Zones and IITA Research Stations

The Kano station located in the north of Nigeria in the Sudan savanna has been established within the premises of the Institute of Agricultural Research which is headquartered at Samaru. The research work at Kano is focused on cowpea improvement and on cereal-cowpea intercropping, as well as cowpea IPM and cassava germplasm for the semi-arid zone.

Since 1990, IITA has established its Humid Forest Station in the Cameroon at Nkolbisson, Yaoundé (offices) and at Mbalmayo (research station and offices), some 40 kilometres South of Yaoundé. This is a principal location for resource management research. The Humid Forest Programme of the RCMD and the Director of the Division are based there.

A small research facility for the moist savanna located in the northern Guinea savanna has become operational in 1993 at Ferkessedougou, Côte d'Ivoire in cooperation with the Institut des Savannes (IDESSA). Research is focused on maize improvement and on maize-based systems of the northern Guinea savanna and is being carried out in collaboration with CIMMYT. WARDA provides office space for the staff at its Headquarters at M'Bé near Bouaké.

In 1994, a start was made to establish infrastructural facilities of the IITA East and Southern Africa Regional Centre (ESARC) at the Namulonge Research Station, near Kampala, Uganda where IITA works in partnership with the National Agricultural Research Organization (NARO). Limited laboratory, office and housing space has been made available to IITA the construction of additional facilities is planned. Research activities focus on (a) development of improved disease and pest resistance, high-quality cultivars of cassava and banana/plantain, and (b) banana/plantain agroecosystems analysis to determine the economic importance of specific pests and to develop appropriate pest management programmes.

1.4.2. Programme Strategy and Structure

In addition to its six crop commodities, IITA, for the 1994-98 MTP period, committed itself to four operational strategies: (a) a regional emphasis on West and Central Africa, with a gradual expansion to include the warm humid and subhumid zones of East and Southern Africa, (b) a focus on the small-holder family farm, (c) an agroecological orientation and (d) concentration on farming systems. Further, it decided to decentralize its research in order to achieve greater proximity to the client. It is now also developing benchmark areas which should become increasingly important research locations.

As noted in the organizational structure (Figure 1.1), IITA's research programmes are located in RCMD, CID, PHMD. The institution-strengthening activities are based in ICD, whereas the information services are in MD.

RCMD conducts research in collaboration with NARS and other institutions on both the biophysical and social dimensions of the farming environment and on technologies which can improve or sustain farm productivity. Within the Division, two

multidisciplinary programmes have been created: the Humid Forest Programme and the Moist Savanna Programme. This Division (and all other Divisions of the Institute) is supported by the Agroecological Studies Unit. The Division includes, in addition, the Biometrics Unit, the Analytical Services Laboratory, and the Postharvest Engineering Unit. RCMD is actively engaged in putting into operation the ecoregional approach to research.

CID's function is to help conserve genetic resources and to increase the yield, quality and stability of production of IITA's mandated food crops through plant breeding. CID works with national programmes to develop germplasm that is well adapted to various agroecosystems, resists pests and environmental stresses and suits farmers' and consumers' needs. The Division comprises four crop improvement programmes: maize, grain legumes (cowpea and soybean), roots and tubers (cassava and yam), and banana/plantain, together with two support units, the Genetic Resources Unit (GRU) and the Biotechnology Research Unit. The Division also runs the Centre's Research Farms in Nigeria.

PHMD engages in research on crop-pest-environment interactions, in partnership with national programmes and other institutions. PHMD's objectives are to develop and implement ecologically sound interventions for African farming systems, to provide solutions to today's plant health problems and prevent those of tomorrow. Within the Division there are three programmes: Biological Control, Host Plant Resistance and Habitat Management. The Seed-Health Unit and the Technology Transfer and Training Unit which focus on technology relating to plant health are also included in this Division.

ICD provides a platform for the essential tasks of supporting and strengthening NARS. These cover IITA's network and training activities, meetings and workshops, Research Liaison Scientist Scheme, the Visiting Scientists Scheme and the Resident Scientist Scheme. ICD is also responsible for the management of special projects. The Institute's Information Services in MD cover activities related to publications, library services and public affairs.

1.4.3. Funding

The current MTP (1994-98) developed by IITA and approved by TAC in October 1993 serves as a basis for IITA's programmatic efforts. Total core expenditure has grown from US\$19.7 million in 1989 to \$21.7 million in 1994. The share of IITA's research and research support activities as a percentage of total expenditure has grown from 58% in 1989 to 65% in 1994 (Table 1.1). This has been achieved by a decrease in the cost of research support and of finance and administration. The projected operating core budget for 1995 is \$23.6 million.

IITA's total funding, core and special project, was at \$35.7 million maximum in 1992 (Table 1.2.), when the Institute received \$14.1 million (39.5% of total) for special projects. The recovery of indirect cost as percentage of special project cost was around 8% to 9% during the period 1989-93, but has increased to around 13% in 1994.

Table 1.1. Breakdown of IITA's Total Core Expenditure 1989-1995 (US \$000s)

	1989		1990		1991		1992		1993		1994		1995 Projected	
	US\$	%	US\$	%	US\$	%	US\$	%	US\$	%	US\$	%	US\$	%
Research	9,000	46	9,599	47	10,113	51	11,986	55	11,302	55	12,751	59	13,784	58
Research Support	2,346	12	2,266	11	1,664	9	1,680	8	1,703	8	1,600	7	1,673	7
Institution-Building	2,176	11	1982	10	2,064	10	2,321	10	1,744	9	1,624	8	1,762	8
Finance & Administration	6,145	31	6,749	32	5,861	30	5,898	27	5,650	28	5,737	26	6,358	27
Total Expenditure	19,667	100	20,596	100	19,702	100	21,885	100	20,399	100	21,712	100	23,577	100

Source: Program and Funding Proposals (Actual)
(Excludes Depreciation and Capital Expenditure)

Table 1.2. Type of Funding 1989-1995 (US \$000s)

Year	Core Unrestricted	Core Restricted*	Non-Core or Special project	Total	Recovery of Indirect costs
1989	16,954	4,563	9,701	31,218	818 (8.4%)
1990	16,769	5,759	12,805	35,333	1,143 (8.9%)
1991	17,098	5,262	11,914	34,274	983 (8.3%)
1992	16,408	5,209	14,108	35,725	1,106 (7.8%)
1993	14,982	5,837	13,267	34,086	1,137 (8.6%)
1994	14,833	6,980	9,756	31,569	1,257 (12.9%)
1995 Est	16,300	7,000	8,500	31,800	1,200 (14.1%)

Source: Audited Accounts

*Includes Japanese contribution which has very nominal restrictions

The estimated total funding for 1995 is \$31.8 million, of which \$8.5 million (26.7%) is expected for special projects. The downturn in total funding has been a general phenomenon in the CGIAR System, although there is a marked improvement in the estimate for core funding in 1995.

The proposed resource allocation among Divisions and activities during the current MTP is: 24% RCMD, 25% PHMD, 23.0% CID (3% maize, 4% cowpea and soybean, 6% cassava and 6% yam and banana/plantain, and 4% all crops), 11% research support, and 17% international cooperation, information services and training.

1.4.4. Staffing

At present IITA has a total of 1,950 staff, of whom 1585 (81%) are on core and 365 (19%) on complementary funding. There are 129 internationally recruited staff (IRS), of whom 93 (72%) are on core. The number of IRS has declined steadily during the review period, from 158 in 1990 (including 117 on core) - see Table 1.3. At present there are 1,441 nationally recruited (local) staff at headquarters and at the various field locations.

The majority (69; 74%) of the core-funded IRS are based at IITA headquarters in Ibadan, and the remaining are in the field, mostly in Benin and Cameroon - the divisional headquarters of the PHMD and RCMD divisions, respectively. In keeping with the Centre's decentralization policy, a substantial number (51) of the IRS are field-based and roughly half of them are funded from the core budget.

The staffing pattern during the period 1992-95 is shown in Table 1.4., by division. At present, the IRS are distributed almost equally among the research divisions (the range is 18 to 24 staff, including core- and complementary-funded staff). Administration and Management (ADM) has 20 IRS, in its various sections. During the last three years, the number of staff in PHMD has increased from 17 to 24, and in CID from 16 to 18. During the same period, RCMD staff has decreased from 21 to 19, ICD staff from 34 to 19, and ADM staff from 23 to 20.

The distribution of national staff by division is also shown in Table 1.4. As should be expected, ADM and CID have the largest numbers of locally recruited staff, reflecting the nature of the work performed in these divisions. Besides these staff, IITA has a substantial number of post doctoral fellows (21), Associate Scientists (6), and Visiting Scientists (4). The numbers of staff in these categories have increased steadily since 1992, partially offsetting the cuts in core and complementary staff noted above.

The distribution of international and national staff by location is shown in Table 1.5. The largest number of staff (1,350) are at Ibadan, mostly on core funds. The other divisional headquarters, in Benin and Cameroon, have much fewer numbers of staff (227 and 108 respectively).

Table 1.3. Total International Staff Strength (1989 - 1995)

	1989		1990		1991		1992		1993		1994		1995	
Location	Core	Compl.	Core	Compl.	Core	Compl.	Core	Compl.	Core	Compl.	Core	Compl.	Core	Compl.
HQ	97	5	94	4	86	7	85	3	75	8	71	9	69	9
Field	14	35	23	37	23	20	19	30	24	35	25	29	24	27
Total	111	40	117	41	109	27	104	33	99	43	96	38	93	36

Table 1.4 IITA Staffing by Division

	1992		1993		1994		1995	
	Core	Compl.	Core	Compl.	Core	Compl.	Core	Compl.
International Staff								
Research: RCMD	19	2	17	4	12	5	14	5
CID	11	5	10	6	14	2	16	2
PHMD	14	3	13	5	14	5	16	6
ICD	14	20	12	19	12	14	9	10
Admin & Management	23	--	23	--	22	--	20	--
Total International	81	30	75	34	74	26	75	23
National Staff								
Research: RCMD	131	54	126	57	135	68	135	65
CID	365	16	355	16	383	25	365	23
PHMD	175	88	147	71	152	91	155	88
ICD	28	24	29	51	30	58	60	66
Admin & Management	788	20	759	49	763	55	777	54
ILCA	--	--	--	--	--	30	--	33
Total National	1,487	202	1,416	244	1,463	327	1,492	329
Postdoctoral Fellows	6	1	11	4	16	7	12	9
Associate Scientists	15	2	11	2	4	3	4	2
Visiting Scientists	2	--	2	3	2	2	2	2
Total IITA	1,591	235	1,515	287	1,559	365	1,585	365

Table 1.5. IITA Staff by Location - 1995

	International Staff				National Staff				Total			
	Core		Complementary		Core		Complementary		Core		Complementary	
Location	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Nigeria												
Ibadan	69	74	9	25	1,119	75	153	47	1188	75	162	44
Kano	1	1	1	3	37	2	--	--	38	2	1	--
Onne	7	8	--	--	90	6	6	2	97	6	6	2
Ikeja	--	--	--	--	27	2	--	--	27	2	--	--
Abuja	--	--	--	--	9	1	--	--	9	1	--	--
Cameroon	4	4	2	5	102	7	--	--	106	6	2	1
Rep. of Benin	9	10	14	39	83	5	121	36	92	6	135	37
Uganda	3	3	1	3	13	1	49	15	16	1	50	14
Ghana	--	--	1	3	--	--	--	--	--	--	1	--
Malawi	--	--	3	8	--	--	--	--	--	--	3	1
Mozambique	--	--	1	3	--	--	--	--	--	--	1	--
Tanzania	--	--	1	3	--	-	-	-	-	-	1	-
Zambia	--	-	1	3	-	-	-	-	-	-	1	-
Cote d'Ivoire	--	-	2	5	12	1	-	-	12	1	2	1
Total	93	100	36	100	1,492	100	329	100	1,585	100	365	100

Overall, the cuts in staffing noted earlier are the result of the severe funding crises faced by the CGIAR and IITA during the past few years. As a result, the Centre has found it much harder than anticipated in the Medium-Term Plans (for 1989-93 and 1994-98) to implement its research programme. Despite this constraint, in the Panel's view, progress has been steady, as discussed at length in subsequent chapters.

1.5. IITA's Response to the Recommendations of the 1990 External Review

The 1990 External Review of IITA made 36 recommendations, of which 19 were on its research programme and 17 on management. The recommendations were generally endorsed by TAC and the CGIAR. The IITA Board and management at that time, responded positively to most of them. The Panel considers that taken together, the recommendations were far-reaching but necessary, particularly since they further encouraged IITA's continuing efforts toward a leaner operating structure, greater organizational cohesiveness and further decentralization. IITA, to the full credit of all staff and Board, has implemented most of the recommendations with vigour and commitment. Although the results of some of the changes have not yet been fully realized, the Panel has been impressed with the progress achieved. The Panel considers that IITA has benefitted significantly as a result of these changes, which have been "incrementally" introduced, for which the Board and management deserve full credit.

IITA's action in response to the recommendations is tabulated in Appendix VI, together with this Panel's comments. According to the assessment by the Panel, IITA has fully implemented 21 recommendations, partially implemented nine recommendations and not implemented six. Overall, the Panel believes that IITA has taken positive, though sometimes incomplete action on most of the main recommendations. The Panel comments on IITA's actions in the appropriate sections of this Report.

CHAPTER 2 - RESEARCH PROGRAMMES

2.1. Crop Improvement

The Crop Improvement Division (CID) is one of the three new research divisions created since the last EPR. It conveniently brings together in one administrative unit all the plant breeders working at IITA, the majority of whom are located at Ibadan, together with certain support units. This is acknowledged to have improved communication between those working on germplasm enhancement. CID therefore constitutes part of one axis of the evolving matrix of research organization at the Centre. Work is currently undertaken on six mandate crops: cowpea, soybean, cassava, yam, plantain/banana and maize. Since the last EPR, the transfer of all rice improvement work to WARDA has been completed. The transfer of work on sweet potato to CIP was regretted by some NARS representatives in West Africa and members of the staff of IITA, but their concern has hopefully been assuaged by the location of a CIP breeder for this crop at Ibadan.

At the time of this Review, the programme structure of crop improvement work had changed relatively little from the situation at the last EPR, the main change being the separation of banana and plantain work from the former Root, Tuber and Plantain Improvement Programme (TRIP) to constitute an independent programme. Work in this division is therefore reviewed according to the programmes identified as: Grain Legume Improvement, Root and Tuber Improvement, Plantain and Banana Improvement and Maize Improvement. The support units for Biotechnology Research, Genetic Resources and Research Farms also report to the CID Director, but are reviewed in Section 3.5.

In the newly constituted set of 23 projects intended to operate from 1996, CID activities will be represented in 15 projects to varying degrees. It is not yet clear whether the new projects would be arranged in some hierarchical structure relating to the current programme designations. Further reference is made to these issues in Chapter 4.3.3.

2.1.1. Grain Legume Improvement Programme (GLIP)

2.1.1.1. Cowpea

Background

Earlier work on cowpea at IITA, for which the Centre has the global mandate, resulted in the production of cowpea varieties with sufficient insect resistance to permit their cultivation with 2-3 spray applications, instead of the 8-10 applications required for previously available material. However, these were short-duration varieties of determinate type which were suitable for large-scale farmers who were able to afford some chemical inputs on varieties grown as single crops. They did not meet the requirements of the many small-scale farmers growing cowpea in mixed crops in sorghum/millet systems in the dry savanna zone, for which purpose indeterminate, photo-sensitive types of spreading habit and long duration as well as early-maturing types were

needed. Economic crises in the region since the late 1980s have also rendered the use of pesticides less feasible. The last EPR strongly urged IITA to switch the direction of cowpea improvement to these objectives at its Kano substation in the Sudan savanna.

Achievements, current focus and future plans

IITA has offices, laboratories, a conference room and screenhouses on the same compound as the Institute for Agricultural Research (IAR) in Kano city and IAR has allocated land for IITA at their research farm at Minjibir, north of Kano. There is further interaction with ICRISAT which provides additional trial facilities at its own site at Bagauda, where joint inter-cropping trials involving cowpea, soybean, sorghum and millet are conducted. Breeding work on cowpea at Kano reflects a systems perspective which permeates the whole programme. This is a good example of interdisciplinary collaboration in which niches for cowpeas are sought in various cropping systems and agronomic treatments.

Essentially, the breeding policy at Kano for such farming systems is to improve local landraces of cowpea by backcrossing lines with multiple disease and insect resistance from the earlier programme and testing the improved germplasm, destined for grain or forage or dual use in mixed cropping systems. The work also includes screening germplasm for resistance to *Striga gesneroides* and *Alectra vogelii* and its incorporation into the improved landraces.

However, in order to meet its global mandate for this crop, IITA has continued a parallel programme with short-duration, determinate, non-photosensitive types with multiple pest and disease resistance for broad tropical adaptation.

Improving cowpea germplasm in West Africa involves tackling a complex array of diseases and insect pests in addition to the parasitic plants already mentioned. With respect to diseases, resistance to brown blotch (*Colletotrichum truncatum* and *C. capsici*) and bacterial blight (*Xanthomonas campestris* pv. *vignicola*) has been incorporated into local landraces and the transfer of scab (*Elsinoe phaseoli*) resistance is being incorporated. Insect pests, against which some resistance has been incorporated, include aphids, thrips and bruchids. This impressive array of requirements is additional to the need for general agronomic improvements such as drought tolerance.

Resistance to post-flowering insect pests has been targeted as a major objective for the improvement of this crop and the work is proceeding along several parallel lines. Genes conferring partial resistance to *Maruca* and to pod-sucking bugs found in some cowpea, landraces as well as in wild but cross-compatible relatives are being accumulated in cowpea using a modified recurrent selection procedure. More ambitiously, wide crossing of cowpea to wild *Vigna* species is being attempted to transfer resistance and there is a substantial programme undertaken in collaboration with several advanced institutes to achieve genetic transformation and regeneration of cowpea. These aspects of this work are concentrated at Ibadan.

On the general agronomic front, the two-year study conducted in 1992-93 on cropping systems of the Sudan savanna has contributed to the development of breeding

methods employed both on-station and on-farm. In the on-station work at Kano, the screening of germplasm is undertaken in three husbandry systems: as sole crop with and without insecticidal sprays and in simulated intercrop conditions without insecticidal sprays, the work being complemented by on-farm trials with farmer participation. Such trials are evidently subject to high experimental error; e.g. results from multilocal trials which have been presented have CV values ranging from 30 to 74% which make interpretation difficult and conclusions unsound. There is some evidence of improvement from trials involving intercropping with pearl millet in the absence of insecticide but substantial G x E interaction. Results from farmers' participatory trials are difficult to interpret by standard experimental analysis and different criteria need to be applied. It is recognised that the yield advantages demonstrated in on-station trials for the improved germplasm have not been confirmed in farmers' trials, but farmers are reported to have responded well to the improved varieties which suffer less seed damage by bruchids.

Work on the transfer of resistance to *Maruca* from wild *Vigna* species involves conventional genetic studies and the use of RFLP molecular mapping (developed in the University of Minnesota in collaboration with IITA) to identify and, eventually, isolate resistance genes. RAPD markers have also been used to detect interspecific hybrids and also to quantify the genetic diversity present in African domesticated cowpea germplasm.

Assessment

The Centre is to be commended on the good interaction in this programme with both RCMD and PHMD. Integration of the activities at the Kano station with those of the NARS is also to be commended and further encouraged. Given that the northern Guinea Savanna is at the fringe of, and the Sudan savanna (in which the Kano station is located) is outside IITA's ecoregional mandate of subhumid tropics, the development of further collaboration with ICRISAT is greatly to be encouraged at the Kano station and its associated zonal points of contact. The EPMR does not see any great justification at present for discussing the possible transfer of this responsibility from IITA unless on a broader front there is perceived to be an overwhelming case for narrowing the mandate of the Centre. Nor, given the nature of the pest/disease complex, is there any short-term prospect of devolution of the more intricate work to the NARS, although the NARS in Ghana has been particularly effective in developing this crop with the assistance of IITA. Estimated production area for cowpea in Ghana has increased from 94,660 ha in 1977-79 to 146,900 ha in 1987-89, with average yields having doubled in that time. There has been a limited but persistent production and sale of cowpea seed of IITA varieties by seed companies.

Little impact has as yet been demonstrated in the key target area of the Sudan savanna and more precise experimentation will be required than has hitherto been the case, in order to demonstrate progress convincingly. It is pleasing to note therefore that some interest has been elicited among the state-level Agricultural Development Projects (ADPs) in northern Nigeria in cowpea as a dry-season crop, on hydromorphic soils with residual moisture or with irrigation. The improved germplasm which has reduced the need for insecticidal sprays to two or three during the wet season, can be very productive during the dry season when pest pressure is much lower.

The total elimination of insecticide for this crop is a very ambitious target for a highly complex problem and IITA may have to recognize that it is not attainable. The Centre has set itself a deadline of 1998 to make a critical review of the work on all fronts: conventional breeding, wide crossing and genetic transformation; and to decide then on whether continuation of the effort is justifiable. Some progress in regeneration has been demonstrated and work elsewhere has achieved a degree of success in legume transformation. The EPMR endorses the target date of 1998 for assessment, provided that the review is rigorous and involves some independent external participation. Should the review decide that further substantial progress is unlikely, then consideration will need to be given to redeploying some of the present large investment in cowpea improvement, possibly to soybean.

Recommendation:

The Panel recommends that a rigorous review of all aspects of work on cowpea improvement at IITA be undertaken in 1998, with the participation of an external assessor(s), to determine whether the current lines of work will then have shown sufficient progress to justify their continuation.

2.1.1.2. Soybean

Background

Soybean cultivation was introduced into Nigeria in the 1940's but has shown indications of explosive growth, beginning with the restrictions imposed on imports in the 1980's. This is essentially a demand-led phenomenon deriving from domestic and small-scale industrial uptake and spreading to other West and Central African (WCA) countries, although in Côte d'Ivoire some larger-scale production has been evident for some time. FAO data indicate an increase in soybean production in Nigeria from 60 kt in 1979-81 to 160 kt in 1993, the corresponding figures for West Africa as a whole being 62.1 kt and 168.8 kt respectively. In Central Africa, there has been a more modest increase from 8 kt to 16 kt over the same period, while East Africa has increased its production from 25 kt to 115 kt, again over the same period.

Building on the identification of promiscuous nodulation in some germplasm in 1978, the prospects for the widespread adoption of the crop have been greatly enhanced by the confirmation in 1993 of the occurrence of promiscuous nodulation, using a subset of cowpea rhizobia in farmers' fields. IITA has taken a lead in soybean research for production in Africa since the 1970's, with limited resources deployed. In part, it has attempted to strengthen the work of consumer and researcher groups in Nigeria and in other countries such as Ghana, Benin and Togo. Work on soybean utilisation was assisted during the period from 1987-1993 by funding from IDRC and JICA.

Following the termination in 1986 of the additional post for IITA soybean breeding in Brazil the input at Ibadan has been relatively small, with only one breeder deployed. (A second post proposed in the previous review period fell victim to financial cuts). Now, with the well-demonstrated acceptance of soybeans by consumers in Nigeria,

IITA is at the crossroads of its decision-making with respect to its involvement in the genetic improvement of this crop.

Achievements, current focus and future plans

The impact of improvement work at IITA to date has understandably been restricted and only some 5% of the production area in Nigeria is estimated from sales of seed to be planted with IITA-derived varieties.

Target ecologies for the crop improvement programme comprise the Mid-Altitude and Moist Savanna Zones. Using pedigree selection procedures, acceleration is achieved through two field generations per year. There are at present relatively few pests and diseases afflicting the crop, although both may be expected to increase as the crop expands. Earlier concern about the threat of red leaf blotch (*Wachtuliochaeta glycyines*) has somewhat receded since the infection front has not advanced dramatically in West Africa. Nevertheless, breeding for resistance to this disease and also to *Cercospora* leaf spot is a programme objective. Selection for promiscuous nodulation and for increased nitrogen fixation (the relationship is not linear) are clearly important.

In addition to the obvious aims of high and stable yields, resistance to pod shattering and the possession of good seed colour are important objectives. It is already being observed that insect problems are increasing so that pod-sucking bugs and defoliating insects are receiving attention. To assist in the selection for these desiderata, the breeding nurseries are sown without rhizobial inoculum being applied and with fertilizer application at a minimum level for adequate crop growth. No other chemicals, fungicides or insecticides are used. There is collaboration with the University of Hawaii on rhizobial nodulation on promiscuous soybeans and collaboration with RCMD on phosphate-use efficiency.

Evidence presented to the Panel from multilocal trials in Nigeria indicates a clear improvement in the yield performance of IITA breeding lines relative to the most widely grown variety, Samsoy 2, over the period 1988 to 1993. This increase in yield potential has generally been accompanied by increased resistance to fungal pathogens and in some cases, with reduced pod-shattering and improved seed colour. Analysis of G x E effects over trials conducted at lowland humid forest, moist savanna and mid-altitude sites during 1990-93 established that they were significant; but they arose from the mix of genotypes and could not be attributed to specific climatic conditions. Farmer acceptance of improved varieties of soybean has been generally good in the past and the programme is rapidly approaching the time when its impact should be measurable in terms of a greater uptake of IITA-derived varieties than has been evident up to the present. Improved germplasm has been distributed to and received by NARS in Nigeria, Ghana, Zaire, Uganda and Cameroon; but the Panel is unable to make any assessment of its uptake in these countries.

Assessment

All the indications are that the present trend of increased production of soybeans in sub-Saharan Africa will continue. Until now the principal impact of IITA has been to assist in the acceptance of the crop by end users and to demonstrate that it can be grown without rhizobial inoculation. The crop is now finding ready acceptance in the direct domestic use of unprocessed soybean at the household level through to small scale industrial manufacture and commercial sale of processed products. Increased pest and disease problems are almost inevitable if, as expected, the production area increases dramatically. There is likely, therefore, to be a clear need for improved germplasm.

In the opinion of the Panel, the present programme of soybean improvement is under-resourced in relation to the anticipated increase of interest in the crop. The Panel accepts the view of IITA that at present there is a need for a soybean breeder to be based at ESARC (Uganda) to strengthen collaboration with NARS in East and Southern Africa and to develop improved soybean germplasm adapted to the mid-altitudes and higher southerly latitudes of this region. Traits of primary interest would include resistance to red leaf blotch, promiscuous nodulation and resistance to pod shattering. The Centre should give urgent consideration to expanding work on this crop, either by seeking additional resources or by redeploying existing resources and to formulating a clear plan for the expanded activity.

Recommendation

The Panel recommends that IITA increase its effort on producing improved soybean germplasm for the moist savanna and mid-altitude areas of sub-Saharan Africa, either by redeployment of existing resource or by seeking additional resource.

2.1.2. Root and Tuber Improvement Programme (RTIP)

This programme now comprises activity on two crops: cassava, for which IITA has a mandate for the continent of Africa and yam, for which it has the global mandate.

2.1.2.1. Cassava

Background

Within the CGIAR System the other major responsibility for cassava improvement resides with CIAT. There has been good collaboration between the two IARCs and this is continuing.

Cassava is one of the most important staple food crops after maize in SSA. It is becoming of greater importance in terms of food security, since it is seen increasingly as a reserve in times of droughts, which have particularly affected maize production in East and Southern Africa in recent years. IITA's host country, Nigeria, is now the single largest producer in the world. Generally, in Africa, cassava is still seen as providing a

reserve food for small-scale farmers and has not developed as a large-scale crop for industrial processing and export as it has in certain Asian countries, although this area is also growing in importance in Nigeria.

IITA has in the past been noted for its development of biological control systems for cassava mealybug (CM; *Phenacoccus manihoti*) and PHMD is currently testing/releasing predators to develop a biological control system for cassava green mite (CGM; *Mononychellus tanajoa*). IITA's second major contribution has been the production and distribution of cassava germplasm with resistance to several important diseases, especially African cassava mosaic virus (ACMV) and cassava bacterial blight (CBB; *Xanthomonas campestris* pv. *manihotis*) and cassava anthracnose (CAD; *Colletotrichum gleosporioides*). Selection of clones with a lower content of cyanogenic compounds has also been a major objective. IITA has invested much effort on strengthening cassava improvement in the NARS through training and technical backstopping.

Achievements, current focus and future plans

Major developments of relevance to the cassava improvement programme since the last EPR have been the completion of COSCA and the establishment of ESARC at Namulonge, Uganda with a substantial commitment to the transfer of IITA's cassava technology to East Africa.

The 1990 EPR criticized this programme (in its former incarnation as TRIPP) on several counts: a lack of innovative research, a lack of hard evidence of impact, a lack of clear programme focus, a lack of appreciation and of quantitative evaluation of genotype x environment (G x E) interactions leading to inadequate targeting of specific agroecologies, a lack of physiological research, insufficient research on the relationship between yield and disease expression, and poor liaison between the BCP at Cotonou and the programme based in Nigeria. It encouraged further collaboration with CIAT, especially the interchange of germplasm to enlarge the gene pool in Africa and anticipated benefits to be derived from the development of material with varying ploidy level resulting from inter-specific hybridization. It further urged the expansion of work on postharvest technology. It is appropriate to devote part of this section of the current report to reviewing IITA's responses to these comments.

The Panel's view on scientific innovation in TRIP is presented in the next section of this report.

With regard to impact assessment, the Panel has considered this in a more general context in Chapter 7.2. More specifically in relation to cassava, IITA has responded strongly. The Centre has recently used data from the COSCA project to calculate that improved varieties from the Institute have contributed an extra 1.4 million tonnes per annum of "gari" than would have been available from unimproved varieties - sufficient to feed 29 million people. These figures would allow considerable error in estimation and still demonstrate substantial impact. Furthermore, the Panel considers that the dismissal of all verbal evidence as "anecdotal" is too severe. During the present review members of the Panel were assured by extension officers from the Shell

Petroleum Company in discussions at the Onne station that IITA varieties with resistance to CBB saved many people in eastern Nigeria from starvation in the 1970's when the crop was in danger of being wiped out by this disease.

With respect to studies of G x E interactions in cassava, the Panel was presented with extensive documentation by IITA in the form of archival reports of TRIP covering the period 1989-93. These contain reports of numerous trials of genotypes under selection in a wide range of environments which provide a base data pool from which estimates of G x E interaction can be derived, in addition to special studies established more specifically to investigate stability by G x E effects. These comprise:

- the nature and causes of G x E interactions in cassava
- the stability of resistance to pests and diseases
- G x E interactions for yield and yield components and
- G x E interactions relating to cyanogenic potential and dry matter content.

In addition, data from International trials covering various locations in Ghana, Togo, Benin and Nigeria have been analyzed for G x E effects. The interaction of cassava genotype x cropping system in the Moist Savanna Zone is currently being studied and it is intended to duplicate these activities in East and Southern Africa through the root crop networks and ESARC. Available geographical information system (GIS) facilities will also be used in these studies.

IITA has responded to the deficiency in physiological studies identified by the 1990 EPR by initiating studies of the growth, development and morpho-physiological characteristics of cassava in the target agroecologies of the dry savanna and mid-altitudes zones. This is in line with the shift in emphasis in the programme from the traditional concern with lowland humid forest and transition zones to the lowland moist and dry savannas and the mid-altitudes zones, in recognition of the movement of the crop into these agroecologies and the increasing importance of cassava throughout SSA, though the bulk of production is still in the more humid areas.

A substantial body of work on crop physiology of cassava is reported in the TRIP archives referred to above. These studies have concentrated on abiotic stress responses of cassava genotypes and have included studies of stomatal behaviour in both wild species, cultivated genotypes and clones of various ploidy levels, of *Manihot*. Screening for tolerance of low seasonal and minimum night temperatures in the mid-altitudes is an essential feature of the search for adaptation of cassava to these environments. Traditional growth analysis is being employed in the formulation, validation and testing of cassava ideotypes for different agroecologies.

Although hybridization is not generally difficult to effect in cassava, some genotypes exhibit "shy flowering" and the synchronization of flowering of these types in crossing blocks can be difficult. Various studies have therefore been initiated on problems of reproductive biology to help to overcome this. An important development in

the period under review has been the identification of a location (Ubiaja) at which local land races have been induced to flower, thereby enabling the gene pool to be enriched with locally adapted material through hybridization. Investigations are continuing to develop appropriate artificial methods of flower induction.

Interspecific hybridization has generated new hybrid combinations, notably with increased root protein content and resistance to CGM from *Manihot tristis*. Investigations of polyploids (derived in several ways), including the development of methodology for their use, have indicated their high yield potential with prospects for improved dry-matter content and pest resistance. There has however been some questioning of the sustainability of higher-yielding cassava material which may excessively deplete soil minerals. Agronomic studies on this issue are in progress within the programme in the Moist Savanna Zone in Nigeria; however, this would seem to be an appropriate area for interdisciplinary work, particularly with RCMD. The cytogenetic relationships of 12 wild *Manihot* species have been elucidated in more basic studies.

Links with the entomologists in Cotonou are still weak but interaction does take place through exchange visits, workplan discussions and through joint efforts in ESCaPP and the root crops networks (EARRNET and SARRNET). There has been no entomologist assigned to work on host plant resistance breeding in cassava since 1990. However, in complementation of work on biological control of CGM, work has advanced on breeding for host plant resistance based on new introductions from Latin America, from some African land races and from wild species. Resistant genotypes and special seed populations which are targeted at this problem have been transferred to collaborating NARS upon request.

Some diversion of resources has resulted from capitalizing on earlier successes and reducing work on resistance to ACMV and to CBB to maintenance levels, while maintaining strict selection against susceptibility to these two diseases. There is, however, some evidence of a new strain of ACMV in Uganda which may be responsible for reports of severe outbreaks of the disease. IITA has delivered large quantities of seed populations generated by hybridization of various sources of resistance and is planning epidemiological studies. There is excellent collaboration with the local NARS from ESARC at Namulonge where the headquarters of EARRNET is also located.

Close interaction with CIAT has developed further during the review period. The flow of material, as seed, from Latin America has been facilitated by the presence of a CIAT Liaison Scientist based at Ibadan and material is now being targeted at four agroecologies: humid, subhumid, dry savanna and mid-altitudes. Improved materials from the IITA programme are being widely distributed to the various NARS in the form of virus-indexed plantlets from tissue culture, clean vegetative material (mostly within Nigeria) or as seed. There is ample competence in several NARS to develop varieties from basically unselected, highly heterogeneous populations generated by IITA and the proportion of material handled in this way is increasing. In Uganda, improved varieties have demonstrated the value of host plant resistance in the face of a severe outbreak of cassava mosaic virus in that country.

There has been increased emphasis on breeding for improved food quality with, *inter alia*, early and regular assessments for dry matter content, starch yield and quality, cooking characteristics, presence of B-carotene and suitability for the preparation of traditional and non-traditional foods. In Uganda, for example, some 30 products have been introduced and gained acceptance, partly through the intervention of IITA. There has also been a considerable investment in developing techniques for determination of cyanogenic potential (CNP) and in training NARS personnel in their use.

The prospects for transformation of cassava have been advanced by the successful development of a protocol for regeneration by somatic embryogenesis of leaf tissue.

In molecular biology, clonal identification in mixtures has been established by DNA fingerprinting and the development of RAPD patterns for individual clones.

Assessment

The cassava programme is dealing with a wide range of urgent, practical problems effectively. It possibly comes closer than is the case with some of IITA's other mandate crops to the projected role for an IARC of devolving much of the applied work on the crop to the NARS while maintaining technical backstopping and some basic work at the Institute. While scientific innovation in the programme has not been conspicuous, there have been useful advances in cytogenetics and cellular biotechnology during the period of review and molecular marker techniques have also been used to some purpose.

The entomological input to the programme is weak. However, the Panel has greater concern that resources for plant pathology of cassava, which were non-existent between 1991 to 1994 and restricted to one post-doctoral fellow since then, are inadequate. A recommendation concerning this is made in Section 2.2.3. The Panel recognizes that there is good and effective interaction between the virologist and the cassava programme.

The Panel is pleased to note the very positive interaction between CIAT and IITA in terms of germplasm introduction, exchange visits of staff, joint publication of a newsletter and joint involvement in two networks. There is also some joint planning of work involved. IITA and CIAT are both to be congratulated on their increasingly fruitful interaction.

Good use has been made by the programme of results from the COSCA study to identify end-user requirements for maturity, suitability for various cropping systems and type of product consumed. COSCA data have also been used to assist in targeting crop characteristics for various ecological zones of the mandate area.

The Panel considers that the programme has made a vigorous and appropriate response to earlier criticism of inadequate attention to G x E interactions. As a consequence of the studies being undertaken, there is an improved identification of the type of genotype required for particular environments, especially as the genetic improvement work follows the crop into the Moist Savanna and Mid-Altitude Zones.

The original intention of IITA to locate a cassava breeder in Cameroon was cancelled for financial reasons. While NARS capability in cassava improvement in Cameroon, supported by good interaction with IITA, is very strong, the Panel understands that this is not the case in Central Africa generally. IITA therefore needs to reappraise this situation and, given the importance of cassava in this region, to formulate a proposal for increasing its activity.

Recommendation:

The Panel recommends that IITA review the scale of its activity in cassava improvement in the Humid Forest Zone, particularly with respect to Central Africa and formulate a proposal to enhance the uptake of its technology by the national programmes for cassava improvement in this region.

Plant physiology is often regarded by plant breeders more as a retrospective rather than a predictive aid to their work. The cassava programme has initiated work in the area in which it is most required and has directed it, in most cases to assist in the identification of suitable parental material. In the opinion of the Panel, this is a proper use of the discipline in the context of the cassava improvement programme. However, the Panel believes that the current level of investment in plant physiology within the programme should not be increased unless there is further devolution of some of the work on genetic improvement to the NARS.

2.1.2.2. Yam

IITA has the global mandate for this crop within the CGIAR System.

Background

Yam is overwhelmingly a West African crop, some 90% of the world's production being contained in the six countries comprising the "yam belt" stretching from Côte d'Ivoire to Cameroon. Within this area, Nigeria dominates yam production, perhaps with as much as 75% of world production, but there are few reliable statistics available. The crop is also a valued part of the diet in the Caribbean, the Pacific basin and in parts of Asia. It is particularly prized in West Africa where it is integral to the local culture. NARS representatives in Kenya suggested to members of the Panel that yam cultivation there has been underestimated.

The genus *Dioscorea* is a very ancient Angiosperm comprising some 600 species of which about 12 are used for food in varying degrees. In Africa, the principal species used for food are the water yam (*D. alata*) and the white yam (*D. rotundata*) although some consider that *D. dumetorum* receives insufficient attention. Generally, the crop is under-researched and has been subjected to little genetic improvement, partly because it flowers rarely, with varying expression of the basic dioecious condition.

The 1990 EPR made no specific recommendation on yam except to suggest continuance of work at the existing level and to encourage links with advanced institutes to research the problem of "shy-flowering".

Achievements, current focus and future plans

White yam is being routinely distributed as *in vitro* virus-indexed plants by IITA to the NARS. Distribution of improved water yam material in this way is currently precluded by virus problems, so reliance is placed on the provision of seed from crossing blocks to those NARS in SSA and elsewhere that are interested in establishing seedling nurseries for subsequent clonal selection. A fundamental objective is the maintenance of yield stability in the material as it moves out of the traditional yam zone, since the area of cultivation is expanding into the moist savanna.

The crop has the advantage of being plantable in the dry season and is capable of long term storage for consumption and planting. It is labour-intensive and the proportion of the crop traditionally retained for planting is high. IITA has made a valuable contribution to easing this problem by developing miniset technology in collaboration with the National Root Crops Research Institute (NRCRI), Umudike which has facilitated the in-country distribution of improved materials and also the maintenance of germplasm in the GRU and breeding programme. Research into the induction of virus-indexed micro-tubers is already yielding benefits in the distribution of planting material. Current emphasis is on improving uniformity of sprouting of the micro-tubers.

Major advances have been made in the induction of flowering, particularly in white yam, as a result of optimizing husbandry practices and screening the germplasm collection for land races that are flower more freely. This has enabled an enlargement of the operational gene pool to be effected.

Molecular analysis at IITA has made a valuable scientific contribution to our understanding of the origin and phylogeny of Guinea yams. This, in combination with progress in cellular biotechnology offers further pointers for genetic improvement.

Assessment

The 1990 EPR contended that comparative advantage in yam improvement resided with the NARS. Certainly there is competence within Nigeria at NRCRI, Umudike to undertake much of the work being done by IITA, but there are problems of funding. The Panel understands that there is also a strong yam-breeding programme in the NARS of the Republic of Benin. Despite considerable interest in the crop, there is no breeder for yams in the NARS in Ghana. The relationship of IITA to the NARS in yam improvement is broadly similar to the situation with respect to cassava. There is already considerable devolution of applied breeding and selection work, but IITA provides indispensable technical backstopping and basic research. Given the present financial state of the NARS, this work needs to be maintained for the time being. There appears to be good interaction with the HPRP of PHMD, especially in the area of pathology.

Recommendation:

The Panel recommends that IITA maintain its work on yam improvement at the current level while seeking every opportunity to devolve more of the applied work progressively to the NARS, possibly by subcontracting.

2.1.3. Plantain and Banana Improvement Programme (PBIP)

Background

Work on plantain at IITA began in 1979 with a primary focus on crop management, though some work on taxonomy and the selection of cultivars was also initiated. Plantain improvement was introduced as a component of the former TRIPP programme in 1988. With the creation of CID in 1991, PBIP was established as a separate programme with its base at the High Rainfall Station at Onne. The disease Black Sigatoka (BS; *Mycosphaerella fijiensis*), which originated in Fiji, appeared in southern Africa in the 1970's and by the 1980's was presenting a serious threat to the plantain crop in West and Central Africa. Control by fungicide was not a feasible option for economic and other reasons.

In the expectation that control of the disease by introducing genetic resistance into the plantain host would be a long-term process, initial containment of the problem was sought through modifying agronomic practice and what was seen as a temporary expedient of replacing plantain with cooking bananas which are resistant to the disease. Varieties identified as resistant varieties were rapidly multiplied by *in vitro* techniques in collaboration with INIBAP. These cooking bananas met initially with much consumer resistance, but a public education campaign in the use of this "new" staple food has gradually resulted in their greater acceptance by farmers and consumers.

The period under review has seen a further shift in emphasis from agronomy to genetic improvement of plantain at Onne, although the approach is still viewed as holistic.

A further major development has been the establishment of ESARC at Namulonge, Uganda with a substantial component of the work dedicated to transferring banana/plantain technology from Onne to an East African context, where highland cooking and beer bananas comprise the dominant edible agricultural crop.

Achievements, current focus and future plans

The rate of success in transferring genetic resistance to BS in plantain has proceeded at a pace exceeding the expectations of IITA or anyone else. Within six years from the start of the work BS-resistant, tetraploid hybrids derived from plantain and cooking banana have been produced with substantially improved yields (up to 225% more than the parent variety in the absence of fungicide), with large fruits, better ratooning and shorter production cycles. The primary source of improved tetraploid hybrids was

created by crossing triploid plantains to a non-edible diploid with exceptionally good male fertility and a high level of BS resistance. Fourteen tetraploid hybrids have now been registered in the public domain as open-stock, and are freely available, for international use. An equivalent number of plantain-derived diploids have also been registered for use as parental material. This achievement resulted in the Institute receiving the King Baudouin Award in 1994. The Panel wishes to endorse the international acclaim which this work has received.

This success in the breeding work is attributable to a combination of conventional and innovative cross-breeding techniques and the exploitation of the fortuitous finding that seed set at Onne is unusually high. The work has also cast new light on segregation in the triploid genome and generated large numbers of diploid progeny for use in plantain improvement at other ploidy levels. Genetic analysis in *Musa*, which hitherto has been very difficult, has thereby been facilitated. The ultimate breeding strategy is to produce secondary triploid plantains with good expression of resistance to BS. In addition, as a result of the highly satisfactory progress in breeding for BS resistance, breeding for other desirable traits will receive greater attention. These include a better plant type (i.e. deeper rooting, better suckering, less tall, drought tolerant) and resistance to other major biotic stresses (e.g. weevils, nematodes).

It is most regrettable that the dissemination of this improved germplasm is being delayed by the occurrence of banana streak virus (BSV) in tissue culture-derived plantlets. However, IITA is to be complimented on its rapid response to tackling the BSV problem. A project in the Biotechnology Research Unit (BRU) in collaboration with the John Innes Centre (UK) with funding from the Gatsby Foundation will facilitate diagnosis. Similarly a World Bank/IFC funded project for virus elimination from germplasm stocks and some epidemiological studies of BSV is underway, based at the Onne Station.

Other developments in cellular biotechnology have included the transfer of a protocol, developed in collaboration with the Catholic University of Leuven, for regeneration of *Musa* genotypes from cell suspensions, to the tissue culture laboratory at Onne. Techniques for shoot-tip culture *in vitro* are now routine and methods of embryo rescue have been refined. Collaborative projects in molecular biology have been concerned with developing linkage maps of the *Musa* genome and the use of RAPD markers to screen for off-types.

At ESARC, more attention is to be given to banana weevils (*Cosmopolites sordidus*) which are a major pest in the mid-altitudes. This pest is receiving attention from the out-posted PHMD entomologist. Beer bananas are more resistant to weevils than cooking bananas and can be used in breeding for resistance. There is also a complex of plant parasitic nematodes which cause widespread problems through damage to the root system. To tackle these problems, PHMD has appointed a core nematologist based at ESARC. Priorities for leaf diseases will also be different from the lowland rainforest environment at Onne but this station will nevertheless continue to generate basic populations for evaluation and selection in Uganda.

Assessment

PBIP is justifiably considered to be one of the conspicuous successes of IITA, displaying a good mix of innovative science and practical achievement. The Panel confidently expects that further advances will be made on the sound basis already established.

The PBIP programme at Onne is being vigorously pursued at a well-run station. The Panel was particularly impressed by the integration of product development for plantain and banana undertaken as part of the postharvest technology input. The tissue culture laboratory is providing a vital service but IITA needs to consider whether any future plans to become involved in molecular techniques would overlap with activities at Ibadan.

IITA should as a matter of urgency press forward its efforts to overcome the problem which has arisen with BSV, in order that the successes of the breeding programme can be exploited by the uninhibited movement of improved germplasm.

A good start has been made in setting up ESARC at Namulonge, where there is fruitful interaction between the breeding and entomological work from IITA representatives and also good interaction between them and the local NARS. IITA needs to reconsider the reporting structure for the station head of ESARC who has no designated line manager and instead reports to a committee (RDC) in the absence of a DDG(R). There is a danger that he will fall into limbo since his formal administrative link to CID has been severed.

The Panel was disappointed to find little or no evidence of interaction at present between CID and PHMD at the Onne station, where the pathologists have been conducting an epidemiological investigation into BS that runs in parallel with the crop improvement work, without visible contact. Since Onne is the only out-station where all three research divisions are represented, this is a pity. IITA needs to consider how to rectify this situation in order to continue interdivisional collaboration.

2.1.4. Maize Research Programme (MIP)

Background

It has been estimated that there are some 21 million ha of maize in Africa, characterized by low average yields (800-1200 kg/ha) owing to the presence of numerous diseases, insect pests, weed and parasitic plants and the frequent unavailability of chemical inputs. In the past decade there has been a tremendous expansion of maize production in the savannas of West and Central Africa, the estimated cropping area for WCA in 1990-92 being 6.5 million ha of which some 20% has been assigned by CIMMYT to improved varieties. Under the 1977 CGIAR mandate, IITA has the responsibility for maize improvement in the humid and sub-humid regions of Africa, cooperating where appropriate with other international institutes. An agreement with

CIMMYT effectively consigns maize improvement in East and Southern Africa to CIMMYT with inputs from IITA in the realm of plant health. CIMMYT germplasm has been utilized extensively by the IITA programme over the years. Several of the widely-grown IITA populations were derived from CIMMYT germplasm. The history of a poor relationship between the two IARCs resulting from overlapping mandates was considered at some length by the 1990 EPR and need not be repeated here.

The geographic focus of the MIP at IITA covers four agroecologies: humid forest, forest-savanna transition, Guinea savanna and mid-altitudes, with priority assigned to the latter two because of their high production potential. Particular emphasis has been given to the northern Guinea savanna, with both a liaison scientist and the WECAMAN coordinator deployed to northern Côte d'Ivoire, where they conduct maize breeding activities in collaboration with IDESSA in Ferkessedougou.

Achievements, current focus and future plans

One of IITA's major past achievements has been breeding for resistance to maize streak virus (MSV) which resulted in the widespread dissemination of improved germplasm and the Institute's receipt of the King Baudouin Award in 1988. Susceptibility to this disease was a conspicuous weakness of CIMMYT material in WCA which necessitated hybridization with streak-resistant sources. This aspect of the MIP at IITA has now been put on a maintenance basis, as has the work on breeding for resistance to rust (*Puccinia polysora* and *P. sorghi*) and southern leaf blight (*Bipolaris maydis*). Resistance to stem borers (*Eldana* spp. and *Sesamia* spp.) has received some attention for the humid forest and forest-savanna zones as has resistance to northern leaf blight (*Exserohilum turcicum*) for mid-altitudes. There has also been a steady improvement in the level of resistance to downy mildew (*Peronosclerospora sorghi*).

The current programme is organized with two main components: inbred lines/hybrids and open-pollinated varieties (OPV).

A major development in the review period has been the implementation of a Comprehensive Breeding Programme (CBP) as defined by Eberhart. This was prefaced by a reduction in the number of breeders from six to two between 1988 and 1992, which has necessitated a substantial scaling-down of activity, especially in the OPV work. MIP works in close collaboration with the WECAMAN network. Work carried out in the second phase of the SAFGRAD project made a substantial contribution towards development and distribution of germplasm with improved drought tolerance for the semi-arid regions of WCA.

There has been a major effort on the control of *Striga* by genetic improvement as part of IITA's integrated programme during the period under review. Infestation and evaluation methodology has been involved and contributions made to knowledge of the inheritance of *Striga* resistance. Selection is carried out to reduce *Striga* emergence (and seed production), and to reduce damage to the host plant. Greatest progress to date has been achieved in reducing host plant damage ("tolerance") under field conditions. *Striga*

emergence and tolerance appear to be independently inherited. Concerted efforts are now underway to find better sources of resistance to further reduce *Striga* reproduction.

Studies of G x E in maize international trials have shown that the breeding work at IITA has resulted in selection for broad adaptation. During the review period, IITA established a laboratory for evaluating maize grain quality which is playing an increasing role in backstopping NARS and industries in the area of maize utilization.

A collaborative project funded by GTZ during 1992-1995 on root morphology in relation to nitrogen-use efficiency has provided a framework for further work on improving nitrogen stress tolerance through breeding.

Assessment

The Panel is pleased to record that relationships with CIMMYT are now much improved. There is still some concern, however, that interaction between the two IARCs is limited, especially in Côte d'Ivoire where parallel programmes exist. Collaboration in genetic improvement is essentially conceived as exchanging slots in each other's trial systems. Both Centres should seek to reduce the possibility of further friction arising from a misperception of mandate in the northern Guinea savanna. It might be argued that IITA should now relinquish its remaining mandate for maize in WCA to CIMMYT. The Panel believes that the case for this is not strong, except for dedicated rationalizers of the CGIAR System. Clearly, the relevant work needs to be conducted in WCA on something like the current scale and there seems to be no advantage *per se* in shunting resource from one part of the System to another.

IITA needs to review its policy on breeding hybrids. In on-farm trials, hybrid advantage of 20-30% (and more in Sasakawa Global 2000 trials) has been demonstrated in the northern Guinea savanna, which is undoubtedly an area of great potential. Inbreds and hybrids developed at IITA provided the foundation for development of private seed companies in Nigeria in the 1980's. However, the present economic climate in WCA and in Nigeria in particular is not conducive to a thriving private sector and the capacity of the NARS for large-scale seed production of hybrids is questionable. In any case, the heterotic potential of populations should be maintained and enhanced, so that inbred lines which show good hybrid vigour in crosses could be readily extracted at any time, should the economic situation improve.

The Panel commends IITA on its integrated work on *Striga* to which MIP has made a major contribution. This is probably now the most important single aspect of the MIP and should be regarded as the irreducible minimum in any further retrenchment.

Generally, NARS ability to take over the work of the IARCs is more evident in cereal improvement than is the case with most other crops. However, attempts by IITA to devolve some aspects of the maize work, e.g. stem borer resistance, have met with considerable opposition from some NARS. This work is of especial importance to the Humid Forest Zone where the production of "green" maize is economically significant. Nevertheless, a further retreat by IITA to the more strategic aspects of maize improvement should be encouraged. For the medium term, these would include *Striga*

resistance, research on drought tolerance, on the efficiency of nitrogen use and on host plant resistance to pathogens which produce grain toxins. It would also in the short term include breeding for resistance to stem borer, although the problem of assumption by the NARS is one of resource rather than of entomological competence. This situation should be reviewed in three-four years' time. The routine maintenance and distribution of improved germplasm should be capable of early devolution to the NARS, as should breeding for resistance to downy mildew.

The report of the TAC Study on CGIAR Commitments in West Africa specifically recommended devolution of maize research for the humid forest zone from IITA to the NARS. The potential for devolution of maize breeding activities for the Humid Forest Zone to NARS was discussed during the 1993 internal review of CID. It was agreed that, although the downy mildew resistance breeding work could potentially be transferred to NARS, the involvement of IITA is justified for several more years. Breeding activities must be carried out in Nigeria, where the maize strain of downy mildew occurs. IITA should utilize the improved screening methods now available to quickly obtain varieties with high levels of resistance, as part of the efforts to curtail the rapid spread of downy mildew in the region. Progress in improving the levels of resistance, the economic situation in Nigeria and capacity of Nigerian NARS must be reviewed in the next several years to determine if a devolution of the breeding work can be effected.

Recommendation:

The Panel recommends that IITA, in its continuing reorganization of the Maize Improvement Programme, seek ways of devolving more of its work on genetic improvement of maize to NARS in the region.

2.1.5. Overall Assessment

The remit of CID with six mandate crops continues to be broader than that of most other genetic improvement teams within the CGIAR System. However, the Panel sees no overwhelming case in the present situation for recommending a reduction. Good progress is being made on a broad front and the leadership of the division is firm, clear and well articulated, though a less authoritarian style would sometimes be better received.

IITA has already obtained funding to extend and improve the facilities for its work in the moist savanna at Ferkessedougou in Côte d'Ivoire. The Panel is aware that an internal debate is continuing at the Institute on whether this will cover the need for additional work in this Zone for the foreseeable future. A major decision will therefore have to be faced by the Division and by IITA on the extent of its future involvement in the Moist Savanna Zone since this has great potential importance for the exploitation of several of the commodities upon which work on genetic improvement is undertaken. It is in this area also that CID interacts most effectively with RCMD, with emphasis currently

on the grain crops (mainly maize and soybean). Collaboration with PHMD, particularly HPRP, is more evident across a wider range of activities.

The Panel believes that soybean improvement is currently under-resourced and that, if necessary, there may have to be redeployment from the substantial effort on cowpea which is facing formidable challenges with uncertain prospects of success.

The collaborative work on *Striga* and other parasitic plants on maize and cowpeas is beginning to show results and this must for the foreseeable future be considered a key activity, especially with regard to the now much-reduced maize improvement work. Relations with CIMMYT are greatly improved, but there are still some adjustments to be made, especially with regard to the work in the northern Guinea savanna.

In the root and tuber crops the practice of leaving much of the adaptive work to the NARS, with technical backstopping from IITA should continue, while also ensuring the future of basic and strategic research at the Institute. IITA still has much to do in the realm of making secure the African genetic resources in these crops, in which it is admirably served by the GRU.

The work on plantain/bananas was highly praised by the previous EPR and this Panel is pleased to add its endorsement. It hopes that the present difficulties with BSV will be shortly overcome so that the benefits of this improved planting material can be spread widely in SSA.

CID is developing a strong corporate identity and has the advantage for both geographic and disciplinary reasons of being a more coherent entity than either of the other two divisions. It is a productive organization and the Panel commends its achievements.

2.2. Plant Health Management

2.2.1. Overview and Evolution of the Programme

At the time of the 1990 EPR, plant health management research was dispersed over:

- the various Commodity Improvement Programmes (root, tuber and plantain; grain legumes, maize, rice) and linked mainly with breeding for pest- or disease-resistant genotypes at Ibadan
- the Biological Control Programme, focused on cassava pests, relocated since 1988 at the Cotonou station in Benin
- the Virology Unit, one of the Research Support Units at Ibadan.

These various groups had been associated with major achievements, such as the development of high-yielding cassava clones with various degrees of resistance to African cassava mosaic virus (ACMV) and cassava bacterial blight (CBB, *Xanthomonas campestris* pv. *manihotis*);, maize cultivars resistant to maize streak virus and Africa-wide control of cassava mealybug (CM, *Phenacoccus manihoti*) by release of the parasite *Epidinocarsis lopezi*. IITA received the King Baudouin Award for the latter two achievements.

The interest and the need for an integration of the tactics of using both host plant resistance and classical biological control within the framework of an IITA Integrated Pest Management (IPM) strategy was analysed critically at various levels. The 1990 EPR recommended "that the Biological Control Programme evolves into a Biological and Integrated Control Programme (BICP) and that a Thematic Working Group on Plant Protection is established, including all plant protectionists, no matter where they are located". An internal Review of Pest Management in 1990 and further discussions led to the creation of the Plant Health Management Division (PHMD), comprising three programmes: the Biological Control Programme (BC), the Host Plant Resistance Programme (HPR) and the Habitat Management Programme (HM), each headed by an elected programme leader. Plant health staff who were located in the crop improvement programmes together with the Virology Unit were moved to a PHMD Programme with effect from 1 January 1992. A PHMD Technology Transfer and Training Unit (TT&TU), for the implementation and establishment of sustainable crop protection systems with a strong biological control basis in Africa, as well as IITA's insect museum and identification service, are located at the Cotonou station. A small Seed Health Unit (SHU) is located at Ibadan.

This organizational structure of PHMD is confirmed in the IITA Medium-Term Plan 1994-1998 and its function defined as follows: "PHMD engages in strategic and applied research on crop/pest/environment interactions, in partnership with the national programmes of sub-Saharan African countries. PHMD develops and implements ecologically sound interventions for African farming systems, to provide solutions to today's plant health problems and prevent those of tomorrow... PHMD programmes cooperate closely with CID and RCMD in the development of sustainable plant health management systems."

Taking into consideration the importance of the research in biological control as a component of IITA's core plant protection research, TAC has recommended to CGIAR the allocation of additional core resources to IITA for 1998 in the framework of the Centre Medium-Term Plans 1994-98. TAC expects IITA to fund the operational costs of the biological control programme from core.

IITA is actively involved in setting up a Systemwide Programme for Integrated Pest Management (SPIPM). At the CGIAR Mid-Term Meeting of 1994, Centre Directors confirmed the continued role of IITA as Convening Centre to develop this initiative further. At a recent meeting, the Intercentre Working Group for SPIPM prepared a draft policy statement on IPM intended to guide the application of IPM in CGIAR activities, as well as providing a definition of IPM appropriate for the specific situation of the IARCs.

To assist in assessing PHMDs achievement and future plans with regards to IPM, this definition is given below:

"Integrated Pest Management (IPM) is here defined as ecologically-based pest management that promotes the health of crops and animals, and makes full use of natural and cultural control processes and methods, including host resistance and biological control. It uses chemical pesticides only where and when the above measures fail to keep pests below damaging levels. All interventions are need-based and are applied in ways that minimise undesirable side effects."

Since 1994 PHMD has, for its working programme, adopted a project structure with numerous cross-Programme and cross-Division linkages with the objective of developing of IPM strategies for various commodities and ecoregions. The contribution of each individual is thus, *per se*, difficult to assess. Up to 1992 some activities were executed within the commodity programmes before transfer of the plant health staff to PHMD. The project set-up is still and will continue to be in a dynamic evolution. In order to allow easier comparison with the 1990 EPR, the review of the PHMD activities is presented following the Programme subdivision.

2.2.2. Biological Control Programme (BCP)

The fame of BCP is founded on the successful Africa-wide release of the exotic parasitoid *Epidinocarsis lopezi* for the control of the cassava mealybug (CM), *Phenacoccus manihoti*. Around a rather small team of permanent core principal scientific staff (4), including the PHMD director, there is a large group of principal staff on external funding (3), postdoctoral fellows, associate experts, visiting scientists, or consultants (10) as well as Ph.D. (13) and M.S. students (10). The activities are located at the IITA Benin Station, Cotonou and are linked to many collaborating institutes all over the world.

2.2.2.1. Achievements, current focus and future plans

A. Classical biological control

Cassava mealybug

Detailed impact studies have been conducted since the 1990 EPR in most African countries and have confirmed that *E. lopezi* becomes established and reduces CM to a minor pest in about two years after release. The reduction is less satisfactory in a few fields on degraded sandy soil lacking organic matter. Research has been continued on these sites and has demonstrated that mulching allows reduction of CM population to acceptable levels. Three promising exotic coccinellids have shown a lower capacity for establishment than *E. lopezi* in these situations. Further improvement of CM control thus relies mostly on improved farming practice. Consequently the activities on CM biological control have been wound down. Mass rearing of CM natural enemies came to an end in 1993 but cultures of the parasites are kept for further use. The effectiveness of the

control is monitored through the ESCaPP (Ecologically Sustainable Cassava Plant Protection) project covering Benin, Cameroon, Ghana and Nigeria.

Cassava green mite

Work on the exotic cassava green mite (CGM), *Mononychellus tanajoa*, started in 1984. It has been based on the introduction and testing of a range of natural enemies from South America and in recent years, on assessment of the contribution of entomopathogenic fungi such as *Neozygites* sp. Progress appeared to be much slower than for CM control. Systematic agroecological studies allowed more selective foreign explorations with a shift from Colombia to ecological zones in Brazil that were similar to those in Africa where CGM is a serious pest. This was the basis for the identification and release of the phytoseiid predator *Typhlodromalus manihoti*, which was discovered in late 1993 to be well established along the coast in Ghana, and of *T. aripo*, released in Benin in late 1993 and discovered dispersing over 1,500 km² in less than a year over different ecological zones. Together with *Neoseiulus idaeus*, these two predators have opened very positive perspectives for sustainable control of CGM in the near future. Work will proceed along these very promising lines. Foreign exploration will continue, given the necessity of controlling CGM over a wide range of ecological zones in Africa. Studies on the effect of IITA cassava cultivars on populations of the exotic phytoseiids have been undertaken with the cassava breeder of CID. This activity merged into the project integrated on control of root and tuber crop pests and diseases which also covered the training component of the ESCaPP project. Parallel to these efforts, stretching from strategic to adaptive research, numerous training courses in rearing predators have been given. During the visit to Ghana, the EPMR panel saw the successful result of this training.

Mango mealybug

Classical biological control has also been developed for the mango mealybug (MM) *Rastrococcus invadens*, recently introduced from India to West Africa. On the basis of the experience gained with research on the control of CM, the Indian parasitoid *Gyranoidea tebygi*, first introduced by IIBC in an FAO/GTZ project in Togo, was released and became established in several other countries. The MM has been brought under control except in some hot spots in urban centres where a related parasitoid *Anagyrus mangicola* gives renewed hope. Current investment into this demand-driven project is limited.

Spiralling whitefly

The spiralling whitefly (SW) *Aleurodicus dispersus* of South American origin has been observed since 1992 in West Africa on a wide range of crops including cassava and soybean. IITA started monitoring this pest in collaboration with the NARS. The aim of the work is to develop a sustainable solution through host plant resistance and biological control, e. g. through release of *Encarsia haitiensis* and some coccinellids, which have been associated with successful control of this pest on some Pacific islands. Since *E. haitiensis* was later found to have been introduced serendipitously into Africa,

the project is now aimed at monitoring its impact and at eventually introducing an exotic coccinellid.

Water hyacinth

The floating water weed *Eichhornia crassipes* was introduced during the 1980s in southern Benin, affecting navigation and traditional fishing. At the request of the Ministry of Agriculture of the country hosting the Biological Control Centre for Africa and with GTZ funding, BCP became involved in a pilot project for adaptation to West African conditions of biological control of the water hyacinth by weevils and a moth. These insects were introduced and mass-reared, and the weevils established. They have already led to slow but successful control of water hyacinth in other countries and first signs of this control are observable in Benin.

African honeybees

Beyond the IITA mandate, but with possible importance for smallholder farmers in the region covered by IITA, this is a recent project for exploratory work on genetic improvement and biodiversity in African honeybees. Honeybees are also supplied to the ESCaPP and LUBILOS projects (see below) as test organisms for assessment of the environmental impact of entomopathogens.

B. Control by biopesticides

The LUBILOS (Lutte Biologique contre les Locustes et Sauteriaux) project includes IIBC (UK), IITA (Cotonou), DFPV (Niger) and involves collaboration with NARS of countries affected by locusts and grasshoppers. It is funded by CIDA, ODA, SDC and DGIS. During the first phase (1990-1992) new strains of the entomopathogenic fungus *Metarhizium flavoviride* were selected in the UK and mass production of spores, formulation and application technology were developed. BCP has been involved in feasibility field trials and studies on the ecology of the acridids and of their antagonists. During phase II (1993-1995) the main thrust is on field testing of *M. flavoviride* formulations under a variety of conditions and involving NARS. In some field trials, successful control of grasshoppers has been demonstrated. Field results have shown little difference between strains. The real practical value of this approach; adoption by the farmer and complete proof of mammalian and environmental safety, are under investigation and are essential before further scaling up of the work.

As an extension of the LUBILOS project, work has also started on a similar basis for control of the variegated grasshopper (VG) *Zonocerus variegatus*. Its importance has increased because of forest clearing and soil degradation. This pest has a more regular occurrence and a more stationary distribution than the Sahelian grasshopper and the desert locust. This allows the use of a trap dispensing *M. flavoviride* spores combined with extracts of *Chromolaena odorata* as an attractant. The inclusion of research on socioeconomic aspects, such as farmers' participation and cost-benefits studies of the IPM measures, is very valuable.

C. Postharvest protection of maize

The larger grain borer (LGB), *Prostephanus truncatus*, is of American origin. It has been introduced to Africa during the early 1980s. Extensive studies have been undertaken in recent years by BCP on the population dynamics, the ecology, the influence of farming practices and cultivar reaction to LGB. One promising predator beetle *Teretriosoma nigrescens* has been identified by researchers from GTZ and NRI. Post-release studies by BCP with GTZ collaborators have demonstrated in 1994 the spread of this predator from Togo to Benin and a reduction of LGB populations in traditional maize stores. Good husk cover has been shown to decrease attack by LGB.

An interdisciplinary team of HPRP, HMP, BCP and RCMD started a project in 1993 on preharvest infection of maize with toxigenic fungi such as *Aspergillus flavus* or *Fusarium moniliforme* in various agronomic systems.

D. IITA's insect museum

"Museum" is a surprisingly old-fashioned label for a dynamic Biosystematics Unit under BCP at Cotonou, keeping valuable specimens for further reference in its daily work as an identification service. This covers collections undertaken not only by BC but also HMR, HM or RCMD scientists during characterizations of agroecosystem or benchmark areas and the monitoring of changes in insect biodiversity during changes in the environment. For 1994, some 5,000 specimens were prepared and are in process of identification. Taxonomic work is performed on this material.

Within the recently established biosystematics network BioNET, the IITA insect museum has become the WAFRINET node to support regional and national services in West Africa. The Museum thus also provides strong support to the NARS scientists in this region. This service is run by a post-doctoral fellow.

2.2.2.2. Assessment

The Panel congratulates the BCP team for their practical achievements and for their scientific contribution and publications record, which help in understanding how ecosystems and biological control interact. These results can assist small-holder farmers through technology development and transfer, the latter being sustained by extensive training. It must be kept in mind that the success of biological control of CM has been due to the conjunction of skill, excellent ecosystem science, tenacity, collaboration among scientists from various institutions and outstanding leadership and continuity for more than a decade. It also proved a lucky choice with the pest to be controlled. The success of BCP is contributing greatly to improving the image of IITA as a centre of excellence in Africa and beyond.

The dynamic interaction of the team at the Benin station at Cotonou and the spirit of commitment to ecological principles in daily life at the workplace also merits highlighting. In the view of the Panel, the appointment of the new divisional Director, who was the leader of BCP, has been received positively. The former PHMD Director

and founder of BCP has recently been appointed as DG of ICIPE. This opens a brighter future for fruitful synergy with ICIPE than was previously the case.

The achievement in CM control and the credibility associated with it has attracted and channelled an impressive number of special projects and complementary funding to BCP, which has evolved into a centre of excellence for biocontrol in the tropics. This has led to a broadening of the research topics, some of them beyond the IITA mandate. From two target pests at the last EPR, the research agenda has expanded to eight! There has been also increased collaboration with other PHMD and IITA staff, for instance on postharvest protection of maize and the inclusion of biological control into IPM. This evolution is entirely in line with recommendation 9 of the 1990 EPR.

A new line of research has been started on biopesticides. In order to assure scientific excellence in this field, IITA has recruited an entomopathologist on core funding. The 1990 EPR considered the LUBILOSA project as "clearly beyond IITA's mandate. However, the project will be fully externally funded and gives IITA a unique opportunity to search the potential and gain experience with pathogens (e.g. viruses, bacteria, fungi and nematodes) for the control of insects, mites, diseases and weeds in all IITA mandate crops". This statement is still valid. However, it should be kept in mind that despite their great theoretical potential as biocontrol agents and their extensive study over more than three decades, the practical value of these biopesticides and their acceptance by farmers have been extremely limited. In dealing with this approach it is indispensable, before starting the work, to set clear evaluation criteria. The Panel **suggests** that the progress of the work should be reviewed regularly to assess its practical impact in relation to the criteria set.

Precise identification of the various insects in an ecosystem is of prime importance in exploration of the trophic chains which link a pest with levels of hyperparasites in very complex chains. The disruptions in this chain, for example through farming, can generate unbalanced development of an initially minor pest and result in crop damage. Release of parasites or predators of a pest also could disturb this chain and induce unexpected side effects. For BCP the IITA insect museum is thus indispensable. Biodiversity studies, on the other hand, are used as tools to monitor indicators of the environment and are thus of greater interest than for BCP alone. Besides its service role, the Museum also attracts taxonomists on sabbatical leave who bring a particular scientific expertise in this area.

Recommendation:

The Panel recommends that IITA secure the continuity of staffing of the Biosystematic Unit by maintaining its core funding.

Because of its scientific excellence and its commitment to biological control, BCP has naturally evolved from its first thrust into a reference centre for adaptation to African conditions and for the evaluation of new biological control strategies for crop protection in the tropics. This opens new prospects for scientific advice and help to the NARS. This group is not resting on its laurels and some realistic prospects of new achievements are evident.

However, this raises also several questions and issues:

- It appears that in the past, there has been a tendency to extend the scope of work beyond the formally recognized mandate of the Biological Control Programme. While this may have been understandable in the context of funding opportunities available at that time, the Panel wishes to emphasize that future research activities should conform to IITA's well-established programme priorities (see Section 4.).
- The Panel is much more concerned with the capacity of the slender core to handle all those generous demand- or interested donor-driven commitments in the rigorous scientific way on which its reputation is based. Without having in mind a particular point of the research agenda or the intention to restrain the dynamism of this dedicated team, the Panel advises BCP to review periodically and critically its capacity to undertake activities on such a broad front.
- Another major point of concern is the effect of the high proportion of external - short to medium term funding of the staff. The resultant tension linked to uncertainty about possible discontinuity in funding, as well as the frequent turnover of senior staff can affect team cohesion, especially in a closely interactive group such as BCP. This type of problem is common with groups where an entrepreneurial fund-raising strategy is practised. The problem for the team *per se* starts when gained knowledge, skill and precious contacts, built up in some key persons, are lost. The Panel notes that first IITA and CGIAR have already greatly contributed to the permanence of this former special project by the switch to core funding and secondly BC is involved in a wide range of actions with positive prospects for future developments. In order to ensure continuity of this BC work, the Panel **suggests** that IITA management should consider providing occasional bridging funds from central reserves to cover temporary shortfalls in special project funding for activities that are essential for programme continuity.

2.2.3. Host Plant Resistance Programme and Habitat Management Programme

2.2.3.1. Achievements, current focus and future plans

In the PHMD 1994 Annual Report the goals of HPRP and HMP are defined as follows:

"Through surveys in collaboration with the national programmes, HPR determines the importance of the various pests and diseases, which leads to priority setting on future research needs. Together with data on resistance mechanisms, pathogen transmission by vectors, etc., these results are used by CID in their development of resistant varieties of mandate crops.

The HM Programme studies difficult pests and diseases that need to be combatted by a variety of methods, depending on research results. In its systematic studies of the environment affecting pests and diseases as well as the crop plants, HM complements the activities of RCMD and participates in the characterization of the newly developed benchmark sites."

HPRP groups together the plant health staff who, before the present structure, were located in the various commodity programmes, as well as those from the former Virology Unit. Scientists with activities broader than host plant resistance are attached to HMP. Most of the HPR staff are posted at Ibadan, while HM staff are scattered among Cotonou, Namulonge and Ibadan. HPRP and HMP together account for 10 permanent scientific staff positions on core, 1 on extra funds, 7 post-doctoral position on core, external funding or as visiting scientists and 38 Ph.D. and 9 M.Sc. students.

Analysis of the activities reveals several staff members with a significant involvement by choice in topics outside the programmes defined above. In the context of IPM this is defensible but makes meaningless the separate analysis of achievements in the two programmes.

The large number of scientists and students involved in various disease-pest x crops x agroecosystem combinations has led to the development of a broad spectrum of activities each one of which on a rather narrow and often isolated target. They could be classified under one of the following phases for development of IPM strategies for IITA commodities:

- "assessment of pest status;
taxonomy/etiology/distribution/dynamics/epidemiology/ diagnostics of damage
- analysis of habitat interactions: between (e.g. crop-pest-antagonist) and across trophic levels (e.g. crop - alternative host plant)
- identification of management strategies. The two first phases can be summarized as agroecosystem analysis. The outcome of this system analysis will indicate the extent to which biological control, host plant resistance and cultural practices can provide effective pest prevention and control" (PHMD, 1994 report). Use of pesticides is not banned but considered a last resort, in relation to the type of farmers whose needs IITA is addressing and the comparative advantage of PHMD.

Because it appears impossible to analyze in a few pages the contribution of all activities in IPM, only a few examples are highlighted, in order to illustrate the research approach and some of the achievements. Presentation follows the project structure decided at the 1995 Work Planning Week (WPW). Several activities were performed in collaboration with BCP as well as with CID and RCMD.

A. Integrated control of pests and diseases of legumes

Characterization activities encompassed work on cowpea and soybean as well as on other legumes of importance and on alternative host plants. Surveys on pest and diseases were mostly done in the northern Guinea savanna, linked to CID activities at Kano and RCMD ones on the Bauchi benchmark area, as well as in southern Benin.

After identification of the main targets, pathologists collaborate for instance in developing techniques for screening cowpea varieties for resistance to *Macrophomina* and bacterial blight, as well as for elucidating resistance mechanisms and their genetic basis. PHMD entomologists collaborate with CID breeders and the Biotechnology Unit in the development of cowpea varieties with resistance to flower thrips and postflowering pests. Neem extract has significantly decreased yield losses due to pests when used in combination with low levels of host resistance. However, insecticide treatments appear much more effective. Possible methods of classical biological control are being explored with BCP and output will be made available through the PEDUNE project (Protection Ecologiquement Durable du Niébé).

With an increase in soybean cultivation, the range of pest and disease problems is increasing in this crop, a major concern being red leaf blotch. Some of the diseases are seed borne, which underlines the care to be taken in germplasm movement.

B. Integrated control of pests and diseases of maize

Maize production is expanding in the Moist Savanna Zone and has intensified in eastern and southern Africa. Monitoring of these areas revealed that this evolution is followed by an increase in several pests and diseases.

Maize downy mildew (MDM) was accidentally introduced and is spreading within Nigeria, also threatening neighbouring countries and the region as a whole. Screening methods for resistance to MDM have been improved and have allowed rapid identification of resistant germplasm. Seed dressings with fungicides and plant extracts are tested as support to control campaigns.

In the light of earlier achievements, work on maize streak virus (MSV) is restricted to studies of pathogenic variability of MSV. This will allow early detection of the emergence of new strains and a rapid adaptation of the breeding strategy to limit yield losses. During the visit to Côte d'Ivoire, the Panel discovered the successful transfer of screening procedures or MSV resistance to the IDESSA maize programme.

Options for biological control and habitat management for reducing stem and cob borer infestations are being explored in order to complement moderate cultivar resistance. There are plans to develop an intercentre consortium on IPM of maize stem borer and postharvest problems.

C. Integrated control of pests and diseases of root and tuber crops

Achievements concerning biological control of CM and CGM were discussed under BCP. Follow-up field studies, as well as training, are undertaken within the framework of the ESCaPP project. Unpredictable, severe outbreaks of CBB were detected during these studies. Research has been launched rapidly to reassess the pathogenic variability of the bacteria causing CBB.

Characterization of yam diseases and especially of anthracnose has resumed since 1992 in the form of a multidisciplinary characterization experiment involving scientists from CID, GRU, and NARS, emphasizing the renewed importance devoted to this crop. Techniques for rapid *in vitro* and *in vivo* screening have been developed in parallel to studies the pathogen diversity and epidemiology.

Root rots and postharvest or storage decays were identified as major constraints in root and tuber crops. Detailed interdisciplinary studies are needed to alleviate these problems. The experience gained at CIAT on this topic would be useful.

The possible existence in East Africa of a new whitefly and of severe ACMV strains able to bypass the resistance of some cassava cultivars has been reported. Given the importance of this issue for the cassava improvement activities in which IITA is involved in this region, a post-doctoral virologist has been hired recently to tackle this urgent problem in close collaboration with the Ugandan NARO and NRI (UK).

The activities of this project have been merged since 1993 with those of ESCaPP. Through its training and implementation of IPM components, ESCaPP has increased the probability that new intervention technologies are adopted. It will also serve as a model for developing plant protection technologies and pest management strategies for other crops.

D. Integrated control of pests and diseases of banana and plantain in Africa

In response to a recommendation of the last EPR, IITA recruited a plant pathologist (one post, two persons) to work on *Musa* pathology with emphasis on Black Sigatoka (BS). This work contributed to the development of high-yielding, BS-resistant plantain, an achievement for which IITA received the 1994 King Baudouin Award.

Distribution of this material has been temporarily stopped following detection of infections by banana streak virus (BSV) and cucumber mosaic virus (CMV) in plantlets of the newly developed *Musa* hybrid germplasm, produced *in vitro*. Prompt collaboration was established with the Biotechnology Unit and advanced laboratories abroad for rapid development of a reliable detection method for these viruses. Given the uncertainty about reliable detection and an accurate evaluation of the risk associated with the possible dissemination of these Nigerian strains, IITA took the distressing but wise decision to halt completely the movement of *Musa* germplasm from Nigeria, pending further clarification. IITA is recruiting a further post-doctoral virologist to speed up the process and the anxiety within INIBAP about this problem has been allayed.

Systematic diagnostic surveys were initiated in 1993 among farmers' plots of cooking bananas and plantains in Uganda and West Africa with the application of GIS techniques for data reporting. Various root nematodes were identified as being associated with declining productivity of *Musa* systems. IITA has recruited a nematologist to investigate IPM of this problem at ESARC. Basic studies to develop IPM against banana weevils are undertaken by an entomologist posted there.

E. Integrated control of *Striga* and other parasitic plants

In response to a recommendation of the 1990 EPR, IITA has created a multidisciplinary working group to focus efforts on strategic and applied research, to find an effective solution to the *Striga* problem. A *Striga* biologist has been hired in HPRP and is the coordinator of this group. Close collaboration has been established with the Pan-African *Striga* Control Network (PASCON) and, in Nigeria, National Agricultural Research and Extension Services (NARES) for technology transfer.

This group has already made progress toward developing IPM of *Striga*.

A rapid *in vitro* screening technique has been developed, allowing identification of germplasm suitable for use as a false host to stimulate *Striga* germination in the absence of the normal crop. Differences in stimulating capacity have even been observed among genotypes of non-host crop plants. Some local sorghum cultivars but no improved varieties have been found to stimulate seed germination of *S. gesnerioides*, which is pathogenic on cowpea. This opens up prospects for rotation and intercropping as simple control methods, but appeals also to the breeder who has been presented with an unexpected selection criterion.

Seed treatments with acetolactate synthase inhibitors, identified by utilizing knowledge of *Striga* physiology, delay *Striga* infections beyond the most susceptible stage of the host plant.

Diversity among *Striga* populations is under investigation. This is of prime importance for understanding differences in tolerance to *Striga* in G x E interactions and also for further breeding for durable resistance.

2.2.3.2. Assessment

The 1990 internal review of pest management appears to have triggered a very productive "back-to-the-field" move among the HPRP and HMP scientists for better characterisation of the pest and patho-agroecosystems across IITA mandate areas and crops. This phase has been a key factor for priority setting and is a basis for further impact assessments after implementation of IPM strategies.

In the past about 50% of the resources were allocated to these studies. With their progressive completion, resources allocated have decreased to 36.2% in 1994; the main effort being put now on development of solutions to problems worthy of control.

Large amounts of data have been accumulated with input of GIS techniques and are being processed.

Recommendation:

The Panel recommends that appropriate measures be taken to ensure that the data on characterization of the pest and patho-agroecosystems are kept in a form that is readily accessible to future generations of scientists.

The Panel is pleased to discover that the move of the plant protectionists from the commodity programmes has not been a constraint to fruitful collaboration with breeders. Only one very isolated case of personal conflict in a field station has been brought to the Panel's attention.

The HPRP and HMP scientists interviewed by the Panel appeared enthusiastic about their work and dedicated and proud of their contribution towards IPM. Collaboration with the BC team and RCMD scientists has been strengthened. During the characterization phase of IPM, interest stronger collaboration with socioeconomists was perceived. At the 1995 Work Planning Week, PHMD recommended that RCMD should recruit a root crop socioeconomist to collaborate with PHMD on crop protection issues. This is considered in Section 7.1.3. Definition and implementation of IPM packages in subsistence farming indeed raises the difficult issue of adaptation by the farmers. The success of CM control has been linked to the possibility of bypassing this bottleneck.

The priority-setting exercise in relation to field situations and farmers' needs has induced a blooming of research activities on different topics around the identified target pests. The dedication of an enthusiastic staff, transmitting this enthusiasm to an impressive number of M.S. and Ph.D. students, as well as keenness to tackle the problem from various sides is probably the cause of this. However, the Panel has some concern about the real strength of this mosaic of activities and would suggest a concentration on more innovative research, using landmarks on the path to IPM which are defined by characterization studies. Notwithstanding this, the Panel congratulates the scientists for their achievements and dedication in research as well as in providing training. The Panel expresses its particular satisfaction on the setting up of the *Striga* working group.

During the review period, several new plant health problems developed or became important on IITA mandate crops across the mandate area, either through accidental introduction, crop expansion, changes in farming practices or better characterisation of the constraints. This demonstrates the continued evolution of problems and the necessity of constant vigilance. IITA must have the capacity to respond quickly to new challenges. During the present review period, the staff able to handle them became promptly involved and already contributed significantly to solving these problems. IITA has adjusted rapidly to fill discipline gaps or to increase work. The Panel congratulates IITA on these decisions, particularly in relation to BSV. The Panel is pleased to note that all recommendations concerning PHMD inputs to commodity programmes have been met. Nevertheless, it has been brought to the attention of the Panel that the entomologist position at Kano station has been filled by postdoctoral fellows.

Core positions for the major basic plant health disciplines, except for bacteriology, are currently filled at IITA. Given the forthcoming problems on soybean and cassava, the Panel would advise IITA to keep this lack of expertise in mind during possible further recruitment of a pathologist. Further investment into control of the yam and cassava rots and postharvest decay, the importance of which has been well documented in the root and tuber IPM project, would require the input of a pathologist.

Recommendation:

The Panel recommends that IITA increase its strength in phytopathology at Ibadan.

2.2.4. Overall Assessment

The Panel views the structural changes implemented by IITA which gave rise to PHMD very positively. There has been a significant improvement in communication between the staff and a move towards an IPM goal. There is now increased awareness of the advantage of close interdivisional collaboration.

However, the programme structure appears to the Panel to reflect more a display of awareness of the importance of habitat management as one IPM component, and as a way to balance resource allocation, than as a real clustering of particular skills or even research lines. The real activity of the staff across the programmes makes the latter somewhat obsolete. Nevertheless, the Panel considers this not as a major or as an urgent issue, given the continuing evolution in the project structure and the association of activities in IPM projects among IITA crops. The difference from the previous situation is that now all plant protectionists are grouped together as an interacting team, rather than being allocated to crop improvement programmes.

The Panel compliments the team spirit and performance at Cotonou as outstanding and not restricted only to the BCP component. The Panel would suggest that attention should be paid to further improving the team spirit at Ibadan so that the staff posted out of headquarters feels at home in both teams. This should not restrain interactions between the teams or lead to rivalry. The Ibadan site is less disposed to fostering team spirit because of the dispersal of its buildings, but it has the advantage of offering interaction with CID and RCMD.

The Panel rates overall achievements as very good and scientific productivity as about normal, with a reasonable balance of refereed and non-refereed publications overall. At the individual level some improvement in publication rate should be made, in order to realize fully the scientific value of this important work.

During the review period, IITA has strengthened its input in plant health management going in some cases beyond the last EPR recommendations. The Panel commends IITA management on this, particularly on the rapid allocation of inputs to tackle important, unexpected problems. This was the case, for example in nematology

and entomopathology. The overall balance between the disciplines is appropriate, except for a weakness in phytopathology.

Additional needs came to the attention of the Panel. The Panel considers that priority should be given to the strengthening of services such as SHU and the Biosystematic Unit. These are fully integrated into the research structure but are also very important for the whole Institute. This raises again the question about IITA's investment in plant health in relation to the needs of the Centre and the past successes achieved.

- The Panel wishes to stress the dynamic nature of the evolution of plant health problems, even during the review period and the challenges to IITA which they have raised.
- The development and implementation of IPM strategies, to which the CGIAR System has a clear commitment, requires more intensive effort and resource application than breeding for resistance with complementary pesticide use. The past success of PHMD at IITA is linked to the work of a large interdisciplinary team, the consolidation of which still appears to be a major issue. Broadening the agroecosystem mandate area on which IPM is to be implemented also dilutes the capacity for interaction.
- ICIPE concentrates its research on non-CGIAR food and horticultural crops. Activities in CGIAR mandated crops will be undertaken only in the framework of IPM projects, designed in partnership with IITA and other CGIAR centres.
- The Panel notes that IITA unfortunately still is the only institution in West Africa on which effort on IPM development and implementation the region can rely. To assure long-term stability of plant health management work at IITA, the Centre needs to ensure that important aspects of the work are assigned to established core members of the staff. This is also of prime importance for the continuous transfer of the IPM strategies to the NARS and the follow-up of their implementation.

2.3. Resource and Crop Management Research

2.3.1. Evolution of Resource and Crop Management Research at IITA Since 1990

This review takes place after a long, period of turbulence in the Division which has been building up since the time of the Third EPR which noted some incipient problems. A very large proportion of the Division's scientific staff left during the review period and many positions have not or have only slowly been refilled, including that of the Division Director. This excessive depletion of staff, which was attributed to poor Division management and dissatisfaction among staff with structural changes (e.g. creation of three agroecosystems programmes in 1992, termination of Inland Valley

Programme in 1993), has seriously affected the output of the Division throughout the review period. The Institute has thus been faced with a considerable challenge in keeping the Division in line with its objectives.

The Panel expresses its concern and disappointment that this crisis was allowed to go on for so long. It notes that this was exacerbated by the financial crisis that the CGIAR and underwent IITA went through in this period.

Three major changes need to be noted about the organization of RCMD since 1990:

- The Third EPR expressed much concern about the functioning and orientation of the Systems Working Groups set up in 1987 in the Resource and Crop Management Programme (RCMP). These groups had, by mandate, to integrate activities across the Institute, to provide feedback through systems characterization, and to play a leading role in on-farm research. The EPR questioned the scientific capacity of the Systems Working Groups for crop management research and recommended (Recommendation 1, EPR) the establishment of such capacity outside the Systems Working Groups. IITA strongly argued that the Institute, while in agreement with the recommendation to strengthen crop management research, preferred to do this within the Systems Groups in order to safeguard the continuum between diagnosis and adaptive research. Implementing a second recommendation (Recommendation 2, EPR) the Systems Groups were converted, in 1990, into Agroecosystems Research Groups, without, however, changing their disciplinary composition and operating mode.
- Concurrently, resource management research was reassessed and, in 1992, organized, together with crop management research, in three agroecosystems programmes, the Moist Savanna, the Humid Forest and the Inland Valleys Programmes. This approach permitted linkages between process studies, systems development and applied technology testing and it provided the basis for multidisciplinary teams to focus on crop and resource management in target agroecosystems. The approach was also conceptually to facilitate decentralization of IITA's operations and IITA-NARS collaboration.
- The last adjustment so far was the elimination of the Inland Valleys Programme in view of (budgetary) capacity constraints and considering WARDA's focus on inland valley ecosystems. RCMD thus remained with the Humid Forest Programme, based in Cameroon, and with the Moist Savanna Programme, based in Nigeria. (Earlier, for more than 20 years, IITA's crop and resource management research had concentrated on the derived and coastal savanna and on the degraded soils of southeastern Nigeria.).

2.3.2. Achievements

As indicated above, there have been major organizational and programmatic changes since the last EPR. Unfortunately these changes coincided with a substantial turnover of international scientists at RCMD. The effect of these staff departures was to reduce progress on most research proposed in the MTP 1989-93, and to force suspension of some proposed research. A brief review of the outputs of the Division since the last EPR is structured in terms of the two agrosystems programmes.

2.3.2.1 Achievements of the Moist Savanna Programme (MSP)

Characterization and Diagnosis

Substantial research investment occurred in the systematic characterization of resources and constraints. The characterization framework adopted (see Section 2.2.2.) enabled systems to be distinguished in terms of being population- or market-driven, and as to whether the system is in a land-expansion (i.e. labour more limiting) or land intensification phase (i.e. labour relatively abundant). The characterization studies confirmed the high production potential of the Moist Savanna Zone, particularly the northern Guinea savanna. The studies indicated that in the short run new cropping systems, in mixtures and rotations incorporating IITA mandate crops, appear promising. Soil, pest and weed problems are becoming apparent where land use has intensified. Thus the MSP research programme is addressing both crop and resource management issues.

Related activities that have supported the development of this programme have included the following:

- Using a framework developed by the MSP, macro-level characterization of 14 countries has been possible using GIS, as a result of data collected through interviews and from secondary sources. Draft monographs on savanna systems characteristics for West and Central Africa have been produced. A number of NARS scientists have been trained and given hardware to analyze data from their own countries.
- Village studies have been implemented on constraints to expanding cowpea production and the socioeconomic constraints and opportunities in a market-driven area.
- Monitoring ecological constraints in collaboration with the Farming Systems Programme at the Institute of Agricultural Research, Ahmadu Bello University, has helped in the identification and quantification of specific constraints on, for example, *Striga hermonthica*, soil-borne pathogens, nutrient deficiencies, and weeds. These studies have helped in indicating their effect on cropping systems, while specific yield losses in maize have been estimated for *Striga* and maize. Results of this work are being disseminated through RCMD monographs.

- In terms of technology, characterization and diagnosis have helped in targeting technology to specific environments. For example, macro-characterization data have helped in determining zonal targets for grain legume varieties (soybean and cowpea), alley farming, legume cover crops, and expansion of mixed crop/livestock systems.

Technology Development

IITA and other organizations in the derived savanna areas have helped to establish relevant technological research priorities, the most important being the introduction and optimization of legumes in cereal-based systems. The earlier emphasis on alley cropping studies has now been redirected at finding grain legumes and herbaceous species for fallow management. Adaptive studies on options for managing *Imperata* are commencing, building on a decade of strategic and applied research. Collaborative research on *Striga* is also being implemented. Given the importance of livestock in the zone, there are plans to continue work on mixed crop/livestock systems and restart work on appropriate animal-traction tillage practices - in collaboration with NARS as well as ILRI.

Specific initiatives relating to technology development have included the following:

- Long-term studies have continued on assessing crop performance under low external chemical input systems and on the performance of exotic and indigenous woody species. Long-term studies on determinants of sustainability in rehabilitation of degraded land at Ibadan continue to show the superiority of planted fallow over natural fallow under low-input systems. The planted fallows not only improved the soil chemical and physical properties, but have also suppressed weeds and increased maize yield. Herbaceous fallows have been found to improve soil physical properties more than have woody species. Another long-term experiment has shown that after five years the yield of maize was higher with continuous cropping and no fertilizer in alley-cropped (with *Leucaena leucocephala*) and relay cropped plots with *Pueraria phaseoloides* relay-cropped plots than in bush fallow plots. Further studies assessed the decomposition and nutrient release of various plant root materials of crops and fallow species. Findings indicated that plant root decomposition and nutrient release is influenced by diameter size, lignin content and C/N ratio.
- Investigations continued into the better understanding of alley cropping systems in the moist savanna zone. These studies are shedding light on the role of *Leucaena leucocephala* and woody hedgerows in the recycling of nutrients. A significant portion of the nutrients recycled is contributed by increased fauna (earthworm) activity induced by the presence of woody hedgerows. Nitrogen fixation studies have been prominent, including the use of *Rhizobia* spp. and mycorrhizae to help establish hedgerow trees and on quantification of N₂ fixed from the atmosphere by woody legume species. Nitrogen fixation has also been examined in terms of environmental factors and management practices, such as

pruning and residue management. Availability of phosphorus can influence nodulation and studies have shown large differences in growth and the efficiency of phosphorus use between and within tree species during early growth stages.

- During 1993, in collaboration with NARS, adaptability studies were initiated on herbaceous and shrubby legumes for use in crop production studies. Data are available on growth, biomass yield, rooting, and nutrient yield.
- Studies have been undertaken in the northern Guinea savanna to estimate N₂ fixation by soybean and cowpea and their contribution to associated and subsequent crops.
- Work directed at biology and control of *Imperata cylindrica* continued. Effects of burning and slashing were evaluated separately and in combination, to determine appropriate management strategies. Both chemical and habitat management control strategies have been identified.

Technology Evaluation and Transfer

Potential solutions to maize production constraints are being tested on-farm in the northern Guinea savanna. Attention has focused on *Striga* resistant hybrids, and rotations of maize with soybean, cowpea and *Aeschynomene histrix*. COMBS was used to strengthen collaborative work with NARS, through which a PC computer-based, decision-support system called LEXSYS was developed along with a comprehensive legume database. Another preliminary decision-support system has been developed to match technology for combating *Striga* on cereals with the economic and ecological environment, taking into account the availability of resources such as cash, labour, and physical inputs. *Ex ante* impact studies in the northern Guinea savanna have shown that with moderate fertilizer rates (60 kg N/ha), hybrid maize could make a substantial contribution to food production.

2.3.2.2. Achievements of the Humid Forest Programme (HFP)

Characterization and Diagnosis

Characterization of current farming systems and resource management has been completed for southeastern Nigeria and Cameroon. A 1991 southeastern Nigerian survey of farmers' natural resource management, which illustrated patterns of intensification resource use in a peri-urban area with high population densities was followed in 1992 by a detailed resource management survey in 85 Cameroon villages, of which 47 were in the forest zone (see Section 7.1.1). This was implemented primarily with scientists from the NARS. These data are being used in identifying technology development strategies, which are linked to a resource-use intensification gradient, for the benchmark area in southern Cameroon. It is anticipated that the methodology used in this survey will be a cost-effective means for differentiating resource use patterns and research domains and will be very helpful in regional diagnostic work. The two surveys have been complemented by agroethnographic studies. The forest margin benchmark area was

established in late 1993, and baseline characterization is almost completed. The studies implemented to date indicate that the Cameroon forest zone represents "the low-pressure, low-developed end of an agricultural development spectrum." Where population density is higher, and near urban areas, household food self-sufficiency is lower, more resources are devoted to non-farm activities and less benefit is derived from forestry resource exploitation (i.e. fishing and hunting). The major economic challenge is finding substitutes for the declining access to forest resources and industrial crops. Some focus on declining fallows is important but new or underexploited income opportunities need to be exploited (e.g. including fruits, wetlands, fish, and small stock). Targeting once again is considered necessary with intensive systems for urban proximity, sustainable short/medium fallow systems for intermediate zones and forest/agroforestry systems for isolated areas.

Technology Development

Specific initiatives relating to technology development have included the following:

- With reference to determinants of sustainability, process-level studies are being implemented to develop a practical understanding of mechanisms influencing the management of agroecosystems. The components will be integrated at the agroecosystem level, which will then lead to the delineation of priorities for different target zones, taking into account resource endowments and socioeconomic circumstances. A long-term cropping systems trial, established at Mbalmayo in 1993, is designed to study the dominant cassava-groundnut system in terms of nutrient cycling, soil structural stabilization, pest and weed regulation and resource conservation. The results will help improve understanding of long-term implications of increased cropping intensity and interventions relating to soil fertility conservation.
- With reference to slash-and-burn practices, a number of burning trials have investigated impact of heat on the chemical and physical properties of the soil and burning intensity on the weed seed bank and weed community establishment and on maize establishment, growth, and yield.
- Weed community development and weed seed-bank dynamics have been evaluated in most-soil-related experiments and all systems trials, while farm level data are being analysed to identify weed community shifts associated with fallow length and soil class. *Chromolaena odorata* is receiving some attention, while weed/crop interactions are being studied for cassava-based systems.
- Alley cropping work has focused on the adaptive capabilities of hedgerow trees, and their response to pruning and other management practices. Also alley cropping performance studies have evaluated the relationships between climate and soil condition.
- Studies have continued on management practices for sustainable perennial plantain production using mulching, alley cropping and natural hedgerows.

- Legume fallow species have been evaluated for improved fallow management, while it has been found that *Tephrosia candida* can be established during the last phase of cassava cropping, before a fallow cycle, without additional labour and with no reduction in cassava yield.
- Some progress has been made on developing models for analyzing plant interaction and cropping system dynamics and until departure of staff, some progress was made on decision-support models for the introduction of legumes in cassava-based system, and for alley cropping.

Technology Evaluation and Transfer

Work with farmer-managed alley cropping trials has continued in collaboration with ICRAF and NCRE and on-farm tests have evaluated *L. leucocephala* and *Cassia siamea* as options for perennial alley cropping with oilpalm or plantain and food crops. Several variants of cropping systems were tested in on-station trials, while CORTIS collaborators developed a framework for on-farm testing to ensure methodological consistency in regional testing. A second edition of the "Field Guide for On-Farm Experimentation" will shortly be published.

2.3.2.3. Other Achievements

- **Inland Valleys Research.** A systems working group handled inland valleys research until 1993, when it was handed to the major agroecosystems programmes to ensure better integration or work on uplands and wetlands. A strategy for inland valley research, involving characterization at three levels, was developed for the current MTP. A seminal monograph on methodology and draft monographs for six site studies were prepared. On-farm trials have assessed yield loss due to weed infestation and helped to understand farmers' soil, water, and weed management practices. Work on legumes has taken place in both on-farm and on-station trials.
- **Postharvest engineering.** More than a dozen pieces of equipment have been designed and disseminated. There is high consumer demand and recognition of the value of this equipment.
- RCMD has developed a GIS capacity and support for modelling work. Research focuses on characterization of agroecological systems (see Section 2.5.).
- **Special Projects and Networks.** Networks (e.g. AFNETA, CORTIS, COMBS and SPALNA) have all played useful roles in the activities of RCMD as have the Multipurpose Trees Screening for West Africa Project and the Alternatives to Slash-and-Burn Project. A soil organic matter and a fallow management and soil nutrients research project are being carried out with special funding (BADC and GTZ, respectively).

2.3.3. IITA's Current Resource and Crop Management Research

Goal. As per the MTP, the goal of the RCMD is to improve the productivity of smallholder farmers in humid and subhumid tropical Africa, while conserving their natural resource base. A particularly important aim is the identification of alternatives to shifting cultivation. The Division thus complements the activity of the other two Divisions at IITA and is expected to interact on a broad front with them.

Objectives, Strategy, and Structure. The overall objective of RCMD is to develop, in collaboration with institutional partners, technologies and methodologies for sustainable use of agricultural resource in smallholder farming.

RCMD currently attempts to synthesize the three main approaches to research it has applied during its historical development: technology development focus (first 10-15 years, typified by alley cropping and zero-tillage); farming systems, mostly location-specific research directed at incremental change in existing cropping systems (early 1980s) and characterization research, extrapolation domain considerations, systems modelling and use of advanced analytical techniques (late 1980s).

The synthesis is intended to provide a "technology development focus while maintaining real-world sensitivity and keeping high standards of methodological expertise and capacities for regional extrapolation orientation".

The Humid Forest Programme, having almost entirely shifted to Cameroon, primarily addresses problems of sustaining fertility of acidic ultisols. The research focus thus shifted from the management of degraded soils of southeastern Nigeria to measures for preventing degradation of forest margins. The Programme also addresses interventions in short fallow systems of subhumid ecology in southern Cameroon. Further research foci are: (a) diversification of production systems to increase farmer welfare and (b) understanding the dynamics of forest agroecologies as a basis for improved resource conservation.

In Nigeria, the Moist Savanna Programme has shifted its focus to the northern Guinea savanna where major potential for production increase is believed to be available (i.e. high levels of insolation and suitable growing period for medium-duration annual crops, of which high-performing IITA-generated materials are available). Work in the southern Guinea savanna is currently just starting. In this zone there are lower levels of insolation, lower population densities, emphasis on mixed farming and longer-duration root and tuber crops for which, once again, IITA materials are available.

In its interpretation and implementation of the CGIAR System's ecoregional research approach, RCMD concentrates work in a limited number of representative benchmark areas. These benchmark "areas" are area-defined research blocks with defined production systems, constraints and opportunities which correspond to known recommendation domains. Benchmark areas are large enough to capture socioeconomic and biophysical gradients affecting adoptability and adaptability of potential technologies. The research approach adopted at these sites seeks to: coordinate activities within IITA

as well as with NARS and other collaborators; reduce overlap; create critical mass; facilitate participatory appraisal and research, and to structure technology evaluation and transfer activities by NARS in pilot areas.

Three benchmark areas have been developed in the last two years by RCMD.

The main benchmark areas for the MSP are two blocks in the northern Guinea savanna of Nigeria, one centred in Kaduna and the other in Bauchi. The Kaduna block is distinguished by high population densities and favourable market access, so that opportunities exist for commercially oriented production. Population density is lower and market access poorer in the Bauchi benchmark block. Increasing population density in parts of the Bauchi state is forcing resource-use intensification but low market opportunities do not provide options which might be available for farmers of the Kaduna area. In both benchmark blocks there are gradients in population density and market access; the dynamics in these gradients are captured by the selection of representative villages with varying levels of market access and resource-use intensification.

The main benchmark area for the Humid Forest Programme is a humid and subhumid forest margins area in southern Cameroon with a gradient in resource-use intensity as a function of population pressure and market access. This gradient determines challenges and opportunities in developing sustainable production systems and provides a basis for technology targeting and extrapolation.

Besides the work at benchmark areas and in several stations outside Ibadan, RCMD houses, at headquarters, several specialist units such as the Agroecological Studies Unit, the Postharvest Engineering Unit, the Biometry Unit and the Analytical Services Laboratory. These Units provide central support in characterization, diagnosis and technology development, evaluation and transfer protocols. They also independently carry out a number of research projects.

In addition, RCMD is associated with a number of special projects which enhance baseline knowledge (e.g. COSCA) and provide the framework for collaborative technology research and development related to crop management and resource use (e.g. AFNETA, Multipurpose Tree Screening for West Africa), and for strengthening national research partners (e.g. Soil and Plant Analytical Laboratories Network for Africa, SPALNA).

The Humid Forest Programme is coordinating the Cameroon benchmark site of the global Alternatives to Slash-and-Burn Project (ASB); this benchmark site is identical with the Humid Forest Programme's benchmark site and activities within ASB deal with technology as well as with policy research and are incremental to the Humid Forest Programme's research agenda.

2.3.4. Assessment

Despite the substantial staff fluctuations and extended vacancies of key staff positions, including the one of the Division Director, the achievements of the research programme as mentioned above are sizeable. They lack, however, the necessary level of programmatic strength.

The strategic reorientation of the research programme is rapidly shaping up under the new divisional leadership; it will need further focusing and the Panel wishes to submit a number of suggestions in support of this.

The Panel believes that the establishment of the two agroecosystems programmes (Moist Savanna and Humid Forest, respectively) provides the right operational basis for adequately meeting IITA's resource and crop management research commitment to its mandate region. This move is of particular importance in the context of IITA's ecoregional responsibilities.

In the Panel's view, RCMD's approach - that is, of defining and using benchmark areas for directing technology generation and evaluation by these Programmes - is promising. The Panel anticipates that the benchmark area approach, which encompasses gradients in resource use dynamics for imbedding technology development and location-specific research in a wider ecoregional context, can become a powerful strategic paradigm in research on sustainability.

The decision by RCMD to emphasize work in the moist savanna and the humid forest agroecologies and to work collaboratively on the Inland Valleys Programme with WARDA is an encouraging indication of enhanced inter-centre integration. The Inland Valley Consortium proposal which was submitted to TAC and CGIAR by WARDA, through IITA, as part of the Ecoregional Programme for the Warm Humid and Subhumid Tropics in Sub-Saharan Africa, is further evidence of that integration of efforts.

Despite major budgetary and leadership constraints and despite several staff resignations, RCMD has now managed to reassemble a highly motivated and qualified core of young scientists. Necessary recruitment is under way to establish the agreed scientific balance in the Division and to achieve operational strength.

The Challenge Faced by RCMD. Natural resource management inherently requires explicit consideration of a complex multitude of factors and their interactions. The purpose is to ensure that the research leads to adequate factor combinations for use, improvement and sustainability of these resources. The maintenance of sustainable agricultural production at enhanced levels of output is thus a multidimensional task. There is a hierarchy of interdependent systems of natural resource use to be worked with which include components ranging from the genetic information of a crop through to the cultural and policy environments of a target area. Intermediate hierarchical levels are plant-soil-water relationships; crop-pest-disease relationships; relationships between crops and their use by man and animal; relationships between crops and farms and watersheds within agroecological zones; economic interactions between farm, local, regional,

national and global level; and land and tree tenure. Sustainability of resource use at one level is co-determined by the conditions at other levels. Hence, research at each level is required, which implies that research requirements in natural resource use are potentially very comprehensive and demanding. The large number of research and development tasks to be addressed for the generation of effective options for sustainable agricultural resource use transcend the capabilities of a single institution. The activities of several institutions need to be integrated in a cooperative and complementary manner.

RCMD clearly recognizes these fundamental concepts as evidenced in the Institute's participation in the Inland Valley Consortium, in the ASB Project, in its efforts to assemble a Moist Savanna Consortium, and in its attempts to set up steering committees in the benchmark sites. IITA has also undertaken comprehensive consultation in the region on ecoregional research initiatives and is exploring possibilities for the design of new modes of regional research organization involving both NARS and IARCs.

However, little effort seems to have been invested in the establishment of an institutional policy for building research alliances involving NARS, NGOs, farmers, IARCs and advanced labs for resource management research and development. NARS integration in IITA's "core" resource and crop management research at all benchmark areas of both the Humid Forest and the Moist Savanna Programmes is not adequate. For example, if it were not for the ASB Project there would be virtually no continuous NARS involvement (e.g. at the Cameroon Humid Forest Programme site), while IAR involvement at the Bauchi benchmark area has, to date, not gone much beyond consultation, information and occasional briefings.

These practical, "ground-level problems" obviously merit greater attention so as to derive the full benefits of RCMD's "benchmark areas" approach. Unless this is done, the Division runs the risk that promising lines of research would not acquire the necessary strength. In this context, IITA has enunciated "a new and innovative concept of its role" which involves "the continuum that proceeds from the onset of the research process to its resolution" and in which "national and international researchers and farmers are partners in a joint venture" and where "collaboration achieves a collegial balance with effectively matched contributions at every stage" (IITA Annual Report 1993, page 5). This concept requires a far more vigorous move by IITA to establish correspondingly effective working relationships with NARS and other institutional partners, exploiting comparative institutional advantage.

Recommendation:

The Panel recommends that IITA emphasize the establishment of strategic institutional research alliances (such as consortia) to address adequately the complexity of sustainable resource management research.

In addition, besides collaboration with others and given the relatively limited core resources available, RCMD should endeavour to avoid spreading its own efforts too thinly, to concentrate on strategic support of collaborative ecoregional research projects (consortia).

Recommendation:

The Panel recommends that the Resource and Crop Management Division core efforts be concentrated on the comprehensive attention to one benchmark area each for the Moist Savanna and Humid Forest Programmes.

In the Panel's view, the placement of RCMD staff outside the present Humid Forest Zone (Cameroon) and Moist Savanna Zone (Nigeria) teams should therefore not be considered in the early and medium-term stages of implementing the "benchmark areas" concept. The Panel suggests that RCMD does not invest core resources in the mid-altitudes savanna but should tie its involvement there to resources acquired within an ecoregional consortium - which may be assembled by regional initiative and/or in association with the ICRAF-led African highlands initiative. This also implies that RCMD staff placements at Ferkessedougou, Kano, and Namulonge or even in Zambia should not be considered at this time. In such cases interdivisional collaboration will need to be accomplished through backstopping and occasional staff visits.

Furthermore, in order to set up adequately "mechanisms for placing factor, commodity and policy research within the context of natural resource management and sustainable land use systems" (TAC, Draft Note on Systemwide and Ecoregional Concepts, April 13, 1995), the assembling of critical mass in a variety of strategically important disciplines is crucially important. The Panel urges RCMD to maintain such a critical mass of scientists in its core programme.

The Panel concurs with RCMD that the focus of its biophysical research should be soil husbandry and vegetation management around which such critical mass should be built up. Other disciplines required for the more comprehensive coverage of the sustainability research agenda will have to be built in through strategic research alliances *via* ecoregional consortia (these are, among others, social science disciplines that would help direct biophysical, socioeconomic and sociocultural research toward aspects such as culture, social and institutional organization, rural law, ethnobotany etc.).

This need for focus and coherence merits further attention by RCMD. In the Panel's view, the current research portfolio of RCMD is large and varied and occasionally conveys the impression of missing programmatic cohesiveness and low attention to priority considerations. A major part of this portfolio is diagnostic and process-study oriented and there is no apparent trend in technology development which would point at potential breakthroughs.

Recommendation:

The Panel recommends that the Resource and Crop Management Division apply rigorous priority setting to its research portfolio in order to concentrate efforts on research areas of highest possible impact.

The research activities of RCMD, particularly those of the Humid Forest Programme, are strongly biased towards on-station research. At the request of the Panel, RCMD staff identified five situations that they believed required on-station research and four requiring on-farm research. These are commented on below.

Five situations that RCMD believe require on-station research and the Panel's responses, are as follows:

- **Long-term studies on degradation/regeneration.** The Panel is of the view that degradation and regeneration studies require real-world environmental parameters in order to be adequate; it is the scientific approach to the investigation of the process in question which requires adjustment to the situation.
- **Evaluate system interactions for multiple new components going beyond incremental change.** The Panel accepts this as one that may be carried out on-station.
- **Develop collateral information for farmer management and implementation; particularly biophysical factors affecting probability of success.** The Panel believes that this is squarely a matter of on-farm research.
- **Determine reasons for contradictory observations and results in on-farm experimentation; particularly when there is an impasse in on-farm work.** The Panel believes that a careful review, and adjustments in on-farm experimentation methodology would address this situation more accurately than a return to controlled environments.
- **Reduce imposition on farmers with high land and labour opportunity cost when focusing on biophysical hypotheses; danger and problems associated with researcher-managed trials in West Africa.** The Panel believes that this is a matter of agreement between researcher and farmer; RCMD itself has generated many precedences for the opposite to be feasible.

Four situations that RCMD believe require on-farm research, and the panel's responses, are as follows:

- **Real-world validation and adaptation before promotion; what role of IITA relative to NARS outside benchmark areas?** The Panel concurs with the RCMD's view. On-farm technology and the development of research on methodology in the benchmark area is a core IITA activity, for adequate feedback to strategic research components.
- **Stability and performance under different ecologies and field circumstances, beyond possibilities of station environment.** The Panel agrees.

- **System design, farmer-participatory approach for problem evaluation, priority setting and design of alternatives.** The Panel agrees.
- **Monitoring for household understanding, impact assessment and complement to long-term situation trials.** The Panel agrees.

Recommendation:

The Panel recommends that Resource and Crop Management Division put greater emphasis on on-farm research in its programme.

Finally, the RCMD needs to give more attention to inter-divisional integration at the benchmark areas. Particularly apparent is the low level of interdivisional interaction in the case of the Humid Forest Programme in Cameroon, where RCMD is working without much input from the other Divisions.

General Assessment. The RCMD is on its way to recovering from a long, traumatic period of disarray which has drastically impacted on its performance as well as internal and external credibility.

The Panel has no doubt that the Institute crucially requires a strong natural resource research capability and it believes that RCMD is suitably positioned to face this task. The Panel recognizes that the shifts in paradigms experienced by the Division in the last two decades reflect the general search of the scientific community to come to terms with the highly demanding subject of resource sustainability.

Key aspects for the successful recasting of RCMD are: effective task-sharing within strategic institutional research alliances critical mass in core disciplinary contributions of the partner institutions in such alliances and proximity to the ultimate clients.

The Panel believes that the RCMD leadership is in a position to implement this process. However, it suggests that IITA establish an external monitoring procedure (e.g. one or two experienced resource management specialists to visit the Division two to three times in the next two years) to accompany and consult the Institute in this activity. This would help ensure that the momentum painstakingly built up over the past year or so would continue to receive both internal and external (donor) support in the coming years.

2.4. Cross-Divisional Integration

2.4.1. Current Situation

IITA has three main Research Divisions (Resource and Crop Management Division, RCMD; Crop Improvement Division, CID; Plant Health Management Division, PHMD); in addition, the International Cooperation Division (ICD) is involved in a number of cooperative research projects and research networks and thus can be

considered as a Research Division as well, although most of its activities are in logistical, administrative, and technical liaison support to the three main research Divisions.

Conceptually (as per IITA's Medium-Term Plan), the cooperation between the Centre's Research Divisions is driven by IITA's agroecosystems research approach; The Centre thereby focuses its research on three agroecosystems: the Humid Forest Zone, the Moist Savanna Zone and the Mid-Altitude Savanna and Woodlands Zone. It has recently identified five "fields" in which its research is to be consolidated and integrated across these agroecosystems (crop improvement and agronomy; integrated pest management; systems development and management; soils and vegetation management; diagnosis and impact). The necessary integration of the activities of the research divisions is to be brought about by a range of mechanisms which enhance interdisciplinary and cross-divisional interaction:

- IITA scientists are encouraged to participate in the planning sessions of the Divisions to which they do not belong. In addition the participation of IITA scientists in research networks contributes to cross-divisional linkages within IITA.
- Four cross-divisional, multidisciplinary working groups have been initiated by scientists working on problems of common interest; they are cross-programme mechanisms operating on a voluntary basis which draw resources from more than one Division and bring concerted efforts to bear on specific tasks. The groups currently in place are: *Striga* working group on maize and cowpea (PHMD, CID, RCMD, ICD); postharvest technology and utilization issues for all crops (RCMD, PHMD, CID, ICD); cowpea technology (CID, PHMD) and the role of legumes in farming systems of the moist savanna (RCMD, PHMD, ICD).
- The fostering of cross-divisional linkages is one of the tasks of the Research Directors' Committee (RDC). When reviewing the Centre's research portfolio, the Committee is in a position to identify deficiencies in inter-disciplinary and cross-divisional integration. This is of particular importance in view of the fact that IITA decided to separate structurally its plant health management and crop improvement research into two Divisions. A similar comment goes for the interface between crop improvement (CID) and crop management research (RCMD) and between plant health (PHMD) and resource and crop management research (RCMD).
- More recently (1993), IITA decided to reorient its research management approach, so far based on programmes, towards a project-based research management mode. It is anticipated that the transition, which includes the transition from cost-centre to project-based budgeting, will be completed over the next few years. Similarly to the cross-divisional working groups, the projects are to contribute to concerted, interdisciplinary research activities across divisions, oriented towards IITA's target agroecological zones. In fact, a few of the "projects" identified in the 1995 IITA Annual Work Planning Week can be regarded as an extension and generalization of the experiences

gained with the cross-divisional working groups - two of them (the *Striga* and the postharvest working groups) are consolidated into research "projects" while the others are subsumed in a variety of systems "projects" (legume working group) or integrated in a broader "project" on genetic stock development (cowpea working group).

2.4.2. Assessment

The focus of IITA's research on the three target agroecologies is a powerful means of providing a common denominator for streamlining the Centre's research portfolio. It can also be an instrument for enhanced cross-divisional integration in that it puts the activities of the individual divisions, programmes and disciplines into an ecological, spatial and systems perspective.

Cross-divisional working groups have, in IITA's experience, been effective, "bottom-up" open mechanisms for the design of integrative elements in the Centre's portfolio management. The intended transition to project-based research management will further enhance cross-divisional integration and builds on this experience. The Panel noted a remarkably strong consensus among scientific staff in favour of project-based research management which bodes well for a successful transition process; the Panel applauds Management for its skilful guidance of this process. In practice, so far, the level of cross-divisional integration is highly variable. For example, collaboration between CID and PHMD in cowpea resistance breeding is close to optimal. However, in other areas integration requires far more systematic attention. What is particularly apparent is the low level of inter-divisional integration in the case of the Humid Forest activities in Cameroon, where IITA's representation addresses the RCMD research agenda only.

It is also apparent that the portfolios of CID (case of cowpea) and of PHMD (all work) transcend the three agroecologies adopted by the Centre as foci for research. However, the agroecological choices of the Centre are taken into account to the a reasonable extent; it appears that the benchmark areas as defined by RCMD could be suitable platforms for such enhanced integration between the research divisions.

2.5. Support Services

Research Support Services Units

The Research Support Units discussed in this section formerly reported to the DDG(R) but were reassigned before the last incumbent's departure and are now located within one or other of the three research Divisions. Reference is made in Chapter 4 to a Panel Recommendation that the reporting lines be changed.

As presently structured, the Genetic Resources Unit (GRU), the Biotechnology Research Unit and the Research Farms Unit are all part of CID. The Analytical Services

Unit, the Agroecological Studies Unit, the Biometrics Unit and the Postharvest Engineering Unit (formerly known as the Postharvest Technology Unit) are located within RCMD. PHMD is responsible for the Seed Health Unit and the Technology Transfer and Training Unit.

It is proposed elsewhere in this report (Section 4.2.5.) that responsibility for some of these services be transferred.

Genetic Resources Unit (GRU)

This Unit is responsible for and coordinates IITA's work on the collection, characterisation and preservation of genetic resources of food legumes, rice, root and tuber crops in Africa. Its remit extends far beyond responsibility for the Centre's mandate crops and at the present time the resources conserved fall into three main categories:

- species and wild relatives of mandate crops (cowpea, yam, cassava, maize, *Musa*, soybean) and former mandate crops (rice, sweet potato, taro)
- indigenous African food legumes not within the IITA mandate (Bambara groundnut, African yam bean, Kersting's groundnut and miscellaneous minor legumes)
- many species of cover crops, shrubs and multipurpose tree species for use in alley cropping and improved fallow systems. These are maintained in arboreta established at Ibadan, Onne and Mbalmayo (Cameroon), the responsibility for which has been transferred from RCMD to the GRU.

More than 40,000 accessions *in toto* are currently held, with cowpea (38%) and rice (*O. sativa* and *O. glaberrima*: 30%) as the largest components.

The Unit is well equipped, to IPGRI standards, and well run. The *in vitro* conservation of vegetatively propagated crops is assisted by the two well-equipped tissue culture laboratories at Ibadan and Onne. The seed conservation facilities permit the maintenance of base collection material at -20°C and active collections at 5°C, according to IPGRI standards. The GRU provides a valuable service to both IITA and the world scientific community, distributing thousands of samples annually in response to *bona fide* requests (e.g. from 1990-93, 23,063 samples to more than 80 countries). In addition to its maintenance role, the Unit also conducts research related to the characterization, genetic diversity and conservation of the materials and research on the genetics and biosystematics of the genus *Vigna* and West African rice. The Unit also attaches great importance to disease (particularly virus disease) elimination from germplasm of roots and tubers and food legumes in collaboration with virologists, the tissue culture scientist, the IITA Seed Health Unit and plant quarantine officers of Nigeria. Representing IITA, the Unit has an important role in liaising with the Plant Quarantine Service of the Federal Department of Agriculture of Nigeria for both the importation of plant materials from other countries and for certification of materials for export. During the review period, GRU organized three IITA/IPGRI/FAO joint training courses on plant genetic resources.

External developments since the last EPR which impinge on the policy and *modus operandi* of the GRU include the Systemwide Genetic Resources Initiative (SGRI) within the Programme (SGRP) of the CGIAR, under the coordinating role of IPGRI and in implementation of the Biodiversity Convention. All germplasm collections at IITA are deemed to be held in trust for the world community. As with all other collections at CGIAR centres, they were placed under the auspices of FAO in 1994.

Within the SGRP, the CGIAR centres have been requested to alter the status of their GRUs to the level of Programmes in order to achieve more powerful external and internal representation of their genetic resources activities and interests. The Panel is aware that the contribution of the CGIAR centres to the conservation of global (agro)biodiversity will become increasingly important. It urges IITA to be prominently and consistently represented in the relevant fora and activities.

In response to a recommendation from the 1990 EPR, IITA has been characterising and progressively transferring to base collection its unique collection of over 2,000 accessions of Bambara groundnuts. A second recommendation, that IITA secure a location for its yam collection, has been implemented by preservation of most of the germplasm *in vitro*, aided by improved field conservation techniques, using minisetts and careful treatment in storage. The need for further collection and conservation of yam genetic resources is recognized and a proposal prepared in collaboration with NARS, has been submitted for funding. IITA has duplicated about half of its existing yam collection with various national programmes during the review period but a satisfactory duplicate location for the entire collection has not yet been identified. IITA has also given a detailed response to the recommendation that characterisation of the most important African cassava varieties be undertaken urgently. This recommendation has been implemented in part but is hampered by international quarantine regulations. The maintenance of this material is a formidable task which still requires some attention. With the agreement of WARDA, IITA continues to maintain and distribute the existing rice germplasm collection available in GRU. It is continuing to process seed accessions for base collection conservation.

The Panel recognizes the excellent work being done by the GRU and encourages IITA to redouble its efforts on the maintenance and characterization of cassava germplasm and to take decisive action to enlarge the yam collection. The collection of African maize is the responsibility of CIMMYT but appears to be receiving inadequate attention. This should be discussed further by the two centres.

Recommendation:

The Panel recommends that IITA conclude an agreement with CIMMYT to ensure that the collection and conservation of African maize germplasm is undertaken.

Biotechnology Research Unit (BRU)

This Unit has essentially developed since the last EPR, having been commissioned in 1990. Its physical facilities adjoin the pre-existing tissue culture

laboratory which is administered by TRIP and a substantial extension has recently been completed, including a containment facility which became operational in 1994.

The 1990 EPR recommended that the BRU, which was then in the process of being established, should defer activities in molecular biotechnology and concentrate on cellular biotechnology, cytogenetics and modern serology. The BRU has nevertheless made a substantial move into the area of molecular biotechnology, initially with molecular marker techniques (RFLP, RAPD) and more recently with several projects on transformation of cowpea, building on its success in achieving regeneration. The Panel supports this action although the work on cowpea transformation in common with many similar projects worldwide must be considered speculative at this stage. This work involves collaboration with several advanced institutes. Other collaborative projects are concerned with *Musa* biotechnology, micropropagation of yam, cassava root quality and cyanogenesis in cassava. The BRU attracts a high proportion of special project funding with only the Head of the Unit being core-funded. One core-funded post-doctoral post has been approved and early recruitment is anticipated.

There is particular expertise in virology, stemming from the discipline of the Head of the unit. A monoclonal antibody laboratory has been developed with IDRC funds and technical support from Canada Agriculture (Vancouver Research Station), for work on the more important viruses of concern to IITA. BRU, in collaboration with the IITA virologist has developed a network involving collaboration between 33 virologists (in 19 African countries) for the application of monoclonal antibody technology. The BRU has played a useful part in the development of biosafety guidelines within Nigeria.

The BRU collaborates actively with the genetic improvement programme in CID and with the programmes of other research divisions. IITA should set a firm target date of 1998 (as agreed by CID) to review progress on transformation in cowpea, since at current levels the effort could be regarded as disproportionate (see Chapter 2.1.1.1.).

Research Farms Unit (RFU)

Management of the farm operations at all sites visited is excellent and the scientists and others of the IITA community are well served by this important unit. During the review period, RFU responsibilities increased with the development of the Minjibir Farm for Kano Station and a 30 ha. research farm site at Kubwa, near Abuja. The latter site was found to be a "hot spot" for *Striga* infestation and has therefore become an important site for PHMD's and CID's *Striga* field research. In 1993, two international staff positions in RFU were terminated, (one by retirement and one by relocation to ESARC) and a senior well-experienced and long-serving member of local staff was appointed to the post of Ibadan Farm Manager. The Head of RFU is located at the Onne Station and supervision of the installation at Ibadan is effected at a distance, with regular monthly visits. The Director of CID provides effective day-to-day advisory support to the Ibadan manager. While IITA needs to monitor that the present arrangement continues to function well, on current evidence from research scientists, all required services are amply met.

Seed Health Unit (SHU)

Achievements

The SHU was established in 1992 at Ibadan IITA HQ to ensure the health of crop seed moving into and out of IITA. In 1994, 894 seed samples were analysed besides field inspection of numerous lines of IITA mandate crops. SHU collaborates with the National Plant Quarantine Service and National Seed Service in setting up a database of seed-borne pathogens of major food crops in Nigeria and in planning training courses for NARS.

Research activity has also developed on seed-borne diseases of viral, bacterial or fungal origin on various IITA crops, in close collaboration with the pathologist and virologist at Ibadan. The service is run by a post-doctoral fellow under the direction of the grain legume pathologist and has a steering committee which, for example, has assumed responsibility for monitoring progress in cleaning up BSV-infected *Musa* materials and for deciding when germplasm movement can resume.

Assessment

The recent outbreaks of new disease problems in Nigeria on maize (MDM), and which reached Ibadan in 1992, soybean, banana (BSV), and larger grain borer (LGB), which reached Ibadan in 1994, highlight the danger of seed transmission and the necessity to guarantee, as far as possible, pathogen-free seed in the exchange of germplasm. For IITA this issue has become particularly critical, given the movement of germplasm among the various stations and the open benchmark sites on farmers fields. This has considerably increased the risk of dissemination of disease.

The Panel agrees with the management of IITA that no compromise is acceptable on this issue.

Healthy seed is also, on the other hand, a key element in IPM, either by providing clean seed to the farmer or by training him to select or treat his own seed or planting material. Further research on the influence of farming practices on seed contamination or seed treatment by compounds with low mammalian toxicity would be worthwhile in this respect.

Seed testing covers a wide range of diagnostic techniques, necessitating rigorous continuous supervision and training of the technical staff. Although no reproach can be addressed to the SHU team which performs in an efficient way in a tiny space, the Panel concludes that a fast and reliable service for an institution such as IITA with its strongly decentralised operations, can hardly rely on a short-term appointment of a post doctorate and on a pathologist who has other important duties in pathosystem characterisation and in field trials on legumes in the northern Guinea and Sudan savanna.

Given the sensitive issues in which this service could be involved, it requires more support and authority.

Recommendation:

The Panel recommends that IITA strengthen the capacity and increase the authority of the Seed Health Unit in matters relating to the movement of germplasm by the Centre.

The Panel further advises that the physical location of SHU within PHMD is retained in order to permit sharing of equipment and integration within the pathology group.

Technology Transfer and Training Unit (TT&TU)

Achievements

The purpose of TT&TU is to implement and establish sustainable crop protection systems with a strong biological control basis. It became funded as a special project in 1992, after a GTZ review had identified the bottlenecks at NARS level which were affecting the implementation of biological control programmes within the respective countries.

TT&TU supports a number of National Biological Control Programmes (NBCPs) in the current execution of their tasks (equipment, operational costs, technical advice), in their institutional development, in training for biological plant protection and for NBCP management, exchange of information, or links with IITA-PHMD. It has also provided technical backstopping during the characterization phase of IPM projects and PHMD-CID training on MSV. Funding ends early in 1996.

Assessments

TT&TU has played a very important role in strengthening NARS capacity to implement biological control. It has gained by this precious experience in the critical issue of improved technology transfer to African partners.

Given the progress in the classical biological programmes as well among the IPM projects, the Panel considers that this service could be of increased interest in the near future. Maintenance of the activity at baseline by a bridging fund (see Section 2.2.2.2.) is one option that could be considered. A still closer collaboration with ICD should also be sought.

Analytical Services Unit

As in most services of this kind which are associated with crops, the demand is characterized by seasonal peaks. Most of the service provided is for the scientists at IITA but 10% of the total workload is undertaken for NARS. Traditional calls are for soil samples (60% of which are from RCMD), plant samples (equally between CID and RCMD) and water samples and extracts (70% CID). There are increasing demands for assays of pesticides, aflatoxins and aminoacids.

The total number of samples analysed has currently reached 60,000 per annum and the system is indicating strain. The Panel was surprised to discover that there is no formal system for prioritization of the work - everything is done on a "first come, first served" basis. The Unit is well-equipped and clearly provides an excellent service which is commended by the Panel. It has acquired an HCN autoanalyser. There is a need for more atomic absorption capacity and problems sometimes arise in HPLC maintenance. Analytical quality monitoring is done in collaboration with ISRIC.

The Unit provides training courses in the maintenance of laboratory equipment.

Biometrics

This Unit, located within RCMD is staffed by only one biometrician and his Research Associate so much reliance is placed on an assumption of dispersed competence among other scientists. However, a number of staff hired as programmers are located elsewhere in the research Divisions and the inclusion of some, if not all of them in a central unit with the biometricians should be considered. There is no formal link with Computer Services, any interaction being dependent upon personal contacts. This inhibits necessary action on science-led institutional policies for hard and software organization and support.

The Panel was appalled to discover that the Unit was located in a building not linked to the computer network in RCMD, although this situation has been scheduled for early correction.

The Panel also noted with some concern that the recommendation of the 1990 EPR that all proposed experiments should be subjected to prior vetting by the Unit had not been implemented.

There is a clear need for biometrical assistance to PHMD in Cotonou which IITA needs to address. Present staffing provides inadequate coverage at Ibadan when the biometricians are on tour. The Panel suggests that the Biometrics Unit might also be strengthened by the transfer of some of the expertise in programming which is dispersed throughout the research Divisions.

Agroecological Studies Unit (ASU)

ASU was created in 1992 and is located within RCMD. It develops and maintains databases on agroclimatic, soil, topographic and socioeconomic conditions in Africa, provides geographic information system (GIS) services to IITA programmes and, in an informal network with 14 countries, to NARS. Studies on weather-related production risks have been carried out and a computerized atlas, *Agroclimatology in Africa*, has been developed which provides climate, soil, vegetation, demographic and crop suitability information. Growing-period models have been used to define geographic research recommendation domains. The resource information system (RIS), a PC-based GIS developed in the Unit, provides information on regional environmental differences for targeting technology.

The Unit has acquired ARC-INFO, a GIS software mostly preferred in the CGIAR centres. This will enable interlinkages and collaboration with other centres and the efficient integration of more databases, including those from remote sensing, as they become available. The Unit has acquired some remote sensing capabilities.

The Panel believes that GIS capabilities are essential for the strategic support of IITA's ecoregional and biodiversity conservation research responsibilities. It encourages the Unit to maintain its activities at the state-of-the-art level in this rapidly evolving research field and to establish very close working relationships with other IARCs and international development agencies such as FAO and UNEP.

Postharvest Engineering Unit (PEU)

PEU is appropriately located in RCMD under the present arrangements. Core-funding supports the head of the Unit while his principal assistant is supported by a grant from Sasakawa Global 2000.

Postharvest technology (*sensu lato*) is a widely dispersed activity at IITA. This unit is exclusively concerned with developing small to medium-scale equipment covering a wide range of functions and capable of use by small farmers and village communities. The objective wherever possible is for a single piece of equipment to be multi-functional. Some 50 items of equipment have been designed and made and about half of them are currently in small-scale commercial production.

The work is being undertaken with much ingenuity and the enthusiasm of the staff is infectious.

In the perception of the Panel, linkage between this unit and CID is poor. IITA should consider how to improve this situation.

2.6. Overall Assessment

The research activities which are at the heart of IITA possibly cover a wider range than those of any other centre within the CGIAR System. An overview necessarily has to take this complexity into account.

Historically, IITA has achieved its most conspicuous successes in two principal areas: biological control of major insect pests and the genetic improvement of key crops in its mandate, resulting in the distribution throughout the region of planting material with better disease and pest resistance, improved yield potential with greater stability of performance over environments and better quality for the end user.

It is, of course, disappointing to record that the period of review was not a happy one for that broad sweep of IITA's work which is now contained within RCMD. Because of the complex nature of this activity the demonstration of a tangible and transferable product will always be more difficult. Problems of sustainability are

addressed more evidently in this Division than in the other two and the degree to which success can be attained is more constrained by political and macro-economic factors. The work of RCMD has clearly suffered from problems of leadership, high turnover of key staff and ensuing demoralization in the recent past. Happily, the new leadership is instilling a new spirit of teamwork and is formulating revised research programmes which are better focused to fulfil IITA's ecoregional mandates in crop management research. The development of the principal site for work on the Humid Forest Programme (HFP) at Mbalmayo in Cameroon has been a major achievement of the review period, while continued characterization of the various components of the Moist Savanna Zone has assisted progress towards achieving the targets of the Medium-Term Plan, 1994-98 (MTP). It is against the major reformulation of the research programme rather than research results over the period of the review that this Division must now be judged.

The other two newly created research divisions, CID and PHMD, are also under leaders who have relatively little previous experience of larger-scale research management. In the case of PHMD (and RCMD), this management has to be conducted from a base in a neighbouring country, away from headquarters. Problems arising from the implementation of a policy of decentralization are discussed at length elsewhere in this report. Nevertheless, there is generally clear and incisive divisional direction of the research programmes which is, in most cases, being well received by the scientists. Individual research scientists at IITA now feel that their voice is heard in the formulation of research projects and that they are involved in shaping research policy.

For some of the mandate crops handled by CID, emphasis is shifting from the Humid Forest to the Moist Savanna Zone, notably in the case of cassava, maize and yam because the crops are in reality moving in that direction and the potential for maize production, in particular, is greater in the Savanna Zone. The Panel is generally supportive of this trend. However, the Panel believes that the scale of CID activity in the Humid Forest Zone is less than optimal, particularly in relation to cassava in Central Africa. The situation needs reviewing again to see how this effort may be increased. The plantain/banana work has its base in the forest zone production systems and the work on these crops is proving transferable to the newly established mid-altitudes location at ESARC in Uganda. Cowpeas are pre-eminently a crop of the drier savanna but some attention has been given to meeting the requirements listed in the MTP for the more humid cultivation zones. The Panel has drawn attention to its belief that soybean is, at the present time, an under-researched crop at IITA.

The structural changes which have taken place in PHMD are viewed very positively by the Panel. There is now better communication between scientists sharing a common discipline and an improved awareness of the advantages of interdivisional collaboration. At the main base of the Division in Cotonou, the prevailing team spirit is very encouraging. PHMD has also retained sufficient flexibility to cope with unpredicted but urgent pest problems as they have arisen. The Division has a good balance of disciplines, except for a deficiency in phytopathology. As an outstanding base for the development of IPM strategies in Africa, IITA is well poised, through the work in PHMD, to respond to future threats from pests and diseases to the food supply of resource-poor farmers.

Most of the scientists at IITA are content with the new divisional groupings and there is much to be said in favour of grouping those of a similar discipline together, provided that an effective matrix ensures interdisciplinary collaboration. Interdivisional collaboration at IITA is patchy and is not helped by the geographical separation of the respective heads of these Divisions. For this reason, the informal working groups which have been established in a "bottom-up" manner are to be commended, that for *Striga* research being particularly noteworthy. The evolution of a system which fosters interdisciplinary research within the Centre is probably the greatest challenge in scientific management facing IITA over the next review period.

The Panel has some concerns over the balance struck between projects which are specially funded and those on core budget. This issue is considered in more detail in Chapter 4.3.1. Approximate allocation of resource as indicated by senior staff years (SSY) in the projects defined for commencement in 1996 show that the Centre is making the allocation in a reasonably balanced manner. Humid Forest and Moist Savanna Zones will each receive approximately one third of the allocation, with Dry Savanna having one fifth. Zonally neutral projects also account for approximately one fifth.

The overall record of publication in scientific journals has improved over the period of review and does not give serious cause for concern, bearing in mind the extremely broad remit of much of the work and the necessity to cope with the immense and practical problems of deficient agricultural production in the region. The quality of the scientific work is uneven, as might be expected in such a wide-ranging institute, but mostly sound. Some projects (e.g. plantain/banana improvement) are breaking new scientific ground and making a very practical contribution. The Panel concludes that, in general, IITA is well served by its research scientists and their supporting units who are concerned to make an impact and it commends them for their dedication.

CHAPTER 3 - INTERNATIONAL COOPERATION

3.1. Introduction

The International Cooperation Division is responsible for the design and management of mechanisms for improving and strengthening collaborative research and training activities between IITA and the NARS. The NARS in IITA's mandate area are characterized by a high degree of diversity in respect of structure, size, population, agroecologies and, more importantly, institutional maturity. A mechanism of collaboration that will work well with a strong NARS, possessing a sizeable number of well-trained scientists may not be ideal for collaborating with a relatively weak NARS with a few trained staff and limited research facilities. IITA, over time, has therefore sought different ways of collaboration with the different NARS in the region.

The main mechanisms used by IITA for this purpose are the special projects (and the associated Resident Scientist Scheme); Research Liaison Scientists (RLS) scheme; research networks; training, and a variety of individual contacts. They are described and assessed in the following sections.

3.2. Cooperation with National Programmes

3.2.1. Special Projects and the Resident Scientist Scheme

3.2.1.1. Overview

Special projects have small in-country resident scientist teams working on adaptive research within individual NARS. The team of scientists is utilized in building national capabilities for adaptive research to address pressing research issues, produce improved technologies and ensure feedback of scientific data to the core research programmes of IITA. This mechanism is best used (according to the first Medium-Term Plan of 1989-93) in countries where NARS are in early stages of development and where IITA technologies could be used to solve problems using adaptive research methods; or in those countries where NARS are moving to an intermediate stage of development, but where IITA has a long history of cooperation and which can serve as a relay in the dissemination of technologies to weaker neighbouring NARS. The resident team could help also to solve research problems of an applied nature.

3.2.1.2. Achievements

The resident scientist teams approach has been used in institution-building in the following projects:

National Cereals Research and Extension, Cameroon (1980-94)

The goal of the project was to increase food production and maintain Cameroon's food self-sufficiency and security through the development of institutional capacity to generate high-quality research on cereals (maize, rice, sorghum and millet) and improve research and extension linkages with farmers. Technology developed at IITA in maize and rice was tested for possible adoption.

The project enhanced the NARS capacity to conduct on-farm research to determine research priorities and to prepare strategic plans for agricultural research. In crop improvement, a number of improved varieties of maize for the highlands, mid-altitude and lowlands were released. Four high-yielding varieties of rice were released for general cultivation. The rate of adoption of the NCRE-released maize varieties is considered to be "high". The project also contributed to human resources development for agricultural research by training scientists to the following levels of qualification 11 Ph.D., 29 M.Sc., and 4 B.Sc. In addition, over 105 Cameroonians were sent abroad for short-term, non-degree courses, and over 1000 Cameroonians participated in locally organized courses.

Ghana Grains Development Project (1985-95)

The goal of the Project was to improve maize and legume production in Ghana. IITA was subcontracted by CIMMYT to implement the grain legume component. Initial efforts were on training of staff in on-farm research methods and development of improved and relevant production practices. Later the project emphasized intercropping systems and improving research-extension collaboration. The project developed six superior varieties of cowpea and four of soybean and strengthened legume research in the fields of entomology and breeding. The legume research team now has 5 Ph.D. and 25 M.Sc. staff members and over 6,000 extension workers who have received training on legume production.

National Root and Tuber Crops Improvement Project, Ghana (1989-93)

The objectives of the Project were to introduce high-yielding, disease- and pest-tolerant clones of cassava, develop improved technologies for production, use biocontrol methods for major pests of cassava; train NARS in root crop production techniques, and to develop improved postharvest technologies for processing, particularly for cassava.

The Project introduced IITA cassava materials in clonal and seed forms. Four of the clones introduced have been released following their demonstrated superiority in yield, resistance to diseases and pests, and acceptance in terms of food quality by people. Nine staff were trained in different areas of root crop production, 30 in biocontrol techniques, and over 900 extension officers and farmers in the miniset technique for producing seed yam. Local germplasm of cassava, yam, sweet potato and cocoyam was collected from IITA and is now being maintained at the Crops Research Institute, Kumasi.

Project to Strengthen National/Regional Economic Capacity in East, Central and Southern Africa

The objective of the Project was to reinforce socioeconomic capacity of the national root crops research programmes to increase the performance production systems with root crops. This Project started operations in October 1993 in Rwanda, but had to be terminated following the outbreak of civil war in April 1994. It has now been relocated in Malawi. However, because of shortage of funds, the project will end in May 1995.

SADC Cowpea Research Project, Mozambique (1990-94)

The objectives of the Project were to develop high-yielding cowpea varieties, develop improved production practices and strengthen NARS by training and networking. The project had extensive logistical and administrative problems caused by operating in Mozambique.

The Project defined cowpea agroecologies in the region. It evaluated over 700 cowpea accessions from IITA, out of which 10 were identified and distributed to NARS in the region. Through the project, over 100 NARS scientists and technicians received training at IITA and in-country. The project was closed in 1994 owing to unresolved difficulties, but may be restarted in 1996.

Special Projects with a Wide Geographic Coverage

These are established through formal agreement between IITA and a donor to work on projects of wide geographical application. Such projects provide material and information in support of several national and regional programmes. Two such projects were executed by IITA during the period under review. They were:

- On-Farm Adaptive Research Project for cassava, yam, maize, rice, cowpea and soybean in tropical Africa was funded by EEC. The overall objective of the Project was to improve the productivity of the resource-poor small farmers of West and Central Africa. A workplan and cost estimates were developed by four crop-based working groups and approved by the Steering Committee. The workplan encompassed farmer-managed variety trials. These activities, implemented by the participating NARS, were monitored and reports were made available to the executing agencies. At the end of each year, a monitoring team communicated its findings and recommendations to the appropriate NARS. Guidelines were developed for project preparation and forwarded to all the participating NARS. A Research Committee has now been appointed to review and make recommendations on the proposals that have been submitted by the NARS.
- Regional Research Project on Maize and Cassava was funded by France and the CGIAR. An external evaluation of the first phase of the project conducted in March 1995 found that, in most cases, the project corresponded with NARS' research priorities, and that it had contributed to progress in national research

on the two crops. Despite the fact that most of the research activities began later than planned, mainly due to delays in receiving equipment, they did however contribute to an increase in knowledge in the following areas: collection of ecotypes; variety improvement for local adaptation and regional evaluation of selected varieties; agronomy of cropping systems; postharvest activities; collection and evaluation of local cassava germplasm; and use of maize and cassava in human foods and animal feeds.

3.2.1.3 Assessment

The Resident Scientist Scheme has been an effective vehicle for improving the research capabilities of NARS and for training and technology transfer. It depends however on availability of special project funding. The scientists hired and assigned to the teams are not part of the IITA core staff. The Third EPR argued strongly against this, as the staff were regarded as not belonging to IITA and contributed little to IITA's core activities. IITA Board has come out against the Institute being involved in large institutional-building projects. However, projects involving a small number of scientists will still be accepted. The Panel agrees with this strategy.

3.2.2. Research Liaison Scientist Scheme

3.2.2.1. Overview

The RLS Scheme was designed to link NARS priorities to IITA research and training programmes and thereby foster a "holistic, cost-effective and demand-pulled response to NARS ¹". The Scheme achieves collaboration through, among other things:

- helping to deepen understanding and broaden knowledge at IITA of the NARS in the region; their ecologies, organizational structures, resources, research and training programmes
- reinforcing NARS commodity improvement research on their key food crops through collaborative testing of germplasm generated at IARCs
- facilitating IITA's activities in each NARS and assisting IITA colleagues to focus on the most pressing problems in a holistic approach, to avoid fragmentation
- encouraging and assisting NARS to adopt and use a farming systems orientation in crop and resource management research

1 Suh, J.B. *et al.* 1992. Mechanisms for collaborating and strengthening NARS in sub-Saharan Africa. The Research Liaison Scientist, in *Developing Appropriate Strategies and Organizations for Agricultural Research in Small Countries*, ISNAR, 1992

- assisting the NARS to strengthen linkages between their agricultural research and extension services, in order to promote more effective use of research information.

The Scheme was launched with the RLS being located "in carefully selected host countries on the basis of agroecologies, logistics and absorptive capacities for IITA technologies" (Suh et al.)¹. Côte d'Ivoire, Ghana, Benin and Congo were chosen as host countries for West and Central Africa, representing the moist savanna (Bouaké), forest savanna transition (Kumasi); coastal savanna (Cotonou) and the humid forest (Brazzaville) ecologies respectively. The RLS are expected to carry out liaison activities in the neighbouring five to seven countries. The humid forest assignment was closed in 1993, owing to financial and political difficulties.

3.2.2.2. Assessment

In the Panel's view, the RLS Scheme on which IITA pinned most of its hopes for accelerating collaborative research activities with NARS appears not to have performed well - mainly because the mechanics of its funding and operations did not match its laudable goals. (This poor performance should not therefore be blamed on the incumbents.) More specifically, the reasons for an uneven performance ranged among financial resources not being available to back up the activities; lack of support from research programmes at IITA headquarters in some instances; poor communication facilities in the region; and more importantly, in some countries, political upheavals. However, generalizations across countries cannot capture the unique circumstance of each particular NARS-RLS relationship; and furthermore, these circumstances changed over time. On many occasions, the RLS did a commendable job, including arranging for NARS scientists to participate in courses, seminars, workshops, etc. However, the RLS have had little or no impact in other countries where they had "liaison duties". Even after more than two years since the Scheme was reviewed and relaunched in 1992, the RLS have not always been able to visit and initiate collaborative activities in the countries to which they are "assigned".

The last EPR noted strong misgivings about the likely effectiveness of this Scheme as a facilitating system for collaborative research activities. It noted that one scientist, who had been placed in a NARS with limited financial resources and expected to effect collaborative relations not only within the host NARS but also several with other neighbouring NARS, in an area with poor communication, lacking sufficient institutional support from IITA, could not be expected to succeed. The Panel concurs with this observation and wishes IITA had done so too, in 1990, when it was first put forward. Despite this, the Panel believes the Scheme, with suitable adjustments, could be of use in particular circumstances and for a more limited initiatives - and **suggests** that a few RLS positions could be redeployed for strengthening collaboration with NARS (see Section 4.2.7.).

1 Op. cit.

3.2.3. Networks

3.2.3.1. Overview

There are three basic types of networks as defined by SPAAR:

- Information exchange networks - to organize and facilitate exchange of ideas and methodologies and report on the results of current research
- Scientific coordination/consultative networks - to enable country-country or participant-participant focus on common priority research areas initiated and implemented independently by the participating institutions. These networks hold regular meetings which provide additional means of information exchange on research as "information" networks above;
- collaborative research networks - to enable joint intercountry planning and monitoring of research on problems of common concern to countries within a region.

Currently, IITA has been associated with the following collaborative research networks, and provides a variety of management, coordination and technical support, in varying degrees, to the collaborating NARS:

- (1) Semi-Arid Food Grain Research and Development (SAFGRAD) phase II, for cowpea (RENACO); funding ended in 1993 and resumed for one year in 1995.
- (2) West and Central Africa SAFGRAD Maize Collaborative Research Network ran to mid-1993 and became the West and Central Africa Maize Research Network (WECAMAN) in late 1994, with funding for 1994-96.
- (3) East and Southern Africa Root Crops Research Network (ESARRN) ran to late 1993 and then split to form networks 4 and 5 below.
- (4) East African Root Crops Research Network (EARRNET).
- (5) Southern African Roots Crops Research Network (SARRNET).
- (6) Alley Farming Network for Tropical Africa (AFNETA).
- (7) Soil and Plant Analytical Laboratories Network for Africa (SPALNA).
- (8) Collaborative Group on Maize-Based Systems Research (COMBS).
- (9) Collaborative Group for Root and Tuber Improvement Systems Research (CORTIS).
- (10) Collaborative Study of Cassava in Africa (COSCA).

3.2.3.2. Achievements

The SAFGRAD commodity networks were externally evaluated in 1993¹; the evaluation was very positive for maize and cowpea. The networks had substantial impact

¹ See Impact Assessment of the SAFGRAD Commodity Network - USAID/AFR/ARTS/FARA/OICD OAU/STRC/SAFGRAD. J.H. Saunders, Taye Bezuneh and Alan C. Schroeder

on research on maize and cowpea in West Africa. It was estimated that the internal return to investment in public research through these networks was of the order of 73%. The networks had facilitated diffusion of new cultivars, and to a lesser extent, of improved agronomic technologies associated with the new cultivars of maize and cowpea. Even though the original SAFGRAD Project was terminated in 1993, the encouraging performance of the RENACO and WECAMAN networks, enable their lives to be extended.

The other networks which have been externally evaluated in the recent past are EARRNET and AFNETA. EARRNET (a successor to ESARRN in East Africa) was evaluated in November 1994, and received a positive assessment.¹ The review found that the network was effective in addressing issues and constraints to development of high-yielding cultivars. It developed methodologies for the generation of improved varieties, including basic seed and planting materials; facilitated the strengthening of human resource capacities in the programmes of the participating NARS, in the areas of root crops research and biological control in pest management and facilitated ready exchange of germplasm varieties and research information among the NARS. It had also encouraged on-farm and farmer-participatory research, thus generating greater relevance of research and slowly providing adoption and impact indicators.

The network's leadership was praised for being responsive to donor efforts to give greater emphasis to technology adoption and impact potentials in relation to policy decisions in the region.

ESARRN, the predecessor of EARRNET and SARRNET, was reviewed in 1992.² The report concluded that direct and in-kind project inputs, such as technical assistance, training and network co-ordination, had been delivered successfully and had contributed towards the stated project outputs. Operational support to NARS for regional research had been provided by IITA through the collaborative regional research projects. The NARS had also contributed to the projects in the form of staff time, research facilities and other logistical support.

Technical assistance and technical training provided by IITA were found to be effective and had contributed greatly to strengthening on-farm research of the cooperating NARS root-crops programmes. The overall performance and impact of the network was such that the network had generated strong interest among farmers to obtain improved materials, and had encouraged adoption of rapid multiplication and the roguing and selection of planting materials. Yield estimates indicated that improved varieties of cassava and sweet potato, used with improved management techniques, had considerably out-yielded varieties used with traditional management techniques. The evaluation report summary concluded that "the project generated enough benefits to justify its costs, that the potential for measurable farm level impact and genuine progress towards meeting food

¹ (see Phase II Evaluation of East African Networks funded by USAID — for USAID/G/EG/AFS IARC, Washington, D.C.) Oct. 23-Nov. 12, 1994. Review and Report by James C. Sentz, University of Minnesota, January 1995).

² (See IITA/ESARRN End of Project Review, Jan. 1992)

security needs in the region were good, and future support to the network should continue".¹

AFNETA was also reviewed in 1992.² The evaluator found that "the network had encouraged NARS to conduct work on-farm and develop linkages with NGOs and other extension agencies, thus serving a pioneering role, and concluded that the network had largely been successful in developing strong institutional linkages between IARCs, NARS, donors, external institutions and extension organizations.

Elsewhere in this report we have referred to the performance of COSCA (see Section 7.1.2.), of which it has been said that it "undoubtedly constitutes one of the best commodity studies implemented in Africa to date".

3.2.3.3. Assessment

The reports cited above indicate that the networks have been considered by other evaluators to be a useful vehicle for sustaining collaboration between IITA and the participating NARS. That is also reflected in the response to the survey questionnaire sent to collaborators (Appendix IV). IITA has also found networks to be a valuable means for receiving feedback, for setting research priorities, and for making improved technologies available to the participating NARS for further testing and adaptation in specific agroecologies. They thus enable IITA and the NARS to respond to the concern that technologies increasingly need to be developed within the region. Given the diversity of production environments even at subregional and national levels, technologies targeted to specific niches need to be tested at the national and subnational levels; and this targeting and local testing is facilitated by network activities.

The Panel commends IITA for the part it has played in successfully promoting networks as vehicles for partnership with NARS. However, the Panel also notes that some of them have been running for a long time. AFNETA is a network which is now in its sixth year of operation and has not yet provided evidence that alley farming technology is being accepted by the small-scale farmers. The work which led to this network was undertaken by IITA more than 16 years ago. The last evaluation report, quoted above, observed that alley farming is unlikely to be a solution for the millions of small farmers of sub-Saharan Africa, and that the prospects for its adoption are conditioned by cultural and biophysical zones. Unfortunately, the network participants continue to discuss network procedures and seem not to be adequately addressing the research agenda envisaged in the original project proposal. In the proposed Phase II, emphasis is placed in technology transfer through farmer-participatory approaches.

IITA has recognized this need to focus on both process and output and recently reviewed its policy with regard to the networks. The Panel supports the conclusion that

¹ Op cit, p.v.

² see CIDA/IDRC/IFAD Third Year Evaluation Report of the Alley Farming Network for Tropical Africa - AFNETA, IITA Aug. 1992, p. 4-5

IITA "devolve the responsibility for managing networks to national institutions as soon as they have the capacity and willingness to assume it". Regional bodies like SACCAR and ASARECA, in Southern Africa and East and Central Africa, respectively, have been set up and there are prospects of West and Central Africa having a regional body following the withdrawal of France from CORAF (Conférence des responsables de recherche agronomique africains). The Panel sees this as an opportunity for IITA to initiate the devolution of its responsibilities of running the networks to NARS. In addition, in the Panel's view, there is need to integrate more closely these IITA-supported networks with the Centre's other research and training activities.

In the light of the above, the Panel believes that recent review of IITA and its collaboration with NARS in respect of networks did not go far enough.

Recommendation:

The Panel recommends that IITA review its policies and strategies relating to networks to ensure that these are adequately integrated with, and receive support from, the Centre's research and training programmes.

3.3. Training

3.3.1. Introduction

In sub-Saharan African countries, increasing agricultural productivity is crucial to development process and institutions devoted to agricultural research and development have a vital role to play. The technologies generated in these institutions need to be adapted and adopted by the small-scale farmers who are the dominant group in agriculture in these countries, in order that they may increase their agricultural production. Unfortunately, the region has a critical shortage of trained agricultural scientists and technicians who need to work with the farmers to adopt improved technologies. IITA's Training Programme's main objective is to strengthen the capacities of national agricultural research systems to conduct the research and training regarded as essential to their own agricultural development. To this end, IITA, during the last 27 years, has provided training to over 8,000 research and extension staff - approximately 2,400 of whom were trained during the period under review.

The last EPR had made a series of suggestions about how the Training Programme could become more effective in serving the NARS in SSA. It called for, *inter alia*, giving emphasis to people involved in adaptive research; in individual research training, emphasis on African postgraduate fellows; and a deliberate effort to increase the number of African women trainees at all levels. It further suggested that IITA utilize the RRPMC to train more French-speaking technicians at the University Centre of Dschang in Cameroon. Due to administrative problems within the institution and the country, training planned in collaboration with University of Dschang under RRPMC funding was reluctantly transferred to Cotonou, Benin.

The Strategic Plan (1989-2000) commits IITA to:

- devote more core funds to training than before
- decentralize group training to national institutions
- shift emphasis at Ibadan from group training to individual research training; and
- increase the proportion of African women participants at all levels.

In order to implement the Strategic Plan and to respond effectively to the suggestions of the last EPR, IITA set up, in November 1991, an internal review panel on training. The panel drew members from NARS, one IARC (ISNAR), the IITA BoT, and the Centre itself. Its main recommendations were:

A. Individual Training

1. Specialized training should be given greater emphasis.
2. The Training Programme should take full responsibility for the management of this type of training as for the other types.

B. Graduate Research Fellowships

1. IITA should strive to train scientists of the highest calibre.
2. The trainees' dissertation topics should be within the advising scientist's area of expertise and be an integral part of the adviser's programme.
3. Training Programme should provide an annual course for research fellows that will help them to be better researchers.
4. Training Programme should assist with finding accommodation for the Graduate Research fellows.

C. Group Training

1. IITA should develop a more systematic approach to determine NARS training needs and priorities.
2. IITA research and training programmes should cooperate in developing effective means of assessing NARS priorities for both research and training.
3. Current courses should be disaggregated and reformulated into courses either on research skills for researchers (on-campus courses) or crop production and technology transfer skills (off-campus).

There were also other recommendations on production of Training Materials, Monitoring and Assessment of Training at IITA, Training Women at IITA and Inter-Centre Collaboration. Thus, this Internal Review gave the Training Programme a big inspiration by reinforcing the suggestions of the EPR, as well as the Strategic Plan.

3.3.2. Activities and Achievements

3.3.2.1. Types of Courses

The Training Programme runs three types of programmes:

- The Graduate Research Fellowship Programme, intended for M.Sc. and Ph.D. candidates. Individual research scientists studying for a higher degree are selected for fellowships on the basis of their outstanding performance. Participants may be funded from IITA core or non-core funds or be self-funded
- Non-degree participants (Research Training Associates): they receive specialized and individualized training to improve their professional proficiency, but are not working for a higher university degree
- Group training: as the name indicates, short courses involve working scientists and technicians and generally last between one and four weeks.

During the period under review, the group courses offered by the Training Programme included, among other subject areas, the following:

- Advanced Soils and Plant Analysis
- Alley Farming
- Biological Control of Insect pests
- Computer Application of MSTATC Statistical Package
- Cowpea and Soybean Research Technology Transfer
- Farmer-Participatory Research Methods
- Laboratory Equipment Maintenance
- Maize Research and Technology Transfer
- Plantain Research and Technology Transfer
- Postharvest Research and Technology Development
- Root Crops Research and Technology Transfer
- Training and Communications Skills for Researchers and Extensionists.

During the same period, a total of 30 course planning meetings and workshops were held. Of the 115 group training courses, 64 were conducted at Ibadan (53) and Cotonou (11), while the rest were off-campus. The number of regional courses involving other CGIAR centres has steadily gone up, indicating an increase in inter-centre collaboration in the area of training. IITA, along with ICRAF and WARDA, initiated an annual meeting of the CGIAR training officers - consequently the Training Programme has worked closely with the other CGIAR centres on initiatives to share resources and strengthen the NARS without duplicating their efforts. As a further demonstration of this inter-centre collaboration, IITA and ILCA (now ILRI) have taken steps to integrate their training activities, while leaving the door open for the other CGIAR centres to join them.

3.3.2.2. Participant Statistics

Since 1990, nearly 2,400 scientists and technicians have participated in training and professional advancement programmes of IITA. Of them, 119 were for Ph.D. students and 95 M.Sc. students. Non-degree courses were attended by 90 participants, while the group training courses covered over 2,000 participants. Most of the participants originated from the mandate area of IITA, with only 5% coming from countries outside of Africa. The number of women graduate students has increased appreciably. At the time of the last EPR, women who started graduate research constituted 22% of the Ph.D. students and 23% of the M.Sc. students among all trainees. In 1990, 1991, 1992, 1993 and 1994, the percentage of women offered fellowships for Ph.D. and M.Sc. studies was 18, 23, 29, 36 and 16, respectively. The low figure for 1994 reflects the fact that IITA could not award any new Graduate Research Fellowships from core funds in 1994 due to budget restrictions. The number of African women graduate students is also impressive (34 in 1994 and 31 in 1995). This increase in African women graduate students is not matched in the group training courses, where the proportion of women has remained low (13%). There is no information on the courses which the 13% of women participants attended. Although IITA gives preference to women, the low number of women taking part in the group training course reflects the actual pool of women in agricultural research and the relatively low number of nominations by NARS.

3.3.2.3. Training Materials

The Training programme and the collaborating NARS have produced training materials to support the decentralized courses. A large proportion of the planned numbers of IITA Research Guides have been prepared and others are at an advanced stage of editing. These Guides are used by both researchers and trainers, and are provided to the national programme partners to help provide training of a high quality.

The Training Programme has also provided **consultancies** to national programmes on the preparation of training materials. To help improve the relevance of the courses to the national programmes and trainees, the **Monitoring and Evaluation Unit** asks all participants at the end of each course for their evaluation of the course objectives, design, relevance, quality of instructions and planning and management of the course. The feedback helps the course planners to improve the courses.

3.3.3. Assessment

The close collaboration between the Training Programme and the Research Programmes is elaborated through the Technical Training Committee which meets quarterly to review and plan training activities. This ensures a well-programmed scheme for training at all levels. This internal partnership is a prerequisite for ensuring that quality training is imparted. The Training Programme in many instances surpassed the targets established in the first MTP (1989-93). The MTP provided for 30 graduate researchers on core funds and 70 non-core funds and self-funded; the actual annual

average was maintained at 33 for core, and 82 for non-core and self-funded. As an indication of the Centre's concern for gender in its graduate training, the number of women trainees has doubled in comparison with the previous five years.

Other significant developments regarding individual training comprised:

- commissioning of a study of the pool of women agricultural professionals in 16 West African countries
- securing of special funds for fellowships for East and West African agricultural women professionals
- improvement of the conditions of graduate research fellowships
- exercising of flexibility in granting extensions to research Fellows based on a more vigorous, three-step, programme monitoring and evaluation process.

With regard to group courses, the Programme implemented the recommendations of the 1991 internal review undertaken in 1991 by embarking on a vigorous decentralization of group courses. It has succeeded in reorienting the Group Training Unit towards strengthening the capacity of NARS to conduct their own research-related training. The decision to decentralize the group courses has been welcomed by the NARS, as it has given them an opportunity to provide resource persons and also helps NARS prepare themselves for eventual assumption of full responsibility for such training courses. The Panel commends IITA for having moved expeditiously to decentralize its group training courses. This is being carried out methodically, and is being accompanied by training of trainers and provision of Research Guides, among other measures.

In order to ensure the availability of funds for the decentralized courses, IITA has developed two proposals for special funding. The Programme has provided leadership in developing gender and end-user awareness, has helped develop skills in gender/end-user analysis among IITA training and research staff by hosting consultancies on gender analysis in training materials and research portfolio reviews for IITA scientists.

The need for trained agricultural researchers and technicians in Africa is enormous. IITA and other CGIAR Centres have a comparative advantage in training because of their involvement in agricultural research. The contribution of trained manpower to national development of the NARS will depend on the extent to which national governments give priority in resource allocation to agricultural research and training. Indeed, IITA has trained over 8,000 African men and women but it has not tracked them subsequently. The recent pilot survey questionnaire sent out to all former IITA training participants in Ghana, Sierra Leone and Nigeria is a beginning in the effort to collect information on impact of training. A fuller impact assessment will be carried out in the next 18 months.

The need for training African women scientists and technicians cannot be over-emphasized. The African woman is at the forefront of agriculture and yet national

governments do not nominate women to take advantage of the training programmes of IITA. Perhaps IITA should sensitize not only its staff to this, but also directors of research and extension of the collaborating NARS. Overall, however, the Panel concludes that the Training Programme has done a commendable job during the review period.

3.4. Future Plans for ICD

The need to strengthen the NARS research capabilities in the region is greater today than it was before. The IARCs should increase and strengthen collaboration with NARS to ensure that improved technologies are taken up by small-scale farmers. It must be recognized that the IARCs cannot solve all the problems of technology generation and transfer. The long-term requirement for strengthening research capacity in the region can ultimately only be met by greatly improving the national programmes to which IITA and other IARCs can devolve some of their roles.

The ecoregional approach to international agricultural research has been prepared by TAC for fostering NARS-IARC collaboration. It calls for improving the institutional arrangements involving NARS and IARCs in collaborative research on sustainability problems and integrating productivity research with national resources management research. IITA's ecoregional initiatives provide yet another opportunity for IITA to strengthen its collaboration with its NARS partners, to generate productivity-enhancing and environmentally sound technologies.

IITA within its ecoregional orientation has established research stations in key agroecological zones of the region (see Sections 1.4. and 2.3.). The benefits of decentralization are the closeness of the researchers to the problems to be addressed and increased contacts with the NARS. The regional visibility and accessibility leads to willingness to adopt and adapt new technologies and gives IITA more knowledge of and potential responsiveness to, the real problems faced by the NARS. Decentralization, therefore, has great potential in fostering collaborative, particularly on-farm, research activities within the host NARS and those in the neighbouring countries. The Panel is aware that the IITA management recognizes the potential benefits of decentralization as a mechanism of increasing cooperation with national programmes.

Training is a continuing process and even those who have passed through IITA courses may need to return for refresher courses, more likely as participants in the individualized non-degree training. Individual training needs to be emphasized even more in the future. The initiative taken by IITA to prepare funding proposals should be pursued, to secure funds for group training courses off-campus. The performance of IITA during the past five years in training activities and the growing inter-centre collaboration has created the expectation that more opportunities for training will be created. However, available projections indicate that Africa needs an additional 10,000 research scientists by the year 2000. Clearly, IITA and other IARCs cannot be expected to fill this need, and in the long-run, IITA must work towards reducing its role in training by phasing out its group training activities and individual short training courses. At the

same time, there is a need to develop a more effective training strategy in which other IARCs and stronger NARS can participate.

Overall, the Panel notes that the International Cooperation Division must deal with a large and heterogeneous set of activities. The Panel recognizes that the Institute's role in institution-strengthening will remain important in the foreseeable future. In view of the new functions, including information services and public awareness, proposed to be assigned to ICD (Section 4.2.5), the Panel foresees a stronger institutional role for the Division both within IITA and with its external collaborators. Hence, given the commendable progress made by IITA in decentralizing its training activities, the new emerging Systemwide ecoregional initiatives/programmes within the region and the new potential modes of partnerships with NARS, the Panel recommends the following:

Recommendation:

The Panel recommends that the International Cooperation Division undertake a review of its priorities, strategies and activities, in order to respond effectively to the emerging opportunities for increased partnership with NARS and other collaborators.

CHAPTER 4 - GOVERNANCE AND RESEARCH MANAGEMENT

4.1. Governance

4.1.1. Overview of the IITA Board of Trustees

The 1990 EMR noted that the IITA Board of Trustees (BoT) had made significant progress in improving Board processes during recent years. This process of beneficial change has continued. The BoT is now composed of well-qualified Trustees who are committed to the Institute and its mission. They have developed a sound structure of committees with well-documented terms of reference and they continue to test new methods of performing committee and BoT tasks. Information needs and requests of the BoT are met promptly by management.

Although not having defined precisely the dividing line between "policy" and "management" decisions *per se*, the BoT and the Director General (DG) appear to have reached an implicit accommodation that serves their respective roles in a satisfactory manner. As the "Re-engineered CGIAR" further evolves, the role of the BoT can be expected to change somewhat and relationships with management may be modified. Neither the BoT nor the DG has come to grips with the full implications of that transformation - a situation no doubt shared by all of the IARCs at this early stage. In any event, the goodwill, trust and mutual respect that currently exists between the BoT and management in IITA can be expected to provide a sound basis for working out any adjustments that may be needed.

4.1.2. Size and Composition of the Board

The BoT is authorized to have not less than nine and not more than 17 members. Four Trustees are *ex-officio* members, including the DG and three members from the host country. The BoT which is currently made up of 17 members (Table 4.1.) has made an effort to achieve regional balance among Trustees while maintaining the range of disciplines required to perform its responsibilities for oversight of research policies and programmes and of management operations. It continues to seek qualified women candidates. Twenty-one percent (3 out of 14) of the present Board-selected Trustees are women, which compares very favourably with other IARC Boards. In terms of composition, the Panel believes that besides having experienced business managers, the BoT should continue to include members who are formally trained and experienced in research management in order to help guide the complex management challenges in IITA.

Recognizing that 17 is a large number, the BoT has periodically reviewed the issue of whether or not one or two positions should be left unfilled, especially as a way of economizing on BoT expenses. This issue was revisited during the December 1994 meeting attended by the Panel consultant. As in previous years, the BoT noted that IITA is a research institute with a multicrop portfolio, operating in a region with wide agroecological zones. To achieve the desired range of scientific and managerial

Table 4.1.

Composition of the IITA Board of Trustees: 1989-1994

Name	Nationality	Discipline	Sex	1989	1990	1991	1992	1993	1994	Current Trustees End Term	Term
Fakambi, L.	Rep. of Benin	Nutrition	M	X							
Ikoku, C.*	Nigeria	Higher Education	M	X							
Mustapha, D.*	Nigeria	Agriculture	M	X							
Adetunji, S	Nigeria	Soil Science	M	X							
Wilson, L.	Trinidad	Plant Science/Educ	M	X (C,N)							
Stifel, L.**	USA	Economics	M	X	X						
Crouch, L.	Dominican Rep.	Management	M	X (A)	X (C)						
Wormer, T.	Netherlands	Crop Physiology	M	X (P)	X (P)						
Buvinic, M.	Chile	Social Science	F	X	X (A)	X (A)	X (A)				
Mumba, N.	Zambia	Soil Science	M	X	X (C,N)	X (C,N)	X (C)	X (C)	X		
Toriyama,	Japan	Breeding	M	X							
Barker, R.	USA	Agric. Economics	M	X	X (P)	X (P)	X (P, C)	X (C)	X (C)		
McEwen, F	Canada	Entomology	M	X	X						
Cunningham, R.	U.K.	Agric. Chemistry	M	X	X	X	X	X (V)	X (V)		
Perlasca, G.	Italy	Agribusiness Mgmt	M	X	X	X	X	X	X		
Nakamura, K.	Japan	Biochemistry	F	X	X	X	X	X	X		
Njøs, A.	Norway	Soil Science	M	X	X	X	X (A)	X (A)	X (V, A)	1/05/95	Second
Touré, B.	Côte d'Ivoire	Cell Biology/Educ.	M		X						
Hecht, S.	USA	Geography	F		X	X	X				
Banjo, A.*	Nigeria	Higher Education	M		X	X					
Ayo, A.*	Nigeria	Administration	M		X						
Brader, L**	Netherlands	Entomology	M		X	X	X	X	X	ex-officio	
Anumudu, T.*	Nigeria	Administration	M			X	X	X			
Delucchi, V.	Switzerland	Entomology	M			X	X (P)	X (P)	X		
Dubreuil, P.	France	Ag. Engineering	M			X	X (N)	X (N)	X (C)	1/05/97	Second
Odegbaro, O.*	Nigeria	Crop Physiology	M			X	X				
Diouf, J.	Senegal	Agric. Economics	M			X	X	X			
Stewart, J.	Canada	Soil Science	M			X	X	X	X (P)	1/05/97	Second
Van Montagu, M.	Belgium	Biochemistry	M			X	X	X	X (N)	1/05/97	Second
Mukiibi, J.	Uganda	Plant Pathology	M				X	X	X	1/05/95	First
Okelo, M.	Kenya	Banking	F				X	X	X (A)	1/05/95	First
Omole, W.*	Nigeria	Animal Nutrition	M				X	X	X	ex-officio	
Aliyu, A.*	Nigeria	Veterinary Medicine	M					X	X	ex-officio	
McCorkle, C.	USA	Anthropology	F					X	X	1/12/95	First
Hoffman, V.	Germany	Agric. Sociology	M						X	1/05/97	First
Clucas, M.	U.K.	Business Management	M						X	1/12/97	First
Lamorde, A.*	Nigeria	Veterinary Science	M						X	ex-officio	
Leventis, A..	UK	Business Management	M						X	1/12/97	First
Porceddu, E.	Italy	Plant Genetics	M						X	1/12/97	First
Saio, K.	Japan	Food Science	F						X	1/12/97	First
Sedogo, M.	Burkina Faso	Soil Science	M						X	1/12/97	First

C-Board Chair; V-Vice Chair; P-Program Committee Chair; A-Audit Committee Chair; N Nominating Committee Chair;

*-Host-country representatives; **-Director General

competencies, while maintaining regional balance, a satisfactory donor/non-donor country ratio and increasing the presence of women on the Board, a large majority of the Trustees felt strongly that a full complement of Board members should be maintained.

The Panel shares this view. However, currently, 11 out of 17 Trustees come from donor countries and there are only four members from African countries (Burkina Faso, Kenya, Nigeria and Uganda). If the BoT is to fulfil its commitment to bring the NARS and other collaborators into more effective participation in planning and executing a comprehensive research programme, the Panel **suggests** that the BoT (a) gives serious consideration to achieving a more equitable balance between donor and non-donor countries and seek to recruit well-qualified Trustees from collaborating institutions or (b) develops other consultative processes. The Panel also **suggests** that, since IITA stations are now hosted by several other countries, the BoT consider including one member from another host country (besides Nigeria) without increasing the number of *ex-officio* host-country representatives.

4.1.3. Frequency of Board Meetings

The BoT meets twice a year, usually in April and December, with the Executive Committee (EC) meeting one additional time (or more if the situation demands). To minimize costs, the BoT has adopted the practice of polling members by mail on urgent issues that cannot await the next regularly scheduled meeting. Considering the frequency of meetings, and the travel distances and difficulties involved, the attendance record has been good. Seldom have more than one or two BoT-selected members been absent in recent years, and such absences have usually been due to unexpected and uncontrollable circumstances. The BoT has a standing rule that two successive absences result in termination of the Trustee's membership, and the rule has been rigorously applied, with rare exceptions being made to meet unusual circumstances.

Conscious of the need to keep costs to a minimum, the BoT has periodically considered having one regular meeting a year, with only the EC and Programme Committee (PC) meeting twice. Members feel that since a majority of members serve on those two committees, any saving would be minimal and would deprive the remaining minority of the opportunity to be as informed about IITA's programmes and operations as the others. Furthermore, experience in recent years indicates that the frequent demands on the BoT generated by Strategic and Medium-Term planning exercises, the dynamic changes taking place in the research programmes as a result, and the recurring budget crises in the CGIAR would, in any event, have required the calling of an Extraordinary Meeting of the BoT if only one regular meeting had been scheduled each year.

In the light of the above, the Panel **suggests** that when and if, the financial situation of the CGIAR is stabilized on a sustainable basis and IITA has fully implemented a redesigned research programme and supporting management structure, the BoT should reconsider the need for two full Board meetings a year.

When the full Board meets twice a year, the need for formal interim reporting by management to the BoT is less than for a Board that meets only once a year. Nevertheless, some Trustees feel that more frequent updates on significant developments between BoT meetings would be helpful. As a minimum, the Chief Financial Officer could provide a quarterly update on the current financial and budgetary situation to the EC and the Audit Committee (AC). The Panel therefore **suggests** that the BoT should reach agreement with management on the scope and frequency of interim management and financial reports to the BoT, to keep Trustees informed of significant developments between regularly scheduled BoT meetings.

4.1.4. Management of the Board

Board and committee meetings are well structured, the Board Docket is complete, is convenient to use and is available in advance. Agenda items are clearly identified as to whether a BoT decision is required or whether it is for background and information purposes. This enables the Trustees to allocate their time in reading the analysis more efficiently. BoT and committee agendas are complete, available in advance, and observed. Meetings are orderly, systematic and engage the active participation of members. Trustees feel free to contribute without inhibition, and exchanges are frank and cordial. All members, even first-time attendees, feel free to propose initiatives or agenda items and their interventions are given due consideration.

Committee Terms of Reference are clear and succinct and members seem well acquainted with their roles as committee members. The committees are generally of an adequate size and meetings focus sharply on the agenda items. Participation is active, widespread and lively. A problem arises from a provision in the By-Laws that requires that each Trustee serve on at least one committee while strictly limiting the size of each committee. As a result, when there are many new members it is sometimes required that a veteran member relinquish a post to accommodate a new member, or that one or more Trustees are assigned to a committee for which they lack appropriate background or interest. The BoT decided during the December 1994 meeting to reconsider the committee membership requirements, including any necessary By-Laws revision that would improve use of members' qualifications and interests.

During the December 1994 meetings, the BoT reviewed the current status of its Conflict of Interest Policy. It concluded that the present formulation in the By-Laws did not provide sufficient guidance for Trustees. After an inconclusive discussion of possible changes, the BoT requested the DG to collect examples of such policy statements of other IARCs from the CGIAR Secretariat and to include this subject on the agenda for the next BoT meeting.

It is BoT practice to evaluate the DG annually, in closed session with the DG absent. This was done in December 1994; and the BoT decided to renew the DG's contract for another five years. The evaluation in December 1994 was extremely informal and unstructured. It might even be characterized as superficial, except that it was apparent that each Trustee had formed a firmly held and deeply felt opinion of the

DG's performance - which they found to be excellent, with no dissenting voice heard. However well-merited such an appraisal might be, it is not very helpful to the DG to be told simply that everyone thinks everything is fine. The DG is a man of perception and much well-assimilated experience. He is conscious of the fact that no one is perfect and he is sincerely interested in constructive feedback from the BoT on ways in which he might improve his own performance. The BoT should try to be more helpful in this regard.

Recommendation:

The Panel recommends that IITA Board develop and implement a more systematic and structured process for evaluating the Director General's performance and use the results for making future BoT decisions on Director General contract terms and conditions.

The BoT does not have the custom of evaluating the performance of the BoT Chairman, as do other IARCs. Introducing an annual Chair evaluation, perhaps at alternate meetings from the DG evaluation, would not only serve the customary purpose for the Chairman, it would help focus the members' attention on the desired performance criteria. This would aid both in selecting a successor and in recruiting new members with a potential for succeeding to the Chair. Consequently, the Panel **suggests** that the BoT should develop and implement a systematic process for annually evaluating the performance of the BoT Chairman.

During the December 1994 meeting, the BoT decided to consider initiating a Board self-evaluation process. One member volunteered to develop a rating system for testing at the next meeting. This is a commendable move and provides another indication of the seriousness with which the BoT views its responsibilities and demonstrates its determination to improve its ability to serve IITA.

Although the BoT is conscious that its operations have a cost impact and has taken some steps to reduce costs during periods of budget stringency, it does not systematically review its own budget nor does it receive an annual report of its expenditures. The IITA annual budget includes \$170,000 within the "Administration" activity for BoT expenses but this amount does not reflect the full costs of BoT activities. It covers only the honorarium, travel and subsistence costs. Not included are such costs as printing/reproduction, postage and shipping, telecommunications, operating expenses of IITA-owned aircraft and vehicles when used for BoT activities, etc. Because of the size of the BoT, the frequency of BoT meetings and the cost concerns of some donors, the BoT needs to take exceptional steps to reassure donors (and itself) that it is sensitive to the need to economize. In this regard, the Panel **suggests** that the BoT should request the IITA Finance Officer to provide, each year, a fuller report of BoT expenses. The report should be reviewed by either the EC or AC, and any issues, problems or suggestions for more economical operations should be recommended to the full BoT.

4.1.5. Selection, Orientation and Development of Trustees

Next to the selection and separation of the DG, perhaps the most important single responsibility of a Board is to ensure the quality of the Board itself by selecting highly qualified candidates, making sure that they receive adequate orientation to the Board and the Institute. Furthermore, the Board should ensure that they are given ample opportunity to develop into productive Board members by judicious assignment to (and perhaps rotation between) committees, so that there will always be at hand a good pool from which to select Board and Committee Chairs. A Board that is composed of highly qualified persons, committed to IITA and its mission, who take their Board responsibilities seriously, will not go far wrong. It will provide itself with strong leadership in the Chair and judiciously allocate its time and energies to the appropriate areas of greatest need, taking into consideration the circumstances of the moment.

The principal responsibility for this lies with the NC. The NC consists of four members, elected by the BoT, one of whom is selected by the BoT as Chairperson. The NC is responsible for recommending to the BoT nominations for new Trustees, their nomination for second terms, members of BoT committees, the Chairperson of the NC, and candidates for BoT Chair and Vice Chair. The DG and BoT Chairperson are not members of NC, but usually attend meetings of the NC as non-voting participants.

The NC has developed a good inventory of qualified candidates, and makes a systematic effort to match BoT needs for disciplines and fields of expertise with candidate qualifications. Recent unexpected resignations from the BoT, combined with normal turnover, resulted in the need for six new Trustees in 1994, twice the normal expected intake. The NC was nevertheless able to recommend at least two qualified candidates for each vacancy, while maintaining regional balance and female representation. Recognizing that six new members in 1994 would mean six vacancies again in the year 2000, the NC obtained BoT approval for developing a proposal for selectively altering second-term periods to achieve a more even flow of vacancies.

While the selection of candidates is handled expeditiously, nominations for committee assignments (and thus, to some extent, the development of Trustees) is constrained by the requirement in the By-Laws governing the size of the various committees. Placement of new Trustees, and judicious rotation between committees is thereby hampered. Recognizing the problem, compounded by the unusually large intake in 1994, the NC obtained the concurrence of the BoT to develop proposed amendments to the By-Laws, for consideration at the next BoT meeting, that would provide more flexibility in committee assignments.

The responsibility for the orientation of new Trustees has not been assigned to the NC or to any other committee or officer of the BoT. In the past, the DG has offered an orientation programme to new members that introduced them to IITA, its facilities and its research programmes, and has supplied a compilation of materials in the form of a BoT Handbook. During the December 1994 meeting, the Chairman hosted the new members at a dinner during which the recent history of the BoT and IITA were reviewed. While these efforts were appreciated by the new members, there remains a felt need

(expressed by some older as well as new members) for an added dimension to the orientation process. New Trustees should have an opportunity for a more extensive introduction to the *modus operandi* of the Board itself. This should include the rights and responsibilities of the Trustee (including fiduciary responsibilities), the key decisions that will be on the BoT's agenda for the three years of the member's first term, the BoT's conflict of interest policy, and the opportunities for committee assignments and Board experience. Given the importance of orientation to the performance of the new Trustees, the Panel **suggests** that the responsibility for arranging a comprehensive orientation for new Trustees should be explicitly assigned to a committee (e.g. the NC or EC) or to an officer of the BoT (e.g. the Vice Chairman).

4.1.6. Research Policy and Programme Oversight

While the BoT's responsibility for oversight of IITA's research policies and programmes is shared by all Trustees, the principal responsibility is delegated to the PC. The PC consists of not more than nine members, one of whom is elected by the PC members as the Chairman. It advises the BoT on all matters relating to research plans, programmes policies and budgets. It monitors research programmes for quality and conformity with IITA's approved Strategic and Medium-Term Plans.

The 1990 EMR recommended that BoT "make every effort to interact informally" with scientists and other senior staff to "improve their understanding of the Institute's work". This recommendation has been partially implemented by the current BoT and PC, and additional efforts are needed. This could include mechanisms for sampling opinions of a cross-section of the IITA community. Visits to outstations, as well as informal get-togethers and PC structured meetings with research programme leaders, have provided opportunities for members to gain useful insights into research problems and prospects.

In recent years the PC Programme Review meetings with senior staff consisted largely of presentations on the status of research, training and international cooperation activities. This format provided a useful opportunity for informing PC members about the current status of a wide range of programme activities but was time-consuming and afforded little chance for detailed or extensive interaction between PC members and programme staff. During the December 1994 meeting, the PC experimented with a variation on this customary format. After a half-day session dealing with the more routine committee matters, the PC divided into three "Concurrent Groups" to meet separately with senior staff to explore selected topics in depth. This experience was viewed favourably by senior staff as well as by participating PC members, and should form the basic strategy for PC/staff interaction in the future. It provides a sounder basis for the PC to deal with issues relating to the quality of science in IITA.

The Panel is aware that the current practice is to carry out an internal review of one division each year. Thus, over a five-year period, all IITA activities are reviewed (see Section 4.3.4.). If the CGIAR thrust towards more reliance on internally-managed external reviews continues to be emphasized, the PC (on behalf of the full BoT) may need

to reconsider its relatively passive role in the current external review process. Anticipating the future need to revise the current Medium-Term Plan (and, indeed, eventually to revisit the Strategic Plan), the PC might well begin with a planned series of external reviews of research programmes that would focus more sharply on the longer-range impacts of anticipated technologies.

At present, there is little opportunity for the BoT to systematically address such strategic issues, to identify the longer range implications in terms of the social, environmental and economic impacts, and to reach a consensus on the appropriate research strategy. With some greater involvement of the PC in the structuring of future external reviews, it should be possible to equip the BoT better with the cumulative information and deeper understanding of the costs and consequences of alternative research strategies. This would position the BoT to deal more strategically with the major policy decisions it must make in the not so distant future.

Recommendation:

The Panel recommends that the Programme Committee utilize more proactive and participatory methods in determining research strategies and review policies, including those for internally managed external reviews, to enable the BoT to provide effective oversight of the scope and quality of the research programmes of IITA.

4.1.7. Management Policy and Operations Oversight

Board responsibility for oversight of IITA's management and administrative operations is shared between the EC and AC.

The EC is comprised of the BoT Chairperson, Vice-Chairperson, the DG, and the Chairpersons of PC and AC, plus one additional Trustee. It has the customary power to act on behalf of the BoT between meetings and serves as the Budget and Finance Committee of the BoT. It appears to exercise self-restraint in avoiding the taking of decisions that could and should be taken by the full BoT and reports promptly to the full BoT any decisions or actions taken.

The AC consists of four members, one of which is selected by the AC members to serve as Chairperson. It oversees the work of the External and Internal Auditors and recommends to the BoT appointment of and contractual arrangements for the External Auditors. The AC currently comprises four highly qualified Trustees with broad experience in banking, business and finance, as well as in scientific research. It conducts its business with diligence and dispatch, and has established sound working relationships with both the Internal and External Auditors.

While both the EC and AC are involved in the oversight of management operations, their present practice is partial and reactive. The EC's oversight is largely DG-driven. That is, it reacts to those management issues brought before it by the DG and relies heavily on the DG's recommendations for solutions. The AC's oversight, on

the other hand, is largely driven by audit findings. That is, it reacts to findings presented by the Internal and External Auditors. While both committees are effective in their assigned roles, there remain large areas of management policies and administrative operations not systematically covered under present BoT oversight practices. For example, there are no internally-managed external reviews of management and administrative operations that correspond to those conducted for research programmes and BoT members do not appear to have sufficient informal interaction with staff at all levels to gain an in-depth appreciation of the management issues found by the Centre and how they might be overcome in the future.

If the CGIAR proceeds to implement a revised system for external reviews as envisaged in the TAC Chair's Report to ICW'94, (ICW/94/18) relying to a greater extent on internally managed external reviews, the IITA BoT will need to develop somewhat more comprehensive practices for discharging its oversight responsibilities.

Recommendation:

The Panel recommends that the Terms of Reference of the Audit Committee (AC) include oversight responsibility for management systems, personnel policies and administrative procedures. The AC should also provide guidance for undertaking internally managed external reviews in these areas as appropriate.

In response to recommendations in the 1990 EMR, the BoT has enacted policies on IITA borrowing authority and investment practices (see Section 5.2.). However, neither the full BoT nor any of its committees currently monitors the implementation of either of those policies. Consequently and in view of the importance of minimizing the Centre's exposure to investment risks, the Panel suggests that the BoT should assign, to either the EC or AC, the responsibility of annually reviewing with the Finance Officer the Institute's borrowing practices and investment programme for the past year and any significant changes planned for the current or future years.

4.2. Leadership and Organization

4.2.1. Continuing Evolution

At the last EMR in 1990, the former DG was praised for the determination and skill which had been shown in bringing about major improvements in the management, personnel and fiscal processes of IITA, in what was generally viewed as a "disturbed system". Some in IITA believed that this had led to greater bureaucracy, although it was apparent there was need for greater control and a need for some clarification in management procedures. A recommendation was made for more participatory forms of decision making. In response, after the current DG was appointed at the end of 1990, several participatory fora were established or reinvigorated. These include the Management Consultative Committee (MCC), Research Director's Committee (RDC), Executive Management Committee (EMC), Joint Advisory Committee (JAC), Community Council, and the Work Planning Week. All of them are mechanisms intended to provide

opportunities for collaborative decision making. The minutes of these meetings are available to staff. In addition, the new leadership within IITA encouraged the formation of three new associations in 1991 (i.e. Senior Staff Association, Management Staff Association, and the International Staff Association). The degree to which these "management-initiated" associations have been effective is evaluated elsewhere (see Section 5.1.).

IITA's organizational structure has also evolved since 1990. During the last EPR and EMR there were considerable concerns about the research management structure. These have been addressed in an evolutionary manner. The current research structure that has evolved over the last five years has resulted from comments in the last review: to create a separate plant health management division, to streamline the link between management and research, and to minimize the number of Director and DDG positions. These have been taken into account during the review period, through the creation of the PHMD and the RDC and by reducing the number of Director and DDG positions from 14 to 7.

During 1991, the crop-based working groups were transformed into the humid forest and moist savanna programmes, which in fact included most of the staff of the RCMD. Two other research divisions, CID and PHMD were also formed at the same time. Each research division is divided into programmes that are headed by Programme Leaders who are selected in consultation with programme members. The three Divisional Research Directors, together with the DDG for International Cooperation and the DG currently constitute the Research Directors' Committee (RDC). The RDC is chaired by the DG. The RDC and the DG have taken over the functions of the DDG(R) who has not been replaced since his departure in 1991. The current organization within IITA is shown in Figure 1.1. and is discussed later in this section.

4.2.2. Assessment of DG's Leadership Style

It is obvious that there have been major organizational changes during the review period and that these are continuing to evolve over time. The Panel is impressed with the dynamic leadership and commitment shown by the DG. His informal and straight-forward manner and approachability on research-related issues make him a popular research leader both with the IITA Board and with scientists. The Panel therefore wishes to congratulate the DG on the progress that IITA has continued to make in implementing a very difficult mandate in a complex institutional environment. The "participatory/consultative learning-by-doing approach" to research management issues has been popular with many staff. The DG has also initiated many changes in the research management system. This does not imply that there are no problems, particularly in relation to the more limited attention given by the DG to evolving administrative and human resource management issues (see Section 5.1.) but the progress that has been made in what is a very dynamic and uncertain institutional setting deserves special recognition. It is also apparent that linkages with other IARCs have continued to improve and become stronger during the review period (see Section 6.3.).

4.2.3. Assessment of the Research Culture

The general impression of the Panel is that IITA has become a stronger research centre and that the environment for science is much better than it was five years ago. In general the senior management and research staff appear to work well as a team, and all apparently respect the leadership style of the DG. However, the Panel did detect some evidence of strained relationships between researchers and administration (see Section 5.1.), and sometimes between and within, the research divisions. Nevertheless, the senior management makes efforts to listen to issues raised by staff, including those pertaining to eliciting the views of staff with respect to issues concerning the future programme direction(s) of IITA. For example, during the 1995 Work Planning Week, considerable time was spent in discussing the move towards a project-based approach to organizing the research programme. As a result of this consultative approach, widespread support emerged for the principles underlying the proposed change. Consequently it appears that the changes that are being introduced are not creating, to the same degree, the stresses and strains that have been apparent in some other CGIAR institutions where analogous changes have been introduced using more of a "top-down" approach.

The current organizational environment is now more conducive to encouraging creativity, although because of the evolutionary nature of the research management process, it is apparent that there is sometimes a perceived lack of clarity in what is expected and the way in which things are done. Given the policy of "incremental change", this is perhaps inevitable. However, the Panel is convinced that senior management will devote greater attention to communicating its intentions and expectations to staff, thereby facilitating the continued evolution of the desired research management and processes over the next year or two.

4.2.4. Assessment of Structure of Scientific Leadership

The structure of scientific direction at IITA is unusual, if not unique within the CGIAR System. Since his arrival, the present DG has taken a keen personal interest in the scientific direction of the programmes and is closely involved in their formulation. For this reason, he has elected not to fill the position of DDG(R). As noted earlier (see Section 4.2.2.), he has undoubtedly fostered an *esprit de corps* among the IITA scientists which the Panel strongly commends. Thus the Panel seeks to encourage rather than undermine this personal approach and involvement.

Nevertheless the Panel feels some adjustment is necessary. The reasons for this are as follows:

- The Panel believes the DG is overloaded, considering all the other institutional responsibilities he has. This inevitably means a tendency to address pressing issues through reactive decision-making, and reduces the time available for strategic and proactive decision-making that is so important in the complex environment in which IITA operates. The time and attention given to

administrative issues, particularly the management of IITA's large investment in its staff, is also limited.

- The top scientific direction of the centre is assigned to the RDC, comprising the DG, the three Research Division Directors and the Director of International Cooperation (until recently the DDG(IC)). This committee has broad terms of reference encompassing research policy formulation and implementation, the provision of leadership for planning and implementation of research activities, cross-divisional collaboration and communication and the review and endorsement of research and training proposals to be presented to donors. The Panel is not convinced that a committee, which meets monthly, can effectively perform these functions, including also line responsibility for research implementation and supervision, particularly since two of the Division Directors live away from the Ibadan headquarters in other countries.
- The heads of the Research Divisions are relatively new appointments and the learning cycle which the Research Directors are undergoing, their onerous responsibilities and their geographical separation raise questions as to how effectively they can communicate with each other on a day-to-day basis and at the same time provide the necessary research leadership within their own divisions. As presently structured, the research direction of IITA assumes a degree of altruism on the part of divisional directors which is perhaps unrealistic. There is a widespread but understandable perception within the Centre that the three Divisional Directors on the RDC are sometimes unable to transcend their divisional interests. Thus the response to the criticisms of the last EPMR, that the senior management was top-heavy, now seems to have moved too far in the other direction.
- Under the present arrangements, there is, during the DG's necessary and frequent absences, a lack of a central reference point for scientific matters in IITA, in terms of both internal and external relations. During such absences of the DG and therefore, *de facto*, the DDG(R), the DDG(Management) is in charge and becomes the contact point for scientific matters originating from outside the centre - clearly an unsatisfactory situation. To place one of the Research Directors in charge of scientific matters would also create problems since it would presumably always devolve to the one stationed in Ibadan, creating possible equity problems with the other two located outside Nigeria.

The Panel is aware that the issues relating to the absence of a DDG(R) have been a frequent topic at IITA Board meetings. Nevertheless, in light of the above the concerns, the Panel **suggests** that this issue is addressed once again by the DG in consultation with the Board. The Panel further **suggests** two possible options that could be considered:

- The appointment of a DDG(R) with the management and international cooperation posts each being filled at the same level (i.e. DDG level). This is the option preferred by the Panel. The Panel is aware that both the DG himself and the RDC may not be comfortable with this option, in introducing another

administrative layer. Also, the Research Directors may feel that the interpolation of a DDG(R) with line responsibilities for the direction and implementation of research would diminish their roles. However, the Panel, while acknowledging the risk, believes that such concerns are over stated. The removal of some of the coordinating duties currently assumed by the RDC would free the Divisional Directors for more direct involvement in the planning and execution of the research work in their respective areas. What would be critically important is the appointment of a DDG(R) who would be willing to continue using the RDC as an advisory and consultative body to foster interdivisional communication and cooperation in the Centre.

- The appointment of a DDG without portfolio in the DG's office, and designation, as well, of the management and international cooperation posts at the DDG level. The advantage of this option would be that the DG could decide on the division of the duties between himself and his deputy, thereby permitting him, if he so desires, to continue taking a "leading role" in the direction of research. However, this solution is likely to be far less satisfactory, especially once the current DG completes his appointment at IITA. This option is not preferred by the Panel.

Recommendation:

The Panel recommends that the Director General re-examine with the IITA Board, the appointment of a Deputy Director General (Research) to ensure that top research leadership can be provided in a continuous and sustained manner without distorting relationships in management structure.

With the appointment of the DDG(R), the present distortions in the research management structure could be removed. One of the organizational anomalies of structure is that Research Support and Research Farms Units are allocated to individual Research Divisions. This arrangement is not ideal in terms of safeguarding equal access to and attention to, these Units. It may be desirable for some specialized Units to stay with their current Divisions (e.g. Genetic Resources and Biotechnology with CID, Seed Health and TT&T with PHMD, and Agroecological Studies with RCMD). However, other Research Support Units, Research Farms and IITA stations (i.e. Cotonou, Kano, Onne, Bouaké/Ferkessedougou, Namulonge, and Nkolbisson/Mbalmayo) could report to the DDG(R).

4.2.5. Assessment of Structure for International Cooperation

This issue has been examined by the Panel because of the possibility that the new head might be appointed at the Director level. Reasons why the Panel feels the position should be filled at the DDG level are:

- IITA's external environment is undergoing constant change, with inter-institutional relationships becoming increasingly complex and demanding - for

example, with R&D partners, donors and media. For policy dialogue with NARS and for serving as convenor of ecoregional consortia, the DG will continue to need a dynamic and strong DDG for international cooperation with good negotiating skills.

- Given the international status of IITA, it would be preferable for the head of international cooperation to act as head of IITA in the absence of the DG and DDG(R).
- There will be additional responsibilities arising from the plan to transfer Information Services to the International Cooperation Division. The Panel concurs with this decision of the DG.

Recommendation:

The Panel recommends that the head of international cooperation should continue to be appointed at the Deputy Director General level and have additional responsibilities including information services.

4.2.6. Assessment of Divisional Structure

As the move takes place to greater emphasis on the ecoregional approach and the development of the consortia, there may be pressure to eliminate divisions, as currently constituted, and replace them with divisions organized by ecoregions. The Panel would advise against this move at this time for a number of reasons. The Panel believes that the current divisional structure is desirable, in spite of the fact that, on occasion, it appears to engender some strains when it comes to allocating the limited resources available for research. The Panel believes that persuasive arguments in favour of maintaining the current divisional structure are to:

- Maintain focus and disciplinary strength.
- Ensure that subjects that are not ecoregion-specific (i.e. particularly often relating to a more strategic type of research) continue to receive adequate emphasis.
- Ensure that there is not too much dispersion in disciplines. While the Panel recognizes the strengths of an interdisciplinary approach, which is already reflected in the multidisciplinary composition of the current Divisions and the interdisciplinary nature of the projects, it also believes that peer interaction and review within disciplines is an important activity to ensure scientific quality.

4.2.7. Assessment of Decentralization

Decentralization of research activities has continued since the last review, with the result that IITA is now one of the more decentralized centres. IITA management clearly recognizes the advantages of this but at the same time recognizes the complexities it creates in terms of management. This is apparent in documentation provided to the Panel by the DG:

"The benefits of decentralization are the closeness of the researchers to the problems to be addressed and the increased contacts with NARS. The regional visibility and accessibility leads to willingness to adopt and adapt [and] gives us more knowledge of, and responsiveness to, to the real problems faced by the NARS. There has to be a balance between the requirement for actually being in the region and conducting research in Ibadan, although there is a need for both. Decentralization, however, comes at a price. Greater efforts have to be made to ensure that communication flows; that scientists remain up-to-date in disciplinary terms; and that there is a critical mass for tackling the issues. Decentralization of administration for stations other than headquarters is not an easy issue but is being worked on. As might be anticipated, the stations feel too much is centralized and headquarters requires assurance that devolution of authority, in areas such as purchasing, is effected in an appropriate manner."

The Panel believes that this expressed understanding on the part of the management of IITA bodes well for entering into a dialogue between the "periphery and the centre." Unquestionably there is concern at the periphery about the understanding and the motives of the management at the centre, given that some senior managers have yet to visit stations outside Ibadan. Thus the Panel feels that the initiative for the dialogue needs to come from the central management. This dialogue should cover the following aspects:

- Programmatic and structural decentralization need to go hand-in-hand. In general, scientists appear to have positive feelings about programmatic decentralization, although the Panel is somewhat concerned about inter-divisional collaboration at stations/sites away from Ibadan (see Section 2.4.). Both the Panel and many of the scientists are more concerned about decentralization relating to organizational matters (e.g. procurement, accounting and budget management, office administration, role of the central administration, etc.; see Section 5.2.).
- There is a feeling that the small (e.g. Kano, Ferkessedougou) and large stations (e.g. Cotonou, Yaoundé) should be managed and organized differently, with a greater degree of autonomy for decision-making given to the larger stations (see Section 5.5.). In the interest of managerial efficiency in the stations

outside Ibadan, the Panel believes that this is desirable, provided appropriate controls can be put in place.

- There is sometimes confusion and misunderstanding between Officers-in-Charge of Stations and Programme Leaders, with the former not being kept fully informed about communication and decisions made between individual scientists at the station and their Programme Leaders (i.e. usually at Ibadan). The solution to this is the development of operating procedures for maintaining communications between the scientists concerned and the Officer-in-Charge. Division Directors/Programme Leaders should ensure that this is done particularly at the smaller stations where the actions of one scientist can have a major influence on the resources/activities of the station.

4.2.8. Management of the Ecoregional Consortia Initiative

Under the CGIAR-initiated move to an ecoregional approach, IITA has been named as the convening (host) centre for the ecoregional programme for the warm humid and sub-humid tropics in SSA. Within this, WARDA is a lead centre with respect to the inland valleys component, for which a consortium¹ has already been established. By the end of August, IITA plans to launch two consortia for the humid forest and the moist savanna components. These consortia will facilitate the "demand-pull" orientation to the research programme desired by IITA. The 23 projects that have been identified in the 1995 Work planning Week (see Section 4.3.2.) have been classified in terms of numbers of senior scientist years (SSY) and to the extent to which they apply to one or more agroecological zones in the cases where they are specific. Out of the 23 projects only four are zone-neutral. The plan is to have fulltime zonal IITA-funded coordinators to facilitate coordination of efforts by the members of the consortia (i.e. the host centre, other CGIAR institutions operating in the same zone, and the NARS).

The move to launching ecoregional consortia with the NARS provides special opportunities and challenges. The Panel agrees with the approach being used by the IITA leadership, in emphasizing that the process of establishing the consortia is done in a truly participatory manner. Establishing true collegial relationships with other partners is a critically important pre-condition to optimizing the potential payoff from such consortia. However, prior to their launch, the consortia must define a research agenda, determine how the different research needs will be addressed and decide who will be accountable for which portion of the research agenda.

1 A consortium is the mechanism adopted by the CGIAR centres to implement a Systemwide ecoregional initiative and/or programme. It is defined as a partnership of diverse institutions to create critical mass and jointly plan and implement an integrated research programme of common interest. The commitment between partners in a consortium is at the institutional level and specific research responsibilities are assigned to each institution on the basis of institutional comparative advantage. A consortium has a governance and management structure, funding and resource allocation mechanism and clearly defined responsibilities for financial and programme accountability.

The Panel is supportive of IITA's plan to establish two ecoregional consortia (i.e. Humid Forest, and Moist Savanna in West Africa) but wishes to note that care should be exercised not to extend into the semi-arid areas within the Moist Savanna Zone, without the prior agreement of ICRISAT, which technically has CGIAR support as the convening Centre for an ecoregional programme for the warm arid and semi-arid tropics in SSA. The current plan to delay the establishment of a consortium for the Mid-Alitude Savanna in East Africa seems reasonable, given the current youthfulness of IITA-sponsored activities in that area and the limited resources available to IITA (see Section 2.2.). The Panel suggests that IITA takes into consideration the following:

- For the particular researchable problems selected by the consortia partners, the consortia should oversee and coordinate the complete continuum of research activities that should span the range from strategic through applied to adaptive, with the different institutions having the primary responsibility for the types of research in which they have a comparative advantage (e.g. IITA stressing research activities near the strategic end). As such there would be value in all the IITA Research Divisions playing an active role in the consortia which could provide a major conduit for linkages with the NARS and provide potential for greater input into their strategic research agenda by the major customers of IITA research. If this is accepted there may be some logic in cancelling the current IITA RLS positions (i.e. using the posts in some other manner (see Section 3.2.2.1.) and, with concurrence of the consortium members, using fulltime Consortium Coordinator positions, as substitutes for those positions. The planned Steering Committee and Working Groups of the consortia would then be used as the major focal point of linkages with the NARS.
- Although the consortia primarily have a research function, the Panel supports recently evolving plans to consider representation from extension/development/distribution agencies (i.e. in the public and private sectors) in the Steering/Working Groups of the consortia, since potentially this could facilitate the process of appropriate technology packaging, approval, and dissemination. This also provides an opportunity to address the issue of impact assessment considered later (see Section 7.2.).
- Obviously the Panel supports the notion that the consortia collectively seek external funding to support the full spectrum of research activities specified above. In acquiring and allocating such funds, the Panel believes that consideration should be given to the approach currently used by WARDA through their Task Forces.
- The Panel agrees that IITA should be parsimonious in setting up more benchmark areas from core resources (i.e. not more than one per agroecosystem), leaving it up to the consortia to establish additional benchmark areas (see recommendation in Section 2.3.).

4.3. Research Management

4.3.1. IITA's Research Planning and Management Process

IITA's current work planning process is depicted in Figure 4.1. Preparation of the individual work plans, which are based on IITA's Strategic and Medium-Term Plans, is the responsibility of the researchers concerned, in consultation with their Programme Leader and Research Division Director. Progress in the research activities is reviewed at the annual divisional meetings as a basis for updating plans for the following year. Staff of other divisions attend these meetings to encourage cross-divisional activities. Later a summary of new activities is presented to the annual Work Planning Week, with the purpose of informing others about what is planned and of providing an opportunity to eliminate possible duplication of effort and to identify further areas of possible cooperation. In a further effort to encourage interdivisional cooperation, initiatives on the part of researchers themselves can result in the formation of working groups to tackle a particular problem of common interest and in which joint research planning can take place. Working groups currently exist in the areas of postharvest technologies, *Striga*, legumes in farming systems research and cowpea wide-crosses and biotechnology.

The annual Work Planning Week is held at headquarters and all outposted scientists, including resident scientists, participate. On this occasion all the research portfolios for the year are assembled and by combining them, the Division and overall IITA research portfolios are established.

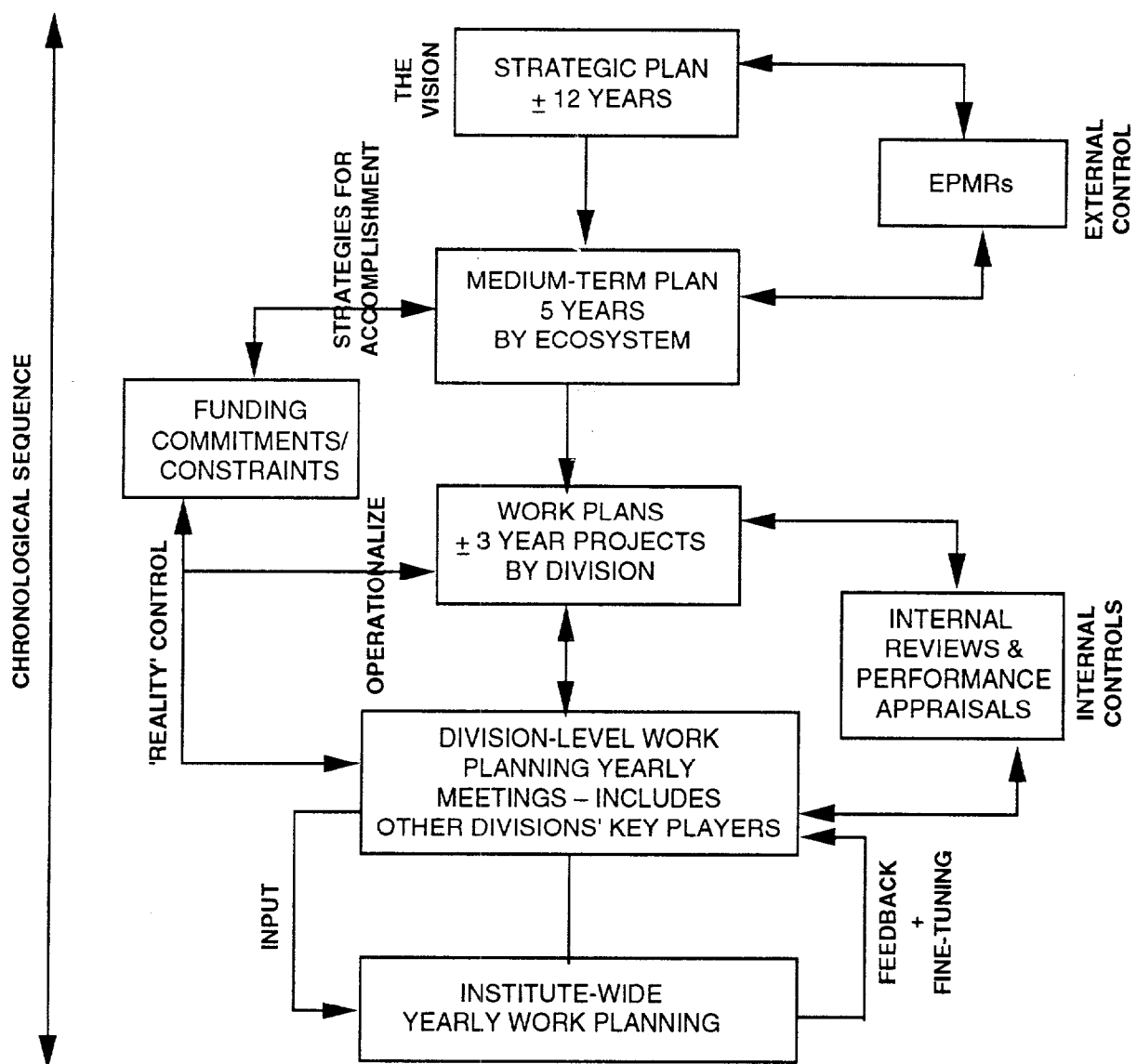
The research planning process is not structured in a systematic way (e.g. with the use of logical framework or goal-oriented project planning methods) and a general procedure by which the research proposals are submitted to an *ex-ante* impact assessment and priority-setting exercise is not yet available. Such methods are occasionally, however, applied in the case of donor-funded special projects and were used in 1994 and 1995 by the Crop Improvement Division for work planning. The Panel suggests that the Institute generalize the use of goal-oriented project planning methods such as the Log-Frame.

IITA has an impressive record in acquiring complementary funding for special projects. The special projects are considered by the RDC and then submitted to the Programme Committee of the BoT. Given the volume and diversity of these projects, continual attention is needed for the integration and consolidation of these activities within IITA's overall research programme, to ensure that they are compatible with the Institute's priorities (see recommendation in Section 4.3.4.).

4.3.2. Plans to Introduce Project-Based Research Management

Under the MTP, IITA's Research Divisions, Programmes and activities are allocated resources in accordance with the relative priorities assigned to each type of research and research-related activity (crop improvement 24%; plant health management 23%; resource and crop management 25%; research support 11%; international cooperation, information and training 17%). These funds are then allocated to research activities within each Division.

Figure 4.1. WORK PLANNING PROCESS



IITA is planning to adopt a "project-based" research management mode instead of the current "programme-based" mode and the transition, including the shift from cost-centre to project-based budgeting, is taking place. Initial plans were to complete this process by 1996. All IITA research will then be assembled in a portfolio of research "projects" - each of which will have clearly defined objectives, anticipated outputs, milestones, personnel and operational inputs and other requirements.

The Panel commends IITA, not only for taking this decision but also for making sure that the IITA scientific community unanimously supports this plan. It is expected that project-based research management will lay the foundation for: greater focusing of the research programme; enhanced technical, scientific and financial accountability; more effective monitoring of priorities; more attention to interdisciplinarity and institutional collaboration requirements; more explicit output orientation of the Institute's research and thus, ultimately, improved scientific quality and greater research productivity and impact.

4.3.3. Assessment and Future Evolution of the Research Management Process

In assessing the research planning and organizing processes at IITA, the Panel wishes to make the following observations:

- **Interdisciplinary Linkages and Team-Building:** The relative "softness" of systems and procedures for planning, prioritizing, budgeting, and reviewing of research activities has sometimes provided an impression of fragmentation and atomization. The planned move to a project-based approach to research planning will greatly improve the probability of creating effective interdisciplinary linkages and more programmatic cohesion. Since planning of research activities would begin at the project level, important linkages such as those between breeding and agronomy, breeding and host plant resistance, etc., would be easier to emphasize. It would also be easier to factor in training requirements more explicitly into the research delivery system. RDC would be expected to provide the inter-disciplinary and inter-divisional balance in the Institute's research and training portfolio.
- **Project-Based Budgeting:** At present, divisional budgets are prepared by Division heads and allocated to Programmes and to research activities and scientists (cost centres). The transition to project-based research management will require an adjustment of the budgeting process with reference to the costing of individual projects and their consolidation into the Institute's overall budget. The Panel concurs with IITA that the use of time-based standard costing techniques would be an appropriate method and the resultant figures could then be reconciled with the divisional financial results. Thus, the transition from budgeting on a cost-centre basis to project-based research management, would be feasible with rather limited adjustments to the present system. The 23 projects identified in the 1995 Work Planning Week, which group activities with common objectives, would meet the definition of a project,

if structured with a logical framework and having budgetary resources attached.

Recommendation:

The Panel recommends that IITA develop an integrated project-based planning, resource allocation and implementation system in the next few years and pilot test it in selected areas before extending its coverage to the entire research programme and to research-related activities.

Each project would be demand- or problem-driven and be implemented by a project coordinator (the scientist with the principal responsibility for that particular project). The project coordinators would report to the Division Directors through the Programme Leaders as at present. In some cases Programme Leaders might also be the project coordinator. Some projects would be interdivisional, such as the *Striga* project (Working Group). While the Panel recognizes that allocating some projects to specific coordinators may not be easy (e.g. particularly when projects involve more than one Division), this bottom-up "building blocks" approach to the research programme (from scientists to projects, to Programmes, to Divisions) would strengthen accountability mechanisms at various levels and would provide the flexibility needed to respond to new research opportunities.

The Panel expects that the projects would remain science-driven and be managed within the divisional structure. They would be oriented towards the agroecological zones covered by IITA's mandate. Thus, conceptually, research management would be implemented in the "soft" matrix structure depicted schematically in Table 4.3.

4.3.4. Assessment of Other Research Management Aspects

Project-Based Financial Information System

At present, policy formulation and resource allocation of scientist years occurs within the divisional structure, and costs are allocated to research activities. The proposed project-based research management is compatible with existing divisional reporting structure for financial information. It is anticipated that after the pilot testing has been completed, a simple, non-bureaucratic procedure for project-based budgeting would be used for the entire research programme. The Panel expects this to be completed by the start of the next Medium-Term Plan, i.e. 1998. The IITA Finance Division is encouraged to make the necessary adjustments in order to provide an effective, project-based Financial Information System as soon as possible (see Section 5.2.).

Table 4.2. Schematic Representation of the Proposed Project - Based Research Management in a "Soft" Matrix Structure^a

Division	Agroecological Focus			General
	Humid Forest	Moist Savanna	Mid-Alitude Savanna	
CID	P1	P1 P3	P4	
PHMD	P2	P3		P5
RCMD	P1 P2	P1 P3		
	▼ ▼	▼ ▼	▼	▼
	Output 1A 2	Output 1B 3	Output 4	Output 5

a. P1 to P5 represent projects and 1 to 5 represent outputs of those projects.

Priority Setting and Strategic Planning

IITA, in its strategic planning, has adopted a number of "relevance indicators" in order to help decide on priorities and strategies. This model includes both demand (e.g. technology and knowledge needs of NARS) and supply (e.g. technologies and knowledge to be developed by scientists) considerations. This approach has helped IITA in defining its longer-term research thrust. However, IITA currently does not have an analogous formal priority-setting mechanism for individual research projects within this overall set of agreed research priorities. This needs to be developed further.

Recommendation:

The Panel recommends that IITA further develop its priority-setting methodology and processes for routine screening of new projects, including *ex ante* impact assessment, irrespective of their funding source. It should also ensure compatibility with the formal strategic planning process of IITA.

IITA implements internal reviews by Division at five-yearly intervals and with the participation of Board members, NARS and sister IARC representatives as well as with the participation of external experts. Internally commissioned external reviews have also been used (e.g. in the case of RCMD). IITA has thus introduced some means of peer review and quality control, and should strengthen these processes.

However, a five-year interval between Division reviews is perceived by the Panel as too long. In addition, there are new requirements in this area emerging from the rationalization of the review process in the CGIAR System which will increasingly rely on the IARCs' own monitoring procedures for quality control and performance. The Panel therefore **suggests** that IITA should revise its Board-approved policy on internal reviews, including the internally managed external reviews (see Section 4.1.6.).

Incorporating Partner Needs

To date, there has been no systematic way in which concerns and priority research needs of IITA's institutional partners in the mandate area are considered and taken into account in the research planning process. The Panel recognizes that IITA frequently consults with NARS and it also appreciates that sometimes NARS scientists have participated in IITA planning meetings and IITA scientists in those of NARS. The Panel also recognizes that, in the case of resident scientists, the practice is for them to agree with their national programmes counterparts on the contents of their research plans before they travel to IITA, where they present this information at the annual Work Planning Week. This naturally establishes a valuable direct linkage to IITA's clients.

However, the Panel believes that there might be room for extending this partnership further by more formal consultation with NARS during the research planning process and to incorporate consideration of research training needs. The move to establishing ecoregional consortia provides another opportunity for formalizing such linkages (see Section 4.2.8.).

Recommendation:

The Panel recommends that IITA should establish a formal and transparent system for ensuring that NARS are routinely consulted in planning the Centre's annual research programme and research-related activities.

Research Support

A structural/organizational deficiency was noted earlier with respect to the Research Support service (Section 4.2.4.). The fact that such support services are not centrally managed but distributed among the Research Divisions, potentially has a negative influence on the efficiency and productivity of research. Consequently, there is a risk of unequal access to the services and also a risk of inadequate attention being given to these units by the Research Division Directors. In order to ensure that they are managed in a way compatible with IITA's overall interests, the Panel **suggests** that those Support Units that routinely provide services for more than one division should be transferred to the DDG(R) when appointed.

CHAPTER 5 - ADMINISTRATION AND OPERATIONS

This chapter reviews the Divisions and activities assigned to the Deputy Director General for Management (DDG(M)) who has overall responsibility for all administrative and finance matters at IITA headquarters and field stations (see Figure 1.1). At Ibadan, these include Human Resources, Budget and Finance, Information Services, Physical Plant Services (PPS), and other services such as hotel catering, travel, computer services, and administrative services. Activities covered by PPS include support for the research Divisions and the IITA campus (or township) at Ibadan: housing, water treatment and sanitation, electrical power production and distribution, air conditioning, communications, building and grounds maintenance, metal and wood fabrication, and scientific equipment maintenance. The IITA school on the campus is independent, and the medical clinic is part of Human Resources.

5.1. Management of Human Resources

5.1.1. Introduction

In 1990, when the last EMR was conducted, the human resources management (HRM) function was headed by a Director of Human Resources reporting to the Director General. This position was supported by two managers, one for Employee Relations and the other for Manpower Development. The positions of the Director and the Manager of Employee Relations were classified as internationally recruited staff. Since then, the two internationally recruited staff positions, the Director and the Manager of Employee Relations, have been eliminated, and all HRM functions placed under the office of the DDG(M) who has reorganized these functions under two broad categories: international and national staff. International staff functions are assigned directly to the DDG(M) assisted by executive assistants in the Director General's office. National staff functions are assigned to a nationally-recruited Personnel Manager who oversees staff development, training, recruitment and employee relations for NRS.

The Panel has reviewed the effectiveness of HRM policies and practices for both the internationally recruited staff (IRS) and the nationally recruited staff (NRS). Overall, the Panel's assessment is that there have been very significant improvements in staff relations during the past 4 years - i.e. since early 1991, when violent labour unrest shocked the Ibadan campus. The Panel commends the management and staff for having successfully overcome the earlier crisis.

This notwithstanding, it is the Panel's judgement that there is no room for complacency, given the heterogeneous, complex and decentralized IITA campus communities where people work and live closely together. The Panel believes that additional efforts are needed to satisfactorily resolve some of the pending issues, and to build adequate HRM capacity to meet the strategic needs of the Institute.

Some of the issues discussed below include, for the IRS, the rule limiting the scientists' tenure at IITA to 11 years (the "11 year rule"), management development,

compensation administration, performance evaluation and relations with the International Staff Association (ISA). The issues addressed below with respect to NRS include compensation administration and relations with the Staff Associations.

To ensure that these issues are effectively handled, and to provide a full-time focal point for the HRM function, the Panel has reached the conclusion that IITA needs a well qualified internationally-recruited professional, specialized in human resources management, who reports to the DDG(M). Further details are discussed below.

5.1.2. International Staff

5.1.2.1. Recruitment, Selection and Turnover

IITA currently employs about 128 international staff, recruited from 32 countries and deployed over 9 countries and 7 stations, including Ibadan (see Section 1.4.3). During the period under review, all divisions except RCMD were able to recruit and retain well qualified internationally recruited staff - and RCMD's staffing situation has not yet been satisfactorily resolved. There were only two departures from PHMD, the research division headquartered in Cotonou (Benin). In divisions located at headquarters, it is somewhat more difficult to attract IRS due to the socioeconomic conditions in Ibadan and Nigeria. In 1993, 8 vacant positions were frozen because of budget cuts.

Besides the general environment in Nigeria, recruitment for positions in Ibadan, particularly of mid-career professionals, is made the more difficult due to at least two other factors: opportunities for spouse employment and for secondary schooling in Ibadan. Spouse employment is a particularly vexing and complex issue, with no easy solutions. IITA, like many other international organizations, has been grappling with this issue for many years. The Centre has a spouse employment policy; but, that policy must conform with Nigerian immigration laws which management cannot change. The only way this policy can be officially changed is by modifying the Institute's Headquarters Agreement with the Nigerian government - and that would require time and effort, and could result in the loss of the Institute's diplomatic status for a period of time.

Since the recruitment of scientists of the highest calibre is essential for maintaining IITA as a centre of scientific excellence, the Panel recognizes management efforts for seeking ways of addressing the spouse employment issue. The Panel also notes that some related-problems are resolved by approaching the Nigerian immigration authorities for individual cases, as appropriate.

To resolve the longer term issues, however, a more detailed study of recruitment and turnover of IRS is advisable. Data could be collected from exit interviews conducted during the past few years, from candidates interviewed for recruitment, including those who subsequently declined offers, and from a general survey of current IRS. Besides the spouse employment issue, information could be collected on the impact - on recruitment and turnover - of the lack of a suitable secondary school on

campus, the deteriorating medical services in Ibadan, and the limited medical services provided by the IITA clinic.

5.1.2.2. Management Development

The last EMR made a clear recommendation for the Human Resources Department to give priority to management development of managers and scientists. The Panel acknowledges management's efforts to implement this recommendation. Besides "on-the-job" training in management, several managers and scientists have been sent to the CGIAR-organized Management Development courses in the USA and elsewhere. This practice should be continued.

To further improve the managerial skills of scientists and administrators at various levels, the Panel suggests that IITA engage a short term consultant for the design and animation of a Performance Improvement Programme for the Institute. The terms of reference for this consultation should include a training needs assessment for IITA-specific management development programmes and the development of a detailed training strategy. The terms of reference should also include suggestions for the design of the curriculum and methodology of the initial trial programme, including the use of such cost-saving methods as distance teaching, audiovisual documentation and programmed instruction. Management could then make a decision about giving increased emphasis to training as an essential feature of human resources management at the Institute.

5.1.2.3. Performance Evaluation

Since the last EMR, when the recommendation was made that the systematic evaluation of scientific staff be given priority, a formal performance evaluation procedure has been instituted. The same appraisal form is used by all research divisions, and the weighting of various criteria is jointly agreed upon by the staff member concerned and the supervisor. This year, at the end of the standard procedure, RCMD and PHMD used an additional form to finally rate their staff from outstanding to below average. These evaluations were then discussed with the staff at the divisional level, and subsequently by the director with the DG.

On the basis of the Panel's discussions with staff, supplemented by the results of the Staff Survey conducted by the Panel prior to the main visit, it appears there is room for further improving the evaluation process to reduce perceived inconsistencies and subjectivity. The Panel recognizes that any performance evaluation system will have its critics, and IITA's system is no exception.

The reported inconsistencies could be the result of (among other reasons) lack of familiarity with the basic principles of performance assessment. Unless supervisors (i.e., scientists and managers) are properly trained in conducting appraisals, and held to a high standard of objectivity, they could easily make some of the common errors in assessing subordinates - for example, the tendency to rate everyone as "above average" or "outstanding"; or the tendency to be unduly influenced by the most recent performance-related incident, positive or negative. Such errors can quickly lead to lack of confidence in the system used, and need to be corrected.

Recommendation:

The Panel recommends that IITA take steps to improve the uniformity, transparency and due process of the current Performance Evaluation System.

The Panel understands that performance evaluation results are mainly used for awarding annual salary increments and extending or terminating contracts. While these are standard uses of such data - and should be continued - additional benefits could be derived from using performance assessments for determining training needs, assessing recruitment strategies, and validating selection procedures.

One suggested improvement is to clearly specify the performance criteria and relative weights for each criterion for each job family. For scientists, one additional step in the evaluation process could be considered, as a strictly voluntary option: any scientist could request to have sent to an external reviewer(s) his/her dossier for a "blind review" of performance. The results of the blind review would supplement the conclusions of the scientific review panels (involving scientists from across Divisions) currently used at IITA.

5.1.2.4. Contract Renewal Policy

In terms of IITA's policy regarding contract renewals, the Panel is concerned about the so-called "11 year rule" instituted by the Centre during the past few years. (This rule seeks to limit the scientists' tenure at the Centre to a maximum of 11 years). In practice, this rule has been enforced only in exceptional cases - for example, of the 10 staff members who came up for such a review in late 1994, 5 were extended for a full 5 years, and 2 for 3 years, till the end of the current MTP. However, there is considerable dissatisfaction among the IRS regarding the perceived arbitrariness of the rule, and of the review process and outcome.

The Panel fully endorses IITA's policy of offering renewable fixed-term contracts, with rigorous evaluation of performance at the end of each contract period, in addition to the annual performance evaluation (as recommended in the last EMR). However, there does not seem to be any convincing rationale for the ceiling of 11 years on a scientist's tenure at IITA, especially if his/her performance is good and the need for his/her services continues to exist. Elimination of the rule could also improve IITA's chances of recruiting scientists in mid-career (i.e., in their late 30s or early 40s).

Recommendation:

The Panel recommends that IITA rescind the "11 year rule", limiting the tenure of scientists at IITA, and delete it from the personnel policies applicable to internationally recruited staff.

5.1.2.5. Compensation Administration

The Panel has been informed that the salary grades of IRS are made available to them on request. The BoT decides on the overall annual salary increase, and this percentage figure is known to staff. The existing system for determining salaries and benefits is specified in the Personnel Policies and Procedures Manual, which is available to all IRS. These are all positive developments since the last EMR.

However, the Panel has noted that the Personnel Manual is silent on the following items: how the salaries are benchmarked and from which occupational markets recruitment takes place; the job evaluation procedures used; how frequently salary surveys are conducted; and the procedure for seeking redress of an individual grievance on salary matters. While the Panel could not delve into specific instances of reported inconsistencies in the application of salary policies, the Panel is of the opinion that, given the large number and diversity of countries from which IITA recruits its IRS, greater transparency in salary determination could only be beneficial.

Recommendation:

The Panel recommends that the Personnel Policies and Procedures Manual for Internationally Recruited Staff include the Institute's Salary Structure for all classes of internationally recruited posts, indicating the pay ranges, incremental steps and criteria for the placement of staff at each level.

Further, in 1993, the Committee of DGs (of the CGIAR-supported Centres) had commissioned a study of compensation of IRSs in the IARCs. This study (by Messrs. Hardin and Gormbley) is used by IITA management as a basis for comparison with other Centres, and is available to interested staff, on request. However, the Panel suggests that the salary grades be reviewed periodically by management and the BoT; and a copy of the latest salary structure for IRS be sent to each individual (as an update of the Manual) along with the letter indicating the annual salary adjustment.

5.1.2.6. The International Staff Association

The Panel notes that IITA has adopted participatory forms of management, as recommended by the last EMR. The need for such measures was sadly reinforced by the unfortunate incidents of violence that occurred on the Ibadan campus in early 1991. In order to devise a long-term strategy for preventing the recurrence of such unforeseeable incidents, management prudently established a broadly-representative Ad Hoc Committee of staff from various levels to uncover items affecting staff morale, both among the IRS and NRS. The Committee highlighted the need for improving communications within and among various groups on campus.

As a remedial measure, management encouraged the formation of a number of committees and staff associations - including the International Staff Association (ISA) - as ongoing mechanisms for regular consultation between management and staff. This willingness to open communication channels with all levels of staff is recognized as a

distinguishing feature of the DG's management style, and is appreciated by the staff (and the Panel).

Based on the minutes of the ISA's discussions with management during the past few years, the Panel believes a serious effort has been made by all concerned to institutionalize this consultative body. Clearly, the ISA has potential - thus far under-utilized - to serve as a forum for raising and discussing important HRM-related issues.

During the current review, some members of the Panel were able to attend a six-monthly meeting of the ISA with management. Unfortunately, from the sparse attendance at the meeting and from our discussions with members of the ISA executive, it appears that interest by international staff in this forum is waning. During the meeting there were not sufficient numbers present (either by proxy or physical attendance) to constitute a quorum - even though important issues of HRM policy and benefits were on the agenda.

While the Panel is unable to untangle the many factors that might underlie this situation, it is clear that all is not well with this important communication mechanism. The Panel's view is reinforced by the results of the Staff Survey conducted by the Panel Secretariat prior to the April visit to Ibadan, and from the results of the earlier ISA Questionnaire on staff concerns.

To ensure that the ISA is able to effectively perform its intended function, and to strengthen its role as a genuinely consultative body for IRS-related matters, the Panel suggests that both management and the ISA redouble their efforts to become more responsive to the other's concerns.

5.1.3. National Staff

5.1.3.1. Staffing, Turnover and Establishment Committee

The Panel has reviewed the effectiveness of human resources management (HRM) of nationally recruited staff (NRS). As noted earlier, staff relations are much better now than 4 years ago, when there was considerable labour unrest on the Ibadan campus.

In the Panel's view, since 1994 - after recruitment of the current Personnel Manager - the HRM function for national staff is being performed professionally and enthusiastically despite very trying circumstances. Management has addressed many of the HRM concerns of Ibadan-based staff; has set up an Establishment Committee to provide clarity on job rankings on an institute-wide basis; has computerized the personnel data base; and has developed a Personnel Information System.

It is apparent to the Panel that, within its limited financial resources, management has attempted to respond to the needs of NRS. However, there is room for improvement - for example, in such matters as implementing the job evaluation system or

career development of staff, both of which are essential features of a responsive and progressive HRM system. Of particular concern to the Panel are apparent anomalies in the classification of such categories as research associates and interpreters, and the lack of career development opportunities for many NRS.

The turnover of national staff in Ibadan is low, as it is at other IITA stations. This provides indirect evidence of the relative attractiveness of the Centre in comparison with other employment opportunities in the local labour market. The low turnover is also, of course, a reflection of the difficult socioeconomic conditions in the external environment. The Panel therefore hesitates to read too much into the turnover data by itself.

Some members of the Panel met with the executive committees of the Management Staff and the Senior Staff Associations. The MSA and the SSA feel that the participatory forms of management which created their associations are not effective. Further, the IITA Productivity Plan (IPP), and its accompanying "idea boxes" and posters - while prominently positioned and displayed throughout the campus - have not generated many useful ideas. Minutes of the two meetings of the Productivity Committee held in the past two years indicate that the IPP has generated a sum total of 30 ideas, submitted by 18 employees. Only five of these ideas were considered by the IPP as deserving further investigation; but no further information is available to the Panel about the status of the IPP. Discussions with management and staff suggest that the programme has not been successful, and has essentially been abandoned.

A number of other concerns of an HRM nature have been brought to the Panel's attention during the course of two visits to Ibadan and field visits to outstation locations by Panel members. Some of these relate to matters essentially beyond the control of management, such as the impact of the deteriorating external environment - which has significantly eroded the living conditions of local staff, and has progressively contributed to generating unrealistic expectations about just what IITA's role and response should be in alleviating the national staff's difficult circumstances, particularly in Nigeria.

This should not be understood to imply that improvements are not needed in HRM policies - and in their implementation - within IITA. A number of HRM issues have been brought to the Panel's attention, and over these, management and national staff do have considerable control. These issues include matters relating to the terms and conditions of employment - such as which comparator organizations to use - and matters relating to wages and benefits, career development, performance assessment, and compensation administration for the NRS at Ibadan. All of these are important aspects of HRM, can be further improved, and merit continued management attention.

The Centre's BoT-approved policy on comparators is to use the local large-scale industries for this purpose, and to ensure that the remuneration package is in the higher part of the upper quartile. In the absence of a detailed study of this and other similarly complex issues (such as wages and benefits), the Panel is unable to comment in specific terms. On the issue of comparators, however, in general terms the Panel's view is that management's approach of maintaining IITA's competitive position in the local labour market seems appropriate under the prevailing circumstances.

One of the main concerns of national staff at other stations is the absence of comprehensive and well documented Personnel Policies and Procedures for those locations. Staff rules and policies do exist in some form, often as inter-office memoranda and administrative orders - but they are generally based upon the Personnel Policies and Procedures Manual for Ibadan, which is tailored to the Nigerian setting, and is unlikely to be applicable elsewhere without substantial adaptation.

Recommendation:

The Panel recommends that IITA prepare comprehensive and updated Personnel Policies and Procedures Manuals for nationally recruited staff at all field stations.

5.1.3.2. National Staff Associations

To help defuse the tension caused by the difficult labour situation in early 1991, and to improve labour-management communication, IITA management encouraged the establishment of three staff associations for NRS: for Management Staff (grades 11-15); Senior Staff (grades 7-10); and General Staff (grades 1-6). Meetings have been held between management and the associations at least twice per year. However, there is an ongoing dispute over which of two competing unions would be legally authorized to represent the General Staff in collective bargaining. While the decision of the National Industrial Court on this issue is awaited, no collective negotiations can take place.

Members of the Panel have had fruitful discussions with the executives of the Management Staff and Senior Staff associations, the Personnel and Employee Relations managers, and some NRS. Although management and national staff are working hard to reach common ground, it is quite apparent that many of the labour relations problems cannot be considered to have been fully resolved. Hence, even though the deteriorating external environment will remain a source of dissatisfaction and unrealistic expectations, continued management attention to HRM issues could yet contribute to providing a reasonable degree of job security and satisfaction. The Panel urges such attention.

The recent appointment of a Personnel Manager for national staff provides the professional focal point to address this continuously-evolving labour relations situation. Additional external assistance from a suitable consultant well-versed in labour-management issues could be sought in the future, as appropriate. Such a consultation could conceivably lead to a systematic programme and action plan for labour-management cooperation and productivity enhancement.

5.1.4. The Human Resources Function - Staffing and Approach

Many of the routine administrative aspects of HRM are being satisfactorily handled at IITA; and there is genuine concern for the welfare of the Centre's human resources. However, it is the Panel's overall judgement that the approach adopted is somewhat reactive and *ad hoc*. While the earlier decision to abolish the two internationally recruited positions was based upon understandable exigencies of diminished

financial resources, the Panel concludes - with the benefit of hindsight - that this may not have been the most cost-effective course of action for meeting IITA's longer term needs.

The Panel believes that to help improve staff morale and productivity, a more forward-looking and long-term perspective on HRM issues would be beneficial for IITA. We are convinced that there is a pressing need for full-time leadership of this important functional area, covering all categories of staff (i.e. both IRS and NRS).

As discussed earlier, in relation to IRS, besides the day-to-day issues of personnel administration, there is need for periodically undertaking such activities as: conducting training needs assessments; analyzing the results of performance appraisals; conducting morale surveys and culture audits; conducting exit interviews; designing and implementing wage and salary surveys; and utilizing this information for devising appropriate HRM strategies and programs. In the Panel's view, this would require the continuing attention of a specialist in human resources management.

Hence, although the DDG(M)'s duties should continue to include overall responsibility for HRM, it is the Panel's conclusion that, given the large scope and diversity of activities under the DDG(M), it is now essential that IITA recruit a professionally qualified, people-oriented manager to serve as the focal point for all HRM functions at IITA.

This manager would be expected to take the functional load for HRM off the DDG(M), but would report to him administratively. We expect he/she would be based at headquarters, but would provide functional guidance on HRM matters to the heads of all IITA stations, including Ibadan.

Recommendation:

The Panel recommends that IITA appoint a professionally qualified, internationally-recruited specialist in human resources management as Head of Human Resources, reporting to the Deputy Director General (Management).

5.1.5. Other Human Resources Services

The Panel had the opportunity to meet with members of the Community Council, the Women's Group and the School Board. It also met informally with staff, spouses, and other members of the IITA community. Panel members have used the services and facilities of the International House and the dormitories; and our overall impression is positive.

However, the following concerns have been brought to the Panel's attention; and on each we give below our views for consideration by management:

- The scope of services provided by the medical clinic, and the sourcing of drugs. This concern has been heightened by the deterioration in hospital-based

specialist care in Ibadan in recent years. In addressing this issue, the Panel is aware that improvements at the clinic - including the acquisition of a new ambulance with life-support systems (currently awaiting clearance at Lagos port), construction of an enlarged clinic and pharmacy, and hiring of more nurses and a pharmacist - are being undertaken. However, the Panel understands that the recommendations of the study of the clinic - undertaken in 1989 by external consultants (Management Sciences for Health, a reputable firm based in the USA) - have not been implemented. A new study of the scope of services that should be provided by the clinic is suggested.

- The lack of a good international-standard secondary school in Ibadan - and hence the issue of extending the campus-based elementary school to the secondary level. The Panel is aware that an in-house study was done some years ago, and concluded that such an extension was not justified at that time. However, as noted above, this issue could have significant implications for the recruitment and retention of IRS, and a new detailed study seems warranted.
- The marked increase in (mainly weekend) visitors to the IITA campus, to take advantage of the excellent lodging, catering and recreational facilities. Although the Panel is aware of the financial and social attractiveness of opening these facilities to the general public on a fee-paying basis, these benefits have to be balanced against the staff's concern for privacy and access to facilities. A cautious approach to a further increase in visitors is suggested.
- The issues raised by the ISA, particularly the cost-of-living allowance (COLA) and hardship allowance. The Panel is aware that these issues are under review by management, and a new BoT-approved policy on hardship allowances is expected to be in place by year-end. However, as a general principle, the Panel suggests a more pro-active stance by management on HRM issues, instead of waiting for the ISA to take the lead.
- The provision of religious services on the Ibadan campus. In the Panel's view, IITA should seek to retain its secular identity on campus, as was suggested by the last EMR as well.

In conclusion, the Panel believes that all such concerns can be effectively addressed by the management remaining responsive to the needs of staff; reorienting the role and activities of the HRM function; re-establishing a senior full-time focal point for the head of human resources at IITA; and further strengthening the various consultative fora already established on the Ibadan campus.

5.2. Budget and Finance

5.2.1. Financial Condition and Budget Strategy

5.2.1.1. Overview

In spite of the financial turbulence that has afflicted the CGIAR System during the past several years, and the severe budgetary stringency that IITA has experienced, IITA today enjoys a relatively sound financial position with a high degree of liquidity. It has not had to resort to short-term borrowing to manage its cash flows, and it has managed to strengthen its reserves.

IITA has achieved this result by following a very conservative budget strategy. It has left vacant many positions, deferred annual salary increases for international staff, energetically sought out economies in support services, and exploited opportunities for self-generated income to partially offset reductions in the purchasing power of grants from core donors. At the same time it has found ways to cope with the financial and logistical stresses resulting from the seriously deteriorating conditions in the host country.

IITA Management and Board are wisely committed to maintaining a very conservative budget and financial strategy in the foreseeable future. Inevitably, such a strategy involves trade-offs - which invariably cause hardships to staff. These hardships and cuts in benefits have, on occasion, led to difficulties in staff relations - but given the extreme financial uncertainties faced by IITA during the past several years, the management's approach has been broadly successful and appropriate.

IITA ranks among the five largest of 16 IARCs in terms of operating expenditures (CGIAR 1993 Financial Report), but has one of the lowest rates of dependence on core funds of all the Centres. In 1993, only 65% of the total was from core grants. Slightly more than half of core grants was from the three largest donors (Japan, United States and the World Bank). IITA has diversified its financial sources by:

- participating in Nigeria's debt conversion programme;
- exploiting other opportunities for self-generated income; and
- attracting complementary and special funds from a wide array of donors.

5.2.1.2. Nigeria Debt Conversion Programme (NDCP)

In 1989 the Federal Government of Nigeria (FGN) established a debt conversion programme carried out through an auction process administered by a newly-formed Debt Conversion Committee (DCC). IITA immediately sought, and obtained, approval from the FGN to participate in the NDCP. Except for the brief period between October 1990 and February 1991 when the DCC temporarily suspended the auctions, IITA has effectively participated in the auctions.

IITA purchases dollar-denominated promissory notes and/or restructured bank debt under refinancing agreements negotiated by the FGN with external creditors. The

purchase price is determined by the New York and London markets dealing in these instruments. The debt currently trades at 30 cents per US dollar of principal amount or face value. The Institute offers the instruments for sale to the Central Bank of Nigeria for local Naira currency. The effective exchange rate obtained by IITA through these series of transactions is better than the Central Bank official exchange rate. The difference thus computed can be a significant cost saving to the Institute's Nigerian operational costs.

The table below plots the difference in dollars between the Central Bank official exchange rate and the effective rate achieved by IITA through the Debt Conversion Programme.

		US\$000		
<u>1990</u>	<u>1991</u>	<u>1992</u>	<u>1993</u>	<u>1994</u>
1,689	1,428	1,000	750	3,010*

* In January 1994 the Nigerian Government announced that the exchange rate for the Naira was to be fixed at Naira 22 per US dollar. Earlier, during the second half of 1993, the exchange rate had been determined by market forces, which caused the Naira to trade at a rate of Naira 40 per US dollar (London Financial Times quoted rate of 31 December 1993). In 1994 IITA achieved an average effective rate of Naira 37 to the dollar. The figure of \$3,010 above represents the difference between the effective rate (Naira 37) and the official rate (Naira 22). However, in the context of the 1994 foreign exchange market, this cannot be viewed as a saving because the parallel rate was over Naira 50 per US dollar on average for the year.

Real savings to research programmes were enhanced by a policy of procuring equipment and supplies within Nigeria using Naira to the maximum extent feasible, rather than importing goods and services using dollars. During the first two years of the NDCP, the Naira's parallel (black) market rate averaged only about 25% higher than the official rate. Since then, a major upheaval in the Nigerian economy and currency markets has resulted in an ever-widening spread between the official rate (22 Naira to the dollar in December 1994) and the parallel rate (100 Naira to the dollar in December 1994). Since the parallel rate is the rate normally used by suppliers, the effective cost savings attainable under the NDCP is rapidly disappearing. Recently the official exchange rate has been adjusted, and the prospects for future significant cost savings to IITA have diminished.

5.2.1.3. Other Self-Generated Income

In addition to the NDCP, IITA has aggressively exploited other opportunities for increasing self-generated income in recent years. Including amounts under the NDCP, it is estimated that IITA will finance about 10% (\$3.3 million) of its total expenses (\$33.6 million) in 1994, including capital depreciation, from self-generated income.

The single largest source of such income, about one-half, is derived from revenues earned by the Hotel and Catering Service at IITA Headquarters in Ibadan. Currently, the Hotel and Catering Service is generating nearly \$1 million in annual income (and part of this revenue could conceivably be used to improve campus facilities).

The next largest source of self-generated income is from investments of cash balances, primarily interest on bank deposits. At its April 1990 meeting, following the recommendation in the February 1990 Report to the Second External Management Review (EMR), the IITA Board adopted an investment policy specifying IITA's investment objectives and the authorized financial instruments. The investment policy is quite conservative, emphasizing preservation of capital. Investments are primarily in short-term obligations of the US, EEC and Japanese governments and their agencies or instrumentalities, and in deposits in large, well-capitalized banks in Nigeria. Income from such investments has been averaging around \$350,000 per year, about 1% of IITA annual expenses.

Opportunities exist for seeking a higher level of income, while maintaining short-term liquidity and preserving capital, by accepting a somewhat higher level of risk. However, the current sound financial position of IITA and its strong balance sheet do not call for a more aggressive investment programme at this time. Nevertheless, in view of the continued uncertainty regarding the future budgetary climate, the Panel suggests that the BoT closely monitor the Institute's investment programme and reassess the BoT's investment policy from time to time.

5.2.1.4. Financial Condition

With highly diversified sources of income, a strong cash management process, and a conservative budget strategy, IITA has managed to achieve and maintain a strong and sustainable financial position in spite of the budgetary stringency experienced in recent years.

As indicated in the Table 5.1., since the 1990s IITA's working capital and operating fund balances and liquidity measures have improved consistently.

With a sound financial position, IITA has not had to borrow to meet cash flow needs. However, starting in 1994 IITA did begin to utilize overdraft facilities for Naira expenditures to take advantage of the fact that interest rates (21%) were currently significantly less than the inflation rate (about 70% in December 1994).

5.2.2. Financial Management System

As evidenced by its strong financial position, IITA has a well developed and energetically administered financial management system (FMS). The FMS can be characterized as conservative, complex, risk-averse and labour intensive. The conservative risk-averse nature of the system is a function of the conservative philosophy

of top management, reinforced by the high risk conditions of operating in-country and within the sub-Saharan African regions.

Table 5.1.: IITA's Operating Fund Balances and Working Capital

	1990 actual	1991 actual	1992* actual	1993 actual	1994 actual*
Operating Fund Balances					
US dollars (millions)	3.7	4.2	5.6	5.6	7.6
Days equivalent of operations	38	45	57	60	92
Working Capital					
US dollars (millions)	4.9	6.3	9.2	10.2	12.4
Days of equivalent of operations	51	68	94	108	149 **
% of Grant Income	14.0	18.5	25.8	29.8	39.3
Ratio					
Current Ratio	1.34	1.48	1.60	1.76	1.69 *
Quick Ratio	1.16	1.40	1.44	1.68	1.84
Cash Ratio	0.59	0.78	0.92	1.10	1.36 **

Notes

* As restated to reflect a change in accounting policy from Commitments to Accruals basis.

** Targets: 180 days of working capital; current ratio of 1.6; cash ratio of 1.0.

5.2.2.1. Financial Information System (FIS)

The FIS was inaugurated in 1989. After one year's operation the Second EMR Report noted that there were many complaints by users, including long processing times, delayed reports, and excess paper generated (1990 EMR Report, page 50). It recommended a Task Force review of the FIS; the transfer of the FIS from Budget and Finance to Computer Services; and a reduction in the size of the chart of accounts and in the level of detail in the monthly reports. The Report also recommended against any large investments in a new computer mainframe, and deferral of upgrades to existing hardware until the FIS was made more efficient and responsive to users. IITA's response to these recommendations has been a mixed one.

The FIS staff continues to report to the Budget and Finance Director, since no apparent advantage is seen in a transfer to Computer Services. IITA has deferred upgrades to the computer system. After lengthy study and deliberations over several years, a decision was taken in December 1994 to refrain from a major hardware/systems replacement and to pursue minor upgrading to the existing configuration to facilitate networking and speed up processing time. This decision was wise, considering the potential need for substantial systems re-design to accommodate an evolving re-structuring of the research project budget structure and supporting management systems.

Some progress was made in reducing the chart of accounts. From a total of 403 accounts in December 1990, some 61 operating accounts were deleted. However, another 38 were subsequently added, primarily in the balance sheet accounts, leaving a total of 380 remaining (a net reduction of only 23, or 6%). Complicating the reporting detail further, there was a net increase in the number of cost centres, which increased from 319 in 1990 to 385 in 1994 (up 66, or 21%). The continued proliferation of cost centres (which are, in fact, responsibility centres) is a function of the devolution of responsibility to research programme and project leaders and establishment of decentralized research stations throughout Africa.

This combination of extensive delegation of authority, a lengthy chart of accounts, a felt need for maintaining a strong control environment to satisfy donor requirements in a high-risk and difficult operating environment, and a computer system that is overburdened leads to a reporting system that is detailed, complex, labour intensive, error prone and perceived by users as being late. The timetable for producing monthly management accounts is, however, generally adhered to. Accounts are available to all budget officers 5 weeks after the month-end together with full details of transactions. A dichotomy exists between the researchers' requests for more condensed financial information and their demands for full transaction detail. Management's planned upgrade of the FIS hardware should provide on-line enquiry capability for budget officers and obviate the perceived need for vast amounts of transaction data.

Some further reduction in the chart of accounts is needed. Many of the detailed subaccounts were introduced as a result of special requests for information (most often from donors) that required time-consuming manual search of the files. It is time to reassess these "requirements". Donors, as well as top management, should be systematically queried as to whether there is a real need for producing such information. In addition, IITA's current plans to upgrade the existing hardware platform should improve efficiency and response time. A reduction in the chart of accounts, and possible consolidation of some cost centres, would enhance this process.

Some of the user frustration and problems with the FIS derives from the frequency of errors (especially coding errors), many of which could be due to carelessness or lack of knowledge on the part of accountable fiscal officers. IITA management is committed to the concept of employing scientists as managers of research projects and stations. Some of the current FIS problems that are correctable in the near term are, in part, problems of systems discipline, and involve the decentralized outstation locations. Training of station personnel in FIS requirements and procedures is suggested.

Further, research programme/station leaders need to be held accountable for their administrative performance (and, therefore, that of their subordinates). The Panel suggests that management revise the performance rating system for scientist-managers to give adequate emphasis to their performance as managers, not only of staff but of budgets as well.

5.2.3. Auditing

5.2.3.1. Internal Audit

IITA's Internal Audit Group (IA) is led by a well-qualified, internationally-recruited person with a Canadian CMR certificate, extensive experience with a variety of private sector firms, and a thorough knowledge of IITA's financial and management operations. He is supported by four locally recruited staff including one senior auditor position, two audit trainees and a secretary.

The IA reports directly to the DG, and to the full BoT, through the AC, and operates in a completely independent mode. It appears to have full support from top management, including complete access to all records, information and personnel, and enjoys adequate budgetary support. The scope of the audit programme is comprehensive, covering outstations as well as headquarters, and reflects due consideration to the need for risk assessment in allocating audit resources.

The current IA head has occupied the position since 1991. As suggested by the 1990 EMR Report, he has gradually shifted the focus of the audit effort more toward operational auditing while maintaining substantial level of effort on traditional financial audits. Prior to 1991, he was a major participant in the design of IITA's FIS and has been actively involved in the current re-evaluation of the present system.

With the contemplated changes in the FIS, especially the introduction of networking access, some upgrading of skills in the IA staff will be needed to assure that adequate controls and audit access are provided. Professional training of the type and quality needed is not currently available in Nigeria. To facilitate this, it is suggested that management provide an opportunity (and funds) for training the IA staff, to equip them with the computer knowledge and skills required to assure adequate audit coverage of the up-graded FIS.

It has not been the practice to include BoT expenses within the scope of the IA programme, although there is no implicit or explicit restriction on doing so. The omission reflects the view that the size and nature of the BoT budget does not warrant audit attention in view of the competing demands on audit resources from higher risk areas. While it is true that BoT expenses are not sizeable enough to justify an annual audit, the BoT should consider requesting a periodic audit (perhaps once in every three years - that is, once in the term of each Trustee). This would help sensitize Trustees to the need to be aware of their own spending practices and would help demonstrate to donors the BoT's concern for fiscal propriety and economy.

5.2.3.2. External Audit

IITA's external auditing has been performed by Arthur Anderson and Company since 1986. The audits are professionally performed by local auditors under the close supervision of an expatriate partner operating out of Lagos. The principal effort of the external audit programme has been at IITA headquarters in Ibadan and at field stations within Nigeria. Because of the high cost of using a commercial firm out-of-country, the IA has assumed primary responsibility for such work.

The external auditors have reported that IITA's internal controls are operating satisfactorily, and that management is responding satisfactorily to the findings and recommendations of the internal as well as the external audits. External audit reports in recent years have been "clean" with only minor findings reported.

As required by CGIAR financial guidelines, IITA's overhead rates and practices are examined periodically by the external auditor. The review focuses on the logic of the methodology and computational correctness, but does not deal with equity issues.

Meetings between the BoT AC and the external auditor are open, frank and comprehensive. The external auditor has never met with the full BoT, a practice other IARCs have found to be beneficial. While not recommended as an annual event (the AC does an excellent job in representing the full BoT's interest), the BoT might consider having a closed session with the external auditor once every three or four years or so. Such a meeting might focus primarily on an overall appraisal by the external auditor of the control environment within IITA, an evaluation of the scope and quality of the internal audit work, and a strategic risk assessment of the Institute. It would also provide an opportunity for Trustees who are not on the AC to raise any questions they might have directly with the external auditor.

The BoT has considered and rejected the idea of automatically rotating external auditors every five years or so. Instead, it has adopted a policy requiring a formal review every five years of the advisability of rotating auditors. Given the satisfactory quality of the work performed by Arthur Anderson and Company, and limited alternatives available in Nigeria, the BoT's position seems quite sound.

5.2.4. Integrated Planning and Budgeting

The Second EMR Report noted deficiencies in IITA's planning and budgeting processes and recommended that the processes be simplified and made more participative and consultative, and that budget allocations directly reflect the goals of the Institute. Management agreed with those recommendations and has made sustained effort to improve both processes. Today, the planning process is based directly on the Institute's approved MTP, and involves the wide-spread participation of research managers and programme leaders.

IITA's budget development takes place in three distinct decision processes covering personnel, capital investment and all other costs. The basic resource allocation decisions pertain to the staffing of research programmes and priorities embodied in the MTP. These decisions are essentially taken during the programme planning phase. Adjustments in staffing patterns required by shortfalls in expected availability of funds are basically determined at the top management level between the DG and the research Division directors and Department heads. Costing of the resulting staffing patterns is relatively mechanical, using standard ratios and approved salary and wage scales.

A capital budget is developed by a Capital Budget Committee consisting of the three research Division directors, the DDG for International Cooperation, the DDG for Management and the Director of Budget and Finance. Capital items requested by research programme leaders and management staff are prioritized and approved for inclusion in the budget within the ceiling previously established by the DG and BoT for the capital budget.

All other input costs (objects of expenditure) are derived by negotiations between the Budget Officer and the responsible research division directors and department heads, relying heavily on the previous year's expenditure patterns adjusted for revised estimates of costs and inflation.

Once the budget is approved, Division directors and Department heads must allocate funds to some 385 cost centres and distribute funds among the detailed object class breakdowns. (There are 180 core operating centres, of which 128 are in research and the other 205 cost centres are for special projects and Funds in Trust). The distribution of allocated funds is input for the FIS and serves as the basis for monthly status reports to all management levels.

The step-wise approach to annual budget development, combined with the turbulence introduced by unpredictable reductions in core funding during the last several years, has made it difficult to achieve consistency between programme priorities and resource allocations across the full range of IITA programmes. However, the FIS software is a powerful package which includes roll-up and consolidation facilities allowing costs to be grouped by research programme, research division and commodity. The information currently produced is in keeping with the requirements of the Institute's divisional management structure and, with suitable adjustments, can be made compatible with the proposed project-based budgeting, reporting and priority-setting systems (see Sections 4.3.2. to 4.3.4.).

What is lacking, and needed, is an overarching, time-phased strategic plan to drive the several development efforts in a more coordinated way. The BoT, as part of its oversight responsibilities, should be more assertive in requiring management to develop such a plan for BoT review and approval. Among other essential concerns, the BoT should assure itself that the programme/project structure that emerges will serve the BoT's needs for strategic and medium-term planning as well as annual budgeting, and that it will be compatible with the CGIAR's requirements for activating the promised matrix under the re-engineered CGIAR System.

To focus attention on this important issue, it would be appropriate for management to prepare a time-phased plan for the further development of an integrated programme/project planning, budgeting and management structure, including a streamlined financial reporting system (see Section 4.3.1). The purpose would be to effectively link strategic and medium-term planning, annual budget development and execution, and management control and accountability processes. The plan would include the designation of a single official to be responsible for coordinating the integrated system design and implementation effort. It would also include the specification of milestones and reporting schedules to keep the BoT informed of progress, problems and design changes contemplated, if any.

Recommendation:

The Panel recommends that IITA develop an integrated programme/project planning, budgeting and financial reporting system to support the transition to project-based research management.

To facilitate this process - as also recommended in Section 4.3.3 - one research working group could be selected to develop and pilot-test the proposed structural concepts of a fully integrated system, working closely with the Institute's Chief Financial Officer and the representatives of the research staff.

5.3. Information and Computer Services

5.3.1. Information Services

IITA's Information Services Programme consists of the three Units: Public Affairs, Publications, and Library.

The Public Affairs Unit promotes public awareness of the Institute's activities and accomplishments and helps create a positive image for the Institute and the CGIAR system. It provides regular Briefing Reports to donors and others, organizes the International Development Lecture series, the Media Forum for Agriculture, and contributes materials for local, regional and international mass media of the Institutes activities.

The Publications Unit with its editing, production and distribution services disseminates IITA's research findings to the broad range of users of such information. It also manages the Institute's peer review process for journal articles under the guidance of IITA's Publications Review Panel. Information Services provides the secretariat to this Review Panel (which consists of research scientists). The production of refereed journal articles by IITA scientists has been steadily increasing in recent years. Contributing factors to this positive development may have been the activity of the Publications Review Panel with its secretariat in the Unit as well as the decision to exclude non-refereed materials from the publication in the Institute's Research Bulletin. The Panel commends

staff for this achievement. The Unit has been equipped with advanced desk-top publishing and graphics systems.

IITA's Library and Documentation Centre has the primary function of serving the needs of the Institute's researchers and trainees. It has, however, also become an important reference library in the region. The Library database with currently a little more than 100,000 records is searchable from terminals located in the library and others located in the Institute's laboratories and offices. The database, so far served by the Institute's VAX mainframe system, will soon be converted to a Pentium-based system operating under Unix and be accessible in the PC network. The Centre has acquired 22 external databases on CD-ROM and has produced guidelines for their easy access.

The Panel notes that two important constraints faced by the Informations Services Programme and raised by the Third EPR and the Internal Review of the Programme in 1992 have not yet been satisfactorily addressed:

- Both the Library and the Publications Unit (the latter in the production and distribution areas) continue to work under conditions of extreme shortage of space.
- While there are Board-approved guidelines for the activities of the Public Affairs and Library Units, there is still no agreed institutional policy on publications activities.

The Panel repeats the statements made by the Third EPR on the need for priority space allocation to Information Services. The reassessment of the organizational setup of the Information Services Programme, as recommended below, should be an opportunity to readdress these urgent requirements.

Recommendation:

The Panel recommends that a Publications Policy for IITA be established, and that an Advisory Committee monitor its implementation.

The Panel noted that there is a certain duplication of efforts, skills and facilities between the Publications Unit and the Training Unit with regard to editing, audiovisuals, graphics and desk-top publishing.

The Panel agrees with the decision made by the DG to transfer the Information Services Programme to the International Cooperation Division, where its needs can be more adequately catered for than in the Administration Division. This also should provide the opportunity for more closely relating Information Services with Training, Monitoring and Evaluation, and Interpretation and Translation, and possibly Geographic Information Systems for the use of synergistic potentials and to avoid duplication of efforts.

In the Panel's view, the forthcoming transfer of responsibilities for IITA's Information Services to ICD could be combined with a general reassessment of the functions and activities covered by these services. This would lead to agreements on priorities, strategic goals and organizational arrangements. This assessment could cover the entire range of IITA's internal and external information functions (Publications, Public Awareness, Library, Training Materials, Interpretation and Translation, GIS, computer services and data bases).

Recommendation:

The Panel recommends that a comprehensive review of Information Services be undertaken as soon as possible.

5.3.2. Computer Services

Computer Services is a support unit within the Management Division and its objective is to ensure that the Centre is served with the most effective computer system available in terms of cost and performance. It also contributes to the necessary level of hard- and software standardization for effective support and cost savings.

The equipment installed in the Institute's headquarters consists of three DEC VAX systems serving the needs primarily of the administration support services, and also of the Library. There are approximately 275 IBM compatible computers, mostly serving the scientific users, and approximately 200 Apple Macintosh computers serving the administrative and scientific support staff. The Cotonou station almost entirely works with Apple machines while the other stations primarily rely on IBM-compatible PCs.

Local area networks have been established in each of the headquarters buildings and their linking is being completed. The Cotonou station has also established a network. E-mail is now available to IITA scientists - which is a definite achievement and is highly appreciated by staff.

The Panel suggests that in the further development of computer services at IITA, preference be given to PC (and Apple) network-based solutions. The proposed upgrade of the DEC hardware is expected to include network compatibility, and is likely to meet IITA's current needs.

Since Computer Services provides user services to the entire Institute, including Central Stores, PPS Stores, FIS, Library, Personnel, Research and all other users of PC and Apple machines, the Panel agrees with management's view that the Unit should remain in Administration with other cross-Institute services. The Information Technology Committee, which has members from all relevant groups in IITA, including research, can continue to provide guidance and strategic direction to Computer Services.

5.4. Physical Plant and Administrative Services

5.4.1. Physical Plant Services

5.4.1.1. Service Coverage

The Physical Plant Services (PPS) programme provides essential services to the research Divisions and the Ibadan campus (or township). Its activities include: housing, water treatment and sanitation, electrical power production and distribution, air-conditioning, communications, building and grounds maintenance, metal and wood fabrication, and scientific equipment maintenance. PPS also serves as a technical resource for other stations outside Ibadan.

The PPS receives over 7,000 service requests annually, some during weekends and holidays. An average of 10 vehicles are serviced or repaired on a daily basis. Approximately 1,000 hours of emergency power are generated and over 400 million litres of potable water are delivered every year. In spite of the problems associated with the aging buildings and equipment, the PPS has managed, since 1988, to reduce materials and supplies by 20%, abolish one internationally recruited position at the director level, and change two internationally positions to nationally recruited. The current Head of PPS reports to the DDG(M).

5.4.1.2. Service Efficiency

The Panel is of the view that although improvements in service provision and efficiency may be needed, PPS has a team of dedicated and hard-working staff and managers who are able to keep the Institute in relatively good shape despite the very difficult external environment. This was amply demonstrated in 1994 when the Ibadan campus and research facilities were kept operating throughout the six weeks-long strike by public utilities and services in the surrounding community.

Since the range of services provided by PPS is very large and diverse, and the work load is heavy, it is to be expected that for some activities there would be a greater need for improvement than in others. Procurement of goods and services is one such activity; and for this activity, IITA's location at Ibadan, some distance from Lagos, is a definite disadvantage.

Despite IITA's decentralization policy, the centralized importation of goods and services (equipment, supplies, spares etc.) is often necessary, and is the responsibility of the materials management section of PPS. Based on discussions at headquarters and during visits to other IITA locations, the Panel understands that the time taken for procurement is often longer than expected because the procedures used are more bureaucratic than necessary.

Some of the scientists' frustrations could obviously be reduced by further streamlining procurement procedures wherever possible, without sacrificing accountability. In addition - assuming that the scientists are familiar with (or can be

trained in) the standard procedures and principles of procurement - authority for local purchasing could be further delegated to the heads of field stations. The Panel suggests that at headquarters, it might also be useful to consider a Users' Procurement Advisory Committee, comprising selected scientists and administrators, to periodically review the problems being encountered - both by the users and the providers of service - and to seek improvements.

5.4.2. Administrative Services

As noted earlier, a large number of administrative services are provided by the Administration department of IITA. Most of these services are of reasonably good quality; and, as in the case of PPS, the Panel has not found it necessary to examine them in detail. Only two service units have been especially brought to our attention - perhaps because they are widely used - and these units are briefly commented upon below.

5.4.2.1. Hotel and Catering Services

This service Unit comprises the International Guest House, Dormitory, Restaurant, Snack Bar, Staff Canteen, Laundry and Recreation Centre at Ibadan. The Unit provides hotel and cafeteria services for official IITA visitors and increasingly to third parties. With nearly 5,000 visitors per year and with the serving of 80,000 meals and over 300,000 lunches, the Unit has established an effective record of service quality. The Panel notes that this Unit has been successful in providing good quality services in spite of difficulties in obtaining local supplies.

In recent years, IITA has "opened" the hotel and related recreational facilities to selected groups of outsiders on a fee basis for meetings, conferences and recreational events. Customers are primarily restricted to the diplomatic community, collaborating scientific and educational institutions, and selected business groups. Despite the substantial revenues generated, this extension of services to outsiders is not universally appreciated by the campus community, as the Panel has noted earlier (see Section 5.1.5).

5.4.2.2. Travel Services

The Travel service Unit comprises airline ticketing, travel documents, immigration and airport services. Its objectives are to provide travel services similar to those available at a private travel agency - such as airline flight information, airline bookings, ticketing and seat confirmations - as well as to assist staff and families obtain proper residence permits and visas.

The Panel notes that providing the above services in Nigeria is not always easy. Many external factors play their part, including frequent changes in immigration rules or procedures, breakdowns in telephone communication links, the changing security situation at Lagos airport, and an unreliable public transportation system, to name just a few. The Panel understands from some users of the Travel Unit that, although service has improved in recent years with the computerization of airline bookings, further improvements are still possible.

CHAPTER 6 - INSTITUTIONAL RELATIONSHIPS

6.1. Host Country Relationships

The Institute has been able to carry forward its programmes in Nigeria effectively by following opportune and pragmatic strategies, including some decentralization of its work to other parts of Africa. However, the sluggish economy and unstable domestic environment of Nigeria over the last decade have created some difficulties for IITA both in financial terms - mainly because of the impact of artificial foreign exchange regulations - and in regard to living and working conditions for staff. Decentralization has been a deliberate policy of IITA since the preparation of its Strategic Plan in 1988, in order to achieve (a) sharper focus on particular agroecologies and (b) more regional transparency, particularly in respect of francophone linkages.

Despite the unstable and deteriorating national scenario, IITA has improved its relations with the country's authorities, as compared to the conditions prevailing in the mid-1980s. In fact, the Institute has finally had its Headquarters Agreement with the Government of Nigeria fully implemented as of 1991, which gives IITA diplomatic privileges. Besides, the Institute has regularly received special assistance from state- and national-level authorities during times of breakdown of public services, so as to permit the normal functioning of the Institute. At present, there is still pending the question of Nigeria's contribution to the CGIAR, which has not been paid in accordance with the agreed dollar values. However, this is expected to be corrected soon.

It should be clear from all the above that host-country conditions have not been conducive to close and efficient collaboration with the IITA. The intermittent shifts in official reporting or contact point (i.e. the Ministries of Planning, of Agriculture and of Science and Technology) and the frequent turnover of officials are also detrimental to collaborative efforts. In particular, the fact that public agricultural research in Nigeria is conducted by some 16 independent institutes, loosely coordinated by a central administration, makes it difficult for IITA to establish broad and stable joint activities with national institutions.

Despite the obstacles noted, there is good, direct cooperation with parts of the Nigerian NARS, for example:

- Institute of Agricultural Research (IAR) within whose premises at Kano, in the north of the country, IITA has established its station for cowpea research;
- National Root Crops Research Institute in the south east, with which IITA maintains close collaborative projects, especially for cassava, yam and farming systems research;
- Institute for Agricultural Research and Training, for downy mildew resistance in maize and use of their Ikenne farm

- Shell Petroleum Extension Service for distribution of improved plantains
- Nigerian Plant Quarantine Service for international exchange of germplasm.

Contacts and collaboration with the agricultural departments of Nigerian universities has diminished relative to earlier times, especially in regard to the University of Ibadan. As a consequence of factors such as poor public funding, academic instability and loss of qualified staff of these institutions, the atmosphere is not conducive to effective joint research. Thus, the main collaboration occurs in the form of graduate training in research at IITA for students who receive their degrees from various national universities (see Section 3.3.). Access to the IITA library and some of its research facilities by national researchers/students also provides a useful service to the local scientific community. Some IITA international staff are honorary research fellows at the University of Ibadan.

As IITA has decentralized its operations, the concept of "host-country" extends also to those nations where the other stations are located. In this respect, conditions are as follows.

Benin: Two of IITA's PHMD programmes, biological control and habitat management have been based in the Cotonou Station since 1988/89. Relations with the national authorities, formalized through a protocol of 1986, are good and the country generally offers quite favourable operating conditions.

Cameroon, with which IITA has a formal cooperation agreement since 1986, has become the major location for resource and crop management research for the humid tropics. IITA researchers are based at Yaoundé and at the nearby Mbalmayo Station, developed on an area of 1,000 hectares made available by the government. Close collaborative ties have been established with IRA. IITA facilities are adjacent to IRA headquarters.

Uganda: IITA established its programme for the Mid-Altitudes Savanna Zone at ESARC in this country through an official agreement with the government in 1993. The Institute is developing its research facilities within the main station of the National Agricultural Research Organization (NARO), at Namulonge. Rapport with the local scientific community is excellent and staff working and living conditions at present are satisfactory.

Côte d'Ivoire: IITA signed a cooperative agreement with the government in 1993 to carry out research for the Moist Savanna Zones. IITA is in the process of establishing a station at the Ferkessedougou Station of the National Agricultural Research Institute for the Savannas (IDESSA). Although activities at this location are still at the early stages, local support and collaboration have been excellent.

6.2. National Institutions

IITA's primary partners in agricultural research are the NARS, composed of the national governmental agricultural research departments, the national agricultural university systems, as well as any other governmental or non-governmental agricultural research agencies. IITA could not achieve its goals without effective linkages to these national programmes; this partnership is, indeed, essential for IITA's research delivery.

The strength of the NARS in the region is highly variable and so are the opportunities for NARS-IITA collaboration. Elsewhere in this report (Section 3.1.) the mechanisms and organizational methods, and achievements of IITA's more formal collaborative activities with NARS are highlighted (Networks, Resident Scientist Scheme, Research Liaison Scheme). In addition to such formal contacts between IITA and NARS, there is a multitude of further, less formal collaborative arrangements and understandings which comprise a dense network of communication and ground-level cooperation.

Collaborative activities which involve transfer of technology and training of national staff do not normally call for specific legal agreements or memoranda of understanding between IITA and the respective NARS. In other cases, with more substantial IITA involvement, such agreements which define the role and responsibilities of the parties have been reached. This is particularly the case when IITA scientists are placed in the national programme in the framework of such collaboration. During the period under review, the following Memoranda of Agreement have been signed: with Ghana (1992), Côte d'Ivoire (1992), and Burundi (1994) to facilitate common programmes of research and training; with Mozambique (1990), Tanzania (1994) and Malawi (1995), to facilitate the implementation of bilateral and regional activities; and with Sierra Leone (1991), Uganda (1991), Guinea Conakry, and Nigeria (1992) in the framework of collaborative biological control operations. Such agreements provide the centre's collaborative activities with the necessary legal standing and contribute to a high degree of transparency and accountability.

Whether supported by bilateral agreements of understanding or not, there is a broad range of contacts in research, training and communication and documentation between IITA and national agricultural researchers which extend beyond the ones maintained in the formal arrangements of networks, or resident scientist schemes reported in Chapter 3. A survey was carried out by the TAC Secretariat on the collaborative activities between IITA and the NARS in the region in 1994. The respondents recorded that they wish to intensify collaboration with the Institute. IITA's training and particularly their information activities were highly rated by the respondents. Of particular importance for the respondents who had been in one way or another associated with IITA's activities, were the Institute's research programmes. IITA-supported networks were given variable but generally not outstanding scores, while the respondents unanimously endorsed IITA's mission, and goals and long-term strategy. They were, on the other hand, less satisfied with the level of technical benefits they had received.

A very significant development in the review period which is highlighted here has been the development of the ESARC for the improvement of cassava, banana and plantain (formally created in 1993) as a basis for longer-term research activities with Uganda's NARO, the host institution and the national systems of the two regions, associated in SADC (SACCAR) and ASARECA, respectively. This initiative has been prepared in broadly-based consultations in the region and is, in its organizational structures (Executive and Steering Committees) and in its participatory approaches, a model for the enhancing of IARC-NARS collaboration. The Panel congratulates IITA for its contribution to this promising development.

It is difficult to present full coverage of the wide range of IITA-NARS interactions. However, the Panel has reviewed a number of collaborative situations which may be mentioned here as selected cases.

In northern Nigeria there are currently four linkages of substance: with the IAR at Ahmadu Bello University (ABU), with the Kano State Agricultural Development Project, primarily through CID (cowpea); with the Bauchi State Agricultural Development Project (BSADP) and NGO (Development Research Centre), through RCMD. The linkage is strongest at Kano, with IITA staff working in the same complex as IAR which has allocated a portion of the experimental farm at Minjibir to IITA. Costs of the municipal facilities at Kano are shared by IITA and IAR. The linkages in northern Nigeria are maintained in several ways, e.g. through joint annual IAR/IITA review and planning meetings. The IITA cowpea breeder is a member of the IAR Legume and Oilseed Research Programme Review Committee and IITA staff participate in IAR's Annual Cropping Scheme Meeting. There is also a linkage through joint activities, such as the joint research field day during the cowpea season at Minjibir and Samaru (IAR headquarters); joint supervision of postgraduate degree research projects for those registered at ABU; joint participation in networks (West and Central African Cowpea Network - RENACO), West Africa Farming Systems Network); joint participation in nationally coordinated research projects (cowpea, soybean); collaboration in on-station and on-farm adaptive research (farmer participatory variety screening of cowpea and cowpea/sorghum, cowpea/maize, soybean/maize systems evaluation) and joint IAR/IITA preparation of training manuals relating to cowpea diseases and agronomy.

A prominent IAR scientist participates in IITA's Task Force for the Ecoregional Programme for the Humid and Subhumid Tropics in sub-Saharan Africa.

In the Bauchi benchmark area, BSADP has helped RCMD in locating villages for the survey work and continues to give feedback on trials and research themes. The link with the Development Research Centre (working with women farmers' groups) is primarily in the area of postharvest engineering.

The Plant Health Management Division, with its Biological Control Programme has established a very dense network of working relationships with national researchers and research groups throughout sub-Saharan Africa. This research relates to the control of the cassava mealybug, the cassava green mite (CGM), water weeds, the banana weevil, and cereal stem borers; the activities also include capacity-building through training. National interest and commitment to biological pest control have been greatly enhanced

by these activities, as evidenced, e.g. by the strength of the Ghana plant protection services and by the formation of a national Society of Entomology in Côte d'Ivoire.

Each of the four Programmes within the Crop Improvement Division has working relationships with a variable but large number of national research groups concerned with genotypic selection for adaptation to local conditions of the crops researched. Improved cassava germplasm (provided as seed) is distributed annually for evaluation for pest & disease resistance (CGM, cassava mosaic virus, and cassava bacterial blight), high yield, dry matter and cooking quality to 33 countries in sub-Saharan Africa. Technical backstopping and follow-up is provided to collaborators. Over 30 country programmes also received improved germplasm as *in vitro* plantlets for evaluation. There was a systematic increase in delivery per year from 1,170 virus-tested plantlets of 31 genotypes in 1990 to 2,385 plantlets of 130 genotypes in 1994. TRIP collaborated with various national programmes in the international testing of improved genotypes across West Africa. The expansion in activities in East and Southern Africa was greatly facilitated by the presence of two root crop networks - EARRNET and SARRNET.

During the period under review there was a very significant increase in collaboration on yam research between IITA and the NARS in Africa. Links with institutions on other continents were also maintained. The number of genotypes available for distribution as virus-tested, *in vitro* plantlets increased from five in 1990 to sixteen in 1994. A new means of delivery introduced in 1991 involves the production of minitubers from the virus-tested plantlets in a protected screenhouse. Over 1,000 of such certified minitubers were distributed each year from 1991 to 1994. The capacity for handling *in vitro* plantlets has improved greatly in the NARS following training. There has been increased use of botanic seeds received from IITA by NARS in the establishment of nurseries for selection in Benin, Uganda, Gambia, Ghana, Togo, Guinea and Rwanda, thus offering more variability than is possible in the clonal materials. Collaborators in eight West African countries are multiplying materials in the field for regional collaborative trials in 1996. IITA has also been involved in the formation of the African Yam Network. The relevant national programmes took the lead in this initiative in which, for the first time, IITA was truly a member rather than an implementing agent.

The Maize Improvement Programme offers various maize trials to national programmes for local evaluation, primarily in West and Central Africa. Large numbers of trials (1,637 in the period 1988-1992) are sent out to collaborators at their request of whom about half return data. From their analysis, stable high-yielding and disease-resistant varieties have been identified for different ecological regions. Most national programmes have released IITA streak resistant varieties directly or after selection; they have also used this material as a germplasm source in their own breeding.

Over the review period, several mechanisms for NARS collaboration in cowpea improvement were in place, such as:

- Cowpea International Trials, carried out in over 50 countries. The trials are routinely available and are conducted by national scientists with their own resources

- West and Central Africa Cowpea Research Network which operated as part of SAFGRAD to 1993 and managed to obtain donor support in 1995
- SADC (SACCAR) regional project 1990-1993
- Special collaborative arrangements focusing on hotspots and linking with national collaborators in five countries for the evaluation of materials for specific traits which cannot be evaluated at IITA's sites;
- Monitoring tours and workshops.

For soybean international trial sets (seeds plus protocol for conducting the trial) are sent on request to collaborators in about 25 countries every year. Similarly the Plantain and Banana Improvement Programme has been evaluating improved germplasm in collaboration with regional centres, national programmes and NGOs in multilocal trials. In the cases of cassava, soybean, plantain, and banana postharvest technologies collaborative research activities were undertaken with NARS. IITA sponsored the formation of the African Plant Biotechnology Network in 1989. GRU collaborated closely with NARS in several African countries and Brazil in the collection and conservation of plant genetic resources of cassava, yam, cowpea and maize. GRU also facilitated the establishment of a NGO - the Plant Diversity Research Organization.

RCMD has collaborated successfully and extensively with NARS in Cameroon (Resident Scientist Scheme, see Section 3.1.2.1.). The vegetation characterization survey in the Moist Savanna Zone was carried out in collaboration with a variety of NARS, as was COSCA. New modes of institutional research collaboration will need to be designed in the context of ecoregional initiatives (see Section 4.2.8.).

The integration of IITA's research in the regional agricultural systems is multifaceted, contributes to the strengthening of the national research capacity and is highly appreciated, as shown in the feedback to the TAC survey among national collaborators.

6.3. CGIAR Centres and Other International Organizations

6.3.1. Introduction

In current efforts to renew the CGIAR System and find its role for the future, a greater openness of the system is advocated. Growing complexity in science will make it likely that any given effort might involve all parts of the research continuum, from strategic through adaptive research. The consequence is that individual centres, indeed often the CGIAR System itself, will not have staff to cover all relevant specializations. To be efficient then, individual parts of the CGIAR must open up to new forms of collaboration. The CGIAR's innovations in "Systemwide global and ecoregional initiatives" are a response to this challenge. Such initiatives rest on an approach that brings new balance into international agricultural research. The approach features

sustainable improvement of productivity as well as a strategy for the mobilization of the global research system to meet the sustainability challenge (CGIAR, 1995, A Research Agenda for the Future).

The request for closer collaboration between CGIAR centres is not new; centres have often been criticized for being too inward-looking and approaching each other as competitors rather than as partners. Such rivalry has reduced potential impact of research programmes and has often frustrated the NARS. The CGIAR intends to provide incentives for the formation of productive partnership - including those among CGIAR centres - and to adjust funding systems to facilitate these collaborative modes of working. The objective is for the CGIAR to become more outward looking in its mode of operation and accountable to a wider constituency through partnership.

The IITA Board and Management have on several occasions stressed their commitment to inter-centre collaboration, also in the context of the Systemwide initiatives and programmes; IITA's responsibilities there have been highlighted elsewhere in the report (Section 4.2.8.). IITA therefore has a broad range of cooperative arrangements with sister CGIAR centres and a generally successful track record of inter-centre collaboration.

Some of these arrangements are highlighted below.

6.3.2. CGIAR Centres

In the context of the formation of the International Livestock Research Institute (ILRI) and the Global Livestock Research Initiative, IITA and ILRI agreed on substantially expanded joint crop-livestock interaction research for the moist savanna; IITA houses a team of ILRI scientists at Ibadan and provides it access to research facilities and comprehensive administrative and logistical support services in the framework of a detailed collaborative agreement. Joint research emphasizes the integration of herbaceous and woody legumes into crop farming for the benefit of soil fertility improvement, for soil conservation and livestock feed supply. The Panel commends the two centres for their excellent integration of programme planning and implementation.

CIAT (Centro Internacional de Agricultura Tropical) has stationed a scientist at IITA in order to facilitate the transfer of cassava germplasm to Nigeria from Latin America and also for some in the reverse direction. At the time of the review the CIAT position was vacant because the incumbent had taken up an IITA appointment in SARRNET. Because of quarantine restrictions, parental clones cannot be sent from Latin America to IITA for crossing there; consequently CIAT sends true seeds from its crosses to IITA. CIAT has received from IITA materials with African cassava mosaic virus (ACMV) disease resistance for use in crossing. Some of these have been passed on to EMBRAPA/CNPMP (Brazil) to incorporate resistance in their breeding programme. A project to tag and map ACMV resistance is being prepared. A greater interaction between CIAT and IITA is foreseen in the area of host plant resistance to major African

pests and diseases. Both Centres also participate in the Cassava Biotechnology Network, sharing several project protocols. IITA and CIAT jointly execute the Ecologically Sustainable Cassava Plant Protection (ESCaPP) in South America and Africa.

The intensity of the CIAT-IITA collaboration on cassava has greatly increased over the review period; there have also been joint activities in East Africa, particularly in training in the areas of legumes and IPM. CIAT is keen to have facilities with IITA in ESEARC for work on beans. The IITA-CIAT relationship has, in sum, been very productive during the review period.

IITA is providing access to the use of its facilities to scientists of ICRAF, CIMMYT, IRRI, WARDA and CIP who use IITA as a basis for their work. Such scientists have the same privileges as IITA staff with respect to living on campus and access to office and laboratory facilities.

ICRAF has two senior staff members in Cameroon. Both work closely with IITA, particularly in the context of the Alternatives-to-Slash-and-Burn project for which IITA has a coordinating role. Until recently one of these staff members was located at IITA in Ibadan for joint research on multipurpose trees. IITA and ICRAF also jointly sponsor the AFNETA network and collaborate in the conservation of germplasm of agroforestry species. While collaboration on the ground is good, there is, however, a need to agree more precisely the respective roles of the two institutions in the areas of agroforestry systems diagnosis and development and in research on component interaction, in order to avoid unnecessary overlap of activities.

The last EPR was very critical of the relationship between IITA and CIMMYT in sharing responsibility for maize improvement in Africa and particularly in West Africa. In January 1994 an agreement was finally ratified between the two institutions on "Areas of IITA and CIMMYT Cooperation on Maize Activities" which sets the terms for division of labour rather than for cooperation. A CIMMYT maize breeder and two IITA breeders (including one of whom also serves as the coordinator of the West and Central African Maize Network) are based at WARDA headquarters at Bouaké-M'bé. The CIMMYT breeder incorporates streak resistance into long-season, lowland tropical maize for West Africa and into short- and intermediate-duration maize targeted for East and Southern Africa, while the IITA breeders produce very short-, short- and intermediate-duration materials for West Africa. The Panel notes that CIMMYT continues to have a maize agronomist in Ghana in the Ghana Grains Development Project (up to end 1995).

The Panel considers that this situation is a workable but clearly a less than optimal solution of the long-standing dispute on CGIAR maize responsibilities in Africa. It decided, however, not to recommend any action, but to leave this to the forthcoming inter-centre cereals review.

The agreement between IITA, IRRI and WARDA on rice research in Africa foresees a gradual but comprehensive transfer of all activities from IITA to WARDA in the course of the current Medium-Term Plan (1994-1998). IITA has implemented this transfer as per the terms of the agreement. The residual rice activity currently maintained at IITA headquarters is the coordination of the International Network for Genetic

Evaluation of Rice in Africa (INGER Africa) with the presence of an IRRI rice scientist in charge. This is done for reasons of convenience (advanced facilities in GRU for the maintenance of the African rice collection, rice research facilities at Ibadan, good quarantine services in Nigeria). These are also the reasons for WARDA to base its lowland rice breeding and its African gall midge control programmes at IITA Ibadan. The decision as to whether and when INGER is transferred to WARDA and to what extent the IRRI scientist at IITA carries out prebreeding work on rice is a matter of agreement between WARDA and IRRI. It is worth mentioning here that the long-standing INGER activity in Africa supported by IITA has led to the release of 141 rice varieties in 27 African countries.

IITA is one of WARDA's key research partners in the region by virtue of its mandate for the humid and subhumid tropics, its location in West Africa and its programs for resource and crop management for the ecological zones that are of interest to both institutes. In order to facilitate the necessary level of interaction WARDA and IITA agreed to have mutual Board of Trustee representation on each others Programme Committee and to establish a Technical IITA-WARDA Task Force to define areas of complementarity among the programmes of the two Centres. The Panel is confident that these mechanisms are effective enough to support successful identification and integration of common research agendas.

IITA and WARDA share responsibilities in the CGIAR ecoregional programme in warm humid and subhumid tropical Africa for which IITA was identified as the convening centre. WARDA has the lead role within this programme for the inland valley component. The corresponding research consortium with the participation of both centres was established in 1993.

After the transition of the sweet potato mandate to **CIP**, IITA continued to maintain the *in vitro* collection of germplasm. This has been partially duplicated by CIP at Lima. The CIP liaison scientist participated in some IITA training courses on root crops. CIP is also interested to use the IITA facilities at ESARC for backstopping of activities in East and South Africa. The secretariat for the potato network is already located in the IITA office in Kampala.

A close technical and administrative collaboration between IITA and **ICRISAT** has emerged in the review period at and around Kano, where IITA's cowpea breeding is primarily done. The Kano zone is outside IITA's ecological mandate area but not outside its commodity mandate area. The question whether cowpea should be an ICRISAT mandate crop is occasionally raised. Given the strengths of the IITA cowpea breeding programme and its strong production systems orientation, and given the adequate level of IITA-ICRISAT interaction in research on cropping systems containing cowpea, the Panel does not recommend any immediate action but suggests that the subject is reassessed as part of the IITA mandate in the preparation of the next Medium-Term Plan.

IITA entertains close collaborative links with **IPGRI** and **INIBAP** in various ways. IITA is the centre with the best plant genetic resource conservation facilities of the entire region and with one of the broadest coverages of species in the CGIAR System; IITA is thus a key partner for IPGRI in agrobiodiversity, and plant genetic resources

research, training and information activities for Africa, particularly in the context of the Systemwide Genetic Resources Programme (SGRP). A joint IITA/IPGRI/FAO training course has been organized. The Panel encourages IITA to play a proactive role in this initiative. The IITA-INIBAP interaction involves joint work on training and information/documentation. A detailed working arrangement has been agreed in East and Southern Africa with respect to highland *Musa* research. A matter of concern related to safe exchange of *Musa* germplasm has swiftly been addressed by IITA through special project funding which will result in the development of indexing facilities.

6.3.3. Non-CGIAR Centres and Others

ICIPE (International Centre for Insect Physiology and Ecology). New far-reaching opportunities for collaboration between IITA and ICIPE have emerged with the appointment of the new Director General of ICIPE, formerly Director of PHMD at IITA. These range from mutual logistical support to the exchange of scientists and integrated research protocols. ICIPE has decided to concentrate on non-CGIAR food and horticultural crop pests and will devolve its banana research to IITA in order to contribute to complementarity between the two institutes.

CIRAD (Centre de Coopération Internationale en Recherche Agronomique pour le Développement). The DG of IITA is a member of the Programme Committee of CIRAD's Annual Crops Department.

A very positive development in the review period has been the signing in 1991 of a general agreement between IITA and the French Institut de la Recherche Agronomique (INRA), CIRAD, and the Institut Français de Recherche Scientifique pour le Développement en Coopération (ORSTOM) on the coordination of research efforts and on research collaboration. Specific agreements were signed with CIRAD in 1993 concerning research on yams in sub-saharan Africa and in 1994 with ORSTOM concerning modelling of CGM biocontrol. One CIRAD and one ORSTOM scientist are based at Cotonou.

IBSRAM (International Board on soil Research and Management). Training/acid soil network/CGIAR soil, water and nutrient management initiative.

IFDC (International Fertilizer Development Centre). Soil, water and nutrient management initiative.

TSBF (Tropical Soil Biology and Fertility Programme). Alternatives-to Slash-and Burn Initiative.

6.4. Advanced Institutions

The 1990 EPR identified a lack of critical mass in many of the Institute's research programmes and also recognized that in some fast-moving fields of science, such as biotechnology, IITA scientists could experience difficulty in keeping abreast of developments. Consequently, it attached considerable importance to external links with advanced institutes, both public and private, as a means of maintaining scientific awareness within the Institute.

Without making a formal recommendation, the 1990 EPR expressed its concern that "direction and research agenda of linkage arrangements are seldom controlled by IITA" and it advised the Institute, *inter alia*, to focus on relatively few priority areas in which it played the leading role in the initiation and conduct of collaborative projects. The further suggestion was made that IITA should consider collaboration with the increasingly important private sector in developed countries. A modest amount of this type of collaboration is in place, e.g. with PGS, Belgium and Monsanto. In addition, in collaboration with the International Service for the Acquisition of Agric-biotec Applications (Cornell University, USA), IITA has tried to link to the private sector, especially for the acquisition of genes and recombinant DNA technology. Similarly, links with Katholieke Universiteit Leuven (KUL) provide a way for tapping the rich vein of anti-fungal proteins developed by the collaboration between KUL and ZENACO. However, IITA's experience to date in this area of prospecting, is that the private sector are not really forthcoming. Hopefully time and further developments in this field will cause some favourable adjustments in the private sector's current attitudes towards non-profit making organizations which focus their work on the developing world.

During the present review period only four memoranda of understanding were signed with advanced laboratories or research organizations abroad: 1992, University of Amsterdam for quarantine of predator mites of CGM; 1992, University of Maryland Eastern Shore on agricultural research and training on root and tuber crops; 1992, Natural Resources Institutes (NRI) on postharvest technology and virology; 1993, KUL on soil organic matter research.

This does not reflect the considerable professional contact IITA scientists have with colleagues abroad (sometimes within the framework of core-supplementing projects). PHMD, in its divisional annual report for 1994, published a very long list of scientific collaborators of whom some 50 are located in advanced institutes or universities (excluding IARCs) outside Africa. In some cases these contacts can be very useful as demonstrated by the collaborative work of IITA and FIC, combined with the technical support of the University of Minnesota for development of diagnostic tools for banana streak virus (BSV).

CAB International collaborates with IITA on a wide range of research and training activities in plant health management through several of its institutes. Collaboration between the International Institute of Biological Control (IIBC) and PHMD is on the LUBILOSA project has been successful for biological control of the water hyacinth and the mango mealybug. Through the Uganda Banana Improvement

Programme, the International Mycological Institute (IMI) interacts with IITA on *Fusarium* wilt. The International Institute of Parasitology (IIP) collaborates with PHMD on studies of root nematodes of bananas and joint work is undertaken between IIP and CID/TRIP on resistance in yams to nematodes.

Current interactions with Natural Resources Institute (NRI) involve the development and implementation of the processing component of the COSCA project; collaboration on a training programme in postharvest technology of the Non-Grain Starch Staples (NGSS) Project in Uganda and collaboration on the epidemiology of ACMV and feeding behaviour of the leafhopper vectors of maize streak disease. Part of NRI's yam research in Nigeria uses land and facilities at IITA's Onne Station.

External linkages in CID are understandably concerned mostly with biotechnology. These cover work in cowpea biotechnology with several universities in Italy, the USA and Belgium and are fully interactive with regular reviews of progress and the exchange of visits. A new series of joint projects concerning yam and cowpea, and the BSV diagnostic project mentioned earlier has been established with the John Innes Institute in the UK with subcontracts to NRI and Horticultural Research International. In *Musa* biotechnology, the links forged with KUL have been maintained. Other collaborative projects cover *in vitro* micropropagation of yam, cassava root quality and cyanogenesis in cassava linking with Wye College (UK), NRI and Royal Veterinary and Agricultural University, Denmark) respectively. The importance of information exchange and reciprocal visits and the free availability of any research outputs in Africa are key considerations in the initiation of any links.

There are relatively few links involving RCMD, the only new project in the review period being that on organic matter with KUL listed above. Michigan State University has been involved in root studies using minirhizotrons as part of the continuing work on alley cropping. As part of a joint activity with ICRAF, the Multipurpose Trees Screening for West Africa project launched in 1990, involves Oregon State University.

The Panel has concluded that the links being formed by IITA at present are generally relevant to the main lines of research at the Institute and are targeted at appropriate advanced institutes. For the most part, the links appear to be genuinely collaborative and the Institute has gone some way towards countering the criticism that it is merely the recipient of scientific services on offer.

CHAPTER 7 - SPECIAL ISSUES

7.1. Socioeconomics

7.1.1. Rationale

Somewhat surprisingly, the last EPR made little explicit mention of the contribution of social science research at IITA. Given the current staffing pattern in this area at IITA, the Panel wishes to indicate the types of roles which it believes social scientists should take at IITA. These include (see also Collinson and Platais, 1992):¹

- Conducting strategic research in social science to improve understanding of human behaviour at the farm, community, and national (policy) levels, in order to assist the conduct of research at IITA.
- Contributing to research that will produce technologies and strategies useful to farmers, and their households, in improving their productivity, welfare, and sustainability in an equitable manner.
- Assisting IITA management and scientists in priority-setting and planning, and in assessing impact.
- Participating in enhancing the capacity of national organizations, particularly in research.

This list of potential roles to be played by social scientists contrasts with the actual presence of social scientists in the core programme since the 1990 EPR. The changes can be traced to the reorientation from crop-based working groups to the agroecosystem programmes in 1992, the significant resignations (i.e. four) that occurred soon after, the strategy developed in the 1994 Medium-Term Plan 1994-1998, and the budgetary crisis that IITA faced during the review period.

The five agricultural economists present at the beginning of the review period (one of whom headed the Resource and Crop Management Research Programme (RCMP)) were reduced to three at the end of 1994. Of these, one currently heads the RCMD and another has been employed under the Collaborative Study of Cassava in Africa (COSCA) project. Thus, of the four core positions indicated in the Medium-Term Plan (including an Impact Assessor) only one is currently filled (i.e. for the Moist Savanna Programme). Technically one position has been "eliminated" resulting from a transfer of responsibility for the Inland Valley Programme to the Moist Savanna and Humid Forest Programmes, while, until recently, another one was frozen (i.e. the Impact Assessor position). Currently, recruiting is underway for an agricultural economist for the Humid Forest Programme and the process of recruiting an Impact Assessor is

1 Collinson, M. and K.W. Platais, 1992. Social Science in the CGIAR. CGIAR Study Paper Number 28. Washington: World Bank. p. 2.

beginning. Apart from the Impact Assessor position, which has not been filled to date, all the social scientist positions are located in the RCMD.

7.1.2. Achievements

Among its major activities, socioeconomic work has helped to characterize environments and technologies in the humid and subhumid regions of West and Central Africa. This exercise has contributed to the "benchmark area" concept, a major focus of IITA's current field efforts under its ecoregional mandate.

- In the Moist Savanna Programme considerable emphasis has been laid on characterizing systems as being population-driven or market-driven and as being in a land-expansion or land-intensification stage of development. Differentiation of systems according to such criteria is designed to help in more definitively targeting technology development. An offshoot of this has been an analysis of the impressive success of introducing maize into the Moist Savanna Zone. Much of the "benchmark" work to date has concentrated on the northern part of the Guinea Savanna Zone but currently the economist, in collaboration with the NARS, is completing a proposal concerning a "benchmark area" in the southern part of the Zone.
- Characterization of current farming systems has also taken place in the Humid Forest Programme in spite of there being no core-funded incumbent. A number of studies have been undertaken, the most notable being a survey of resource management in 85 villages (of which 47 were in the forest zone), conducted in 1992 throughout Cameroon. The survey undertaken with special project funding was implemented primarily by scientists from the Institute of Agronomic Research. A geographic grid-coded scheme indicating native vegetation and soils was used as a sampling frame and the results were used to identify strategies for technology development, linked to a resource-use intensification gradient, for the forest margin benchmark site in southern Cameroon in late 1993. During 1994 survey activities continued with a household characterization study undertaken to complement the soil sampling and rapid appraisal of vegetation in 45 villages which were selected using an area grid approach. Following this, six villages have been selected for intensive monitoring and on-farm technology testing.

The COSCA project started in 1989 with funding from the Rockefeller Foundation. A large amount of information has been collected and analyzed on the cassava growing areas of Africa. Phase I, completed by 1990, addressed characterization of cassava producing zones at village-level, while in 1992, Phase II was devoted to a detailed production survey. Finally, the collection of data in Phase III, which dealt with postharvest issues, such as consumption and marketing, was completed in 1993. Substantial data analysis has been completed on Phases I and II, and databases for these two phases are available for release. Progress is being made on the entry and cleaning of

data collected in Phase III. A large number of publications have been produced and national reports on the 10 countries collaborating in the project are being prepared.

Examples of other activities are as follows: some work relating to sustainability has been undertaken, particularly with respect to the total factor productivity concept, in collaboration with ILRI (formerly ILCA). Resource use dynamics have been studied in southeastern Nigeria, a conceptual framework has been developed for analysis of shifting cultivation and an assessment of alley cropping has been made. An interdisciplinary study involving macro-level characterization of 14 countries has recently been completed on savanna system characteristics for West and Central Africa. Social scientists have also contributed to the characterization conceptual framework used as a basis for the Inland Valley Consortium (see Section 4.2.7.). Finally, the newly appointed head of the RCMD (an agricultural economist) has played an important role in the research priority-setting exercise that has been undertaken within IITA.

7.1.3. Assessment

Unquestionably the disruption in staff continuity and the temporary reduction of core commitments has had a negative impact on the contribution of socioeconomics during the review period. Taking this into account, the socioeconomic input has been remarkably productive, thanks in large part to work undertaken as a result of special project funding.

However, although care must be taken not to use publications too rigidly as a yardstick in assessing the contribution of the social science component, it is apparent from the list of publications provided to the Panel, the publication record of the social scientists in IITA since the last EPR has not been very impressive. There was, as expected, a peak in terms of published papers during the 1991/92 period with a marked decline since then. Taking into account the type of publication and the number of senior scientist years which social scientists actually filled since the last review, the publication record for the social scientists at IITA was no better than that criticized at the time of the last review for IITA as a whole. More than 65% of the scientific output of the IITA social scientists did not involve rigorous, peer review, while the number of externally refereed publications per social scientist was only about 0.83 per year. However, there are a number of papers currently in draft form.

Perhaps of even greater concern is that only a few of the publications appeared to reflect genuine interdisciplinary collaboration, an unfortunate situation given the fact that well over 90% of the IITA scientists have a technical orientation and that an informal survey among such scientists indicated their perception that the most important function of CGIAR social scientists was to provide guidance on technology development (Collinson and Platais, 1992).¹ In fact, even before the last EPR the number of interdisciplinary papers was rather limited. However, as indicated earlier, there is now some evidence that this situation is changing. For example, there appears to have been coordination and

1 Op. cit. p. 11.

collaboration across social and technical disciplines in the characterization studies of the Moist Savanna and Humid Forest agroecosystems. Unfortunately, to date, little has been published from work on the Humid Forest agroecosystem. Given the innovative nature of the approach and its potential value to others, this is something that needs to be rectified as soon as possible. The characterization of the agroecosystems, taking into account the interaction between the technical (i.e. biophysical) and socioeconomic variables, is good and helps lay a much firmer foundation for determining and targeting relevant technologies.

The COSCA study undoubtedly constitutes one of the best commodity studies implemented in Africa to date. Past and current trends in production and utilization of cassava have been quantified and documented for 10 countries and detailed information is now available on cassava production, consumption, and marketing. This information is increasingly appreciated by many both in and outside IITA. In connection with this, as indicated above, the project has been prolific in terms of publications and still more are planned. However, although databases are now available on Phases I and II, they have still not been generally distributed to interested parties. The Panel strongly supports the plan to make a decision on how this should be done at a meeting scheduled for June 1995. It is also apparent the analysis and write-up of the surveys will not be completed, as earlier planned, by the end of 1995. Therefore, now that major support from the Rockefeller Foundation has ended, the Panel supports the plan of IITA to continue funding the economist for a total of one SSY beyond the end of 1995 in order to ensure that this important task is completed.

Although the Panel regrets the delays caused by the budgetary crisis and the need to recruit a new Director of RMCD in filling the vacancies arising from the resignations at the end of 1992 and in 1993, it is also pleased to note that some positive decisions have recently been made. Although, as indicated above, recruiting is underway for two of the vacant positions, there is still a question mark about the position for an agricultural economist in the Inland Valley Programme which, technically, has been eliminated. In essence, the agricultural economist currently leading the COSCA project can be viewed as filling this post. However, if this position were released as one for a core agricultural economist after the termination of the COSCA project, staffing by social scientists would still amount to less than 10% of the total IITA scientist complement, compared with an average in 1991 of about 15% for CGIAR centres as a whole¹ (Collinson and Platais, 1992)².

The Panel believes there is strong justification for making this position available. If plans for expanding the work in the Mid-Altitude Savanna are realised then obviously the position could be used for fulfilling the needs of that agroecosystem. However, for reasons given elsewhere (see Section 4.2.7.), the Panel has some reservations about doing this in the near future, unless additional research resources can

1 However, this includes ISNAR and IFPRI, where there are more social scientists. Excluding these centres, a more realistic figure is around 10%.

2 Op. cit. p. xi.

be identified. Although it recognizes the desirability of an RCMD input right at the beginning of Mid-Altitude Savanna work, it also recognizes that the limited core research resources would mean that the critical masses in the other two agroecosystems would suffer (see Section 2.3.4.). However, there is urgent need for agricultural economists to help in interdisciplinary work of various types, e.g. ascertaining economic feasibility of technologies, assessing impact *ex ante* in equity and welfare terms, etc. with scientists in CID and PHMD. Thus, the Panel would prefer the agricultural economist, who ideally should have some sociological skills, to concentrate on collaborating with scientists in CID and PHMD. For example, PHMD has expressed an interest in a socioeconomic input in their cassava work.

Recommendation:

The Panel recommends that IITA maintain an effective capacity in social science research and recruit to fill the positions approved in the Medium-Term Plan as soon as possible.

Since the two positions for agroecosystem work are for agricultural economists, the Panel supports the current IITA plan to fill the Impact Assessor position with a representative of another social science discipline (see Section 7.2.2.).

Finally the Panel suggests that, given the limitations imposed through having only three core agricultural economist positions, the following points are taken into consideration in charting the strategy for the agricultural economics input over the next five years:

- Top priority should be given by the agricultural economists to providing meaningful services to technical, i.e. biophysical scientists. The Panel therefore concurs with the proposal of the RCMD Director at a presentation to the IITA Board in December 1994 that more than 90% of the social science agenda should focus on services for biophysical scientists, including collaboration in on-farm surveys, studies, and trials.
- Given the priority that should rightly be assigned to identification of technologies and strategies for improving farmer productivity and sustainability, the function of *ex post* impact assessment should primarily be the role of the Impact Assessor. However, assembling appropriate baseline information required for diagnosis and design purposes (which later can also be used for *ex post* assessment) is an appropriate function of the agricultural economists. Another appropriate activity of such economists is *ex ante* assessment of technologies through the use of modelling techniques to help scientists assess the welfare and equity implications of the technologies they are, or are planning to, develop.
- Ways should be sought to collaborate with social scientists in national organizations through not only helping in their training but also, where domestic expertise already exists, e.g. particularly in Nigeria, in increasing the quantity and quality of the social science, i.e. both economics and sociology

inputs not only in the national programmes but also in IITA itself. The Panel believes that much more can be done than is currently the case in using the social science skills within national programmes, i.e. particularly in Nigeria, which generally have very limited resources at present. Obvious examples of where such inputs could be particularly valuable are in *ex post* impact assessment (Section 7.2.2.), collaborating in surveys and on-farm trials (particularly of an applied and adaptive nature) where they have intimate knowledge of the local environment, e.g. the Cameroon survey mentioned in Section 7.1.2.) and studies of a policy nature. What is extremely important, however, is that, in terms of research results, joint products are produced and published.

- Continued encouragement should be given also to filling perceived gaps in skills and expertise in social science areas through the use of Post Doctoral Fellows, Visiting Scientists and special project funding.
- Although it has been said many times before, ways need to be sought to encourage inter-centre collaboration to ensure more effective use of scarce social science capacity. One obvious linkage that needs to be explored to a greater extent than it has to date is with IFPRI,¹ which has a comparative advantage in addressing policy issues which are likely to be very important in facilitating/encouraging/ensuring convergence between productivity and sustainability strategies. Research benefits will be limited unless there is policy reform.

In the light of the above, the Panel **suggests** that IITA initiate discussions with IFPRI regarding effective collaboration on agricultural policy research in Africa, in the IITA mandate regions. The Panel further **suggests** that TAC should ensure that this concern is addressed in the current Stripe Study on Policy and Management Research in the CGIAR.

7.2. Impact Assessment

7.2.1. Achievements

As reported in the last EPR, indicators of impact still appear to be largely anecdotal (for example, see TAC, 1990)² except for external evaluation of the spectacular biocontrol programme on cassava mealybug, on which development was accomplished prior to the current review period. Some published information is also available on the increase in maize production in northern Nigeria and the spread of improved cassava

1 McIntire, J. and B. Ouayogode, 1994. Report of the Panel on CGIAR Commitments in West Africa. Rome: TAC, FAO. p. 49, 55.

2 TAC, 1990. Report of the Third External Programme Review of IITA. Rome: TAC Secretariat, FAO. p. 18, 31, 74.

varieties also in Nigeria. In both cases cultivars from IITA have played significant roles. A comprehensive and seemingly impressive but unquantified list of achievements relating to technology development and adoption is given in different parts of the most recent Medium-Term Plan. There is little point in repeating the list in this report; but the apparent diversity in terms of technologies adopted and the widespread nature of adoption that is claimed for others, do appear to imply that there has been a substantial payoff from the resources devoted to research at IITA. However, the Panel could not be absolutely certain about this, since the plea of TAC in commenting on the last EPR (TAC, 1990: p. xiii), to develop systematic approaches to assessment of impact at three levels, i.e. on science, on national systems development, and selectively on farmer productivity, does not appear to have been heeded. In the lists given, evidence of impact is couched in terms of words and phrases such as "developed," "incorporation of resistance," "enhanced," "released and adopted," "proved to be," "improved," "adopted extensively," "widely adopted," "expanded considerably," "being adopted," "adapted to," "being released," "widely grown," etc.

However, as the discussion in the following section shows, the Panel is reluctant to be too judgemental about the apparent vagueness of the above words/phrases. From information given to the Panel and presented earlier (see Section 2.1.), it is possible to argue that there has been considerable impact relating to the crops under the mandate of IITA and that IITA has contributed to that success. Certainly substantial amounts of improved germplasm have been distributed for all the crops, while impressive increases in production and/or area grown have occurred with respect to maize, cowpeas, and soybean. The 1994 King Baudouin Award was given for success in breeding plantains for Black Sigatoka resistance and advances in *Musa* research, with an estimated potential return for every dollar invested in research of \$1500. The COSCA study has revealed that 55-60% of the cassava cropped area in Nigeria is planted with improved varieties of IITA origin, that has been estimated to provide enough "gari" for 29 million people. For maize in 1990-92 it was estimated that 20% of the cropped area was devoted to improved germplasm to which both CIMMYT and IITA had contributed. Certainly IITA's work on maize streak virus resistance has been important in the adoption of improved varieties. An independent impact assessment report for the SAFGRAD networks revealed that in Mali and Burkino Faso between 1988 and 1991, improved germplasm originating from IITA accounted for 40 to 60 % of the released varieties. Finally, social benefits of cowpea research have been estimated to range from \$6.2 to \$12.3 million per year in the West and Central Africa region for the period 1987-91.

7.2.2. Assessment

Although it is unfortunate that more detailed "quantitative" *ex post* assessments of IITA's impact are not available, the Panel is reluctant at this time to be too critical about the lack of progress in this area. While, on one hand, it is regrettable that the position of Impact Assessor specified in the MTP was frozen until recently, the Panel also believes, as the TAC commentary indicated (TAC, 1990)¹ that the issue of impact

1 Op cit. p. xiii.

assessment is a CGIAR Systemwide concern and therefore needs to be tackled at that level as well. The Panel is aware that Impact Assessors have recently been appointed in at least two centres (CIMMYT and ICRISAT), and the Panel is pleased to note that the process of recruiting one for IITA has recently been started. The CGIAR Task Force on Impact Assessment, consisting of donor and centre representation, is expected shortly to complete its report. This appears likely to recommend an independent two-person Impact Assessment Unit that will interact with Impact Assessors within the individual centres and presumably encourage the implementation of some Systemwide methodologies. The Panel would fully endorse such an approach.

The Panel believes this is important, because while impact assessment is easy to talk about, it can be complex and costly to implement in practice. Thus, to provide comparative data across centres and to encourage evolution in the approaches used, those responsible for impact assessment need to be able to discuss, test and hopefully adopt new, cheaper, and more efficient methods. A number of important issues relating to the difficulty of institutionalizing impact assessment within the CGIAR System are given in a recently-published paper by Collinson and Tollens (1994).¹ A few of the major concerns and issues that need to be recognized and, where necessary, resolved are:

- All parties (donors, CGIAR/TAC and national organizations) need to recognize that the products produced by IITA are generally "intermediate" in nature, therefore complicating the issue of determining impact assessment.
- Because of the "intermediate" nature of some of the products produced by IITA, the ultimate impact of its work is dependent on prevailing national economic policies and on the efficacy of other institutions, e.g. NARS, extension, governments, on which IITA has little influence. Thus, because of the "final (joint) product" that results, to attribute ultimate benefits almost uniquely to the work of IARCs - which on occasion has been done - is both unreasonable and misleading!
- As institutions such as IITA move increasingly emphasize strategic plus some applied research, the impact assessment issue will become increasingly "intermediate" in nature and a longer time frame will need to be accepted, as far as obtaining impact is concerned. Increasing concern and attention to sustainability issues, which relative to evaluating productivity can usually only be ascertained empirically, in a relatively long time frame, further complicates the issue of impact assessment.
- Given the above observations, much of the impact of IITA's work is likely to be indirect (e.g. on institutional capacity and scientific knowledge) rather than direct (e.g. improvement of production, sustainability, consumption and social welfare). Unfortunately but understandably, it is the latter direct impact that donors are most interested in and the one most difficult to achieve because, as

1 Collinson, M. and E. Tollens, 1994. The Impact of the International Agricultural Centres: Quantification and Interpretation. *Experimental Agriculture*, 30: 395-419.

mentioned above, of the critical role played by other institutions. In fact it is probably true to say that these play an even more critical role when actions by farmers are necessary to achieve the desired impact. Thus, as Collinson and Tollens (1994)¹ have indicated, perhaps some of the success of the biological control of the cassava mealybug can be attributed to the fact that impact was possible independently of decision making by the farmer. Unfortunately, as they also emphasize, such opportunities are limited.

- Assessment of direct impact, particularly where direct action by farmers is involved, can be a very complicated and expensive process. The key dilemma to resolve is the extent to which the benefits of collecting more detailed, accurate and comprehensive data outweigh the costs involved in its collection. In reflecting about the benefits of such data collection, the Panel believes there are three groups of clients, beneficiaries or needs:
 - To satisfy the needs of the different stakeholders (in particular the funding or donor agencies)
 - To help internal programme planning and monitoring within IITA itself
 - As a result of adoption studies, to help indicate new research priorities and/or adjustments required in policy/support systems necessary to facilitate, for example, greater and/or more equitable adoption.

The problem therefore that urgently needs resolution is how time-consuming and resource-intensive the data collection exercise needs to be to meet the above needs satisfactorily. Impact measures can vary from the very crude and inadequate estimation of the number of farmers who adopted a particular technology, i.e. assuming that farmers benefited because they adopted it, through determining the level and stability of the return from the new compared with the old technology, i.e. often within the realms of a specific enterprise, to evaluating the benefit of the new technology within the whole farming system of the farmer, i.e. the best and most relevant measure of impact. Obviously the complexity of impact assessment increases as one moves through this continuum but at the same time the value of the results to the three groups mentioned above increases.

Perhaps it is worth noting here that the value of the results of direct impact assessment is likely to be lower, in terms of feedback to help in deciding future activities, the further one is from the farming system end of the continuum referred to above. Also, the maximum impact in terms of feeding back new research priorities and required adjustments in policy/support systems is likely to be achieved if such studies are done in collaboration with national programmes, especially as they increasingly have the sole responsibility of doing adaptive research.

1 Op cit. p.407.

Although the Panel recognizes that there are fairly well-developed methods for measuring the rates of return to research investments, it is still difficult to identify the specific component that can be attributed to research except in an *ex ante* or partial sense. For example, the financial returns to maize research in Zambia in an *ex post* sense have declined markedly since the government has decreased support for maize production. The somewhat lengthy discussion given above is designed to point out additional difficulties in estimating the unique impact of IITA's research.

In conclusion, the Panel wishes to make three specific observations:

- The Panel does not feel it is appropriate to stipulate exactly what should be done, in terms of the above discussion. Rather, it believes that it would be best for the "optimal" solution to be determined collectively by representatives of all the relevant stakeholders, i.e. donors, CGIAR/TAC, NARS, taking into account the nature of the products produced by the IARCs, the time frame in which they are produced, and the limited resources that can be devoted to the impact assessment effort. This effort needs to include CGIAR Systemwide guidance on the methodologies that would be acceptable, e.g. how much emphasis needs to be placed on expensive quantitative measurement compared with cheaper and often very insightful, somewhat more qualitative farmer-participatory techniques complemented perhaps by relatively simple *ex ante* modelling exercises).
- Agreement to place increased emphasis on farmer-participatory types of techniques, which permit ordinal ranking, holds the implication that impact assessment will not only involve greater interdisciplinary cooperation, but also will require expertise that is often not found in mainstream agricultural economists. Thus the Panel has no problem with the plan to advertise that the Impact Assessor position requires a Ph.D. in social agricultural sciences with knowledge of mathematical programming and advanced applied statistical analysis.
- As suggested earlier (see Section 7.1.3.), ways should be sought for including NARS personnel in impact assessment exercises, e.g. through the Ecoregional Consortia - see Section 4.2. Such exercises are of vital interest to their own clients while the results could be extremely important in highlighting new research priorities and necessary adjustments in policy/support systems necessary to address adoption and equitability concerns.

In the light of the above observations, the Panel suggests IITA discuss in the Centre Directors' Committee the idea of setting up an *ad hoc* Inter-Centre Working Group on Impact Assessment to share experiences and evaluate the most appropriate approaches to impact assessment. The IITA Board is to be commended on the recent interest it has shown in the issue of impact assessment.

Recommendation:

The Panel recommends that IITA decide on the appropriate approach to impact assessment and identify specific areas/topics on which work should initially be concentrated.

As the above discussion has implied, the Panel has reservations about the impact assessor position being devoted to expensive data collection techniques for economic rate of return *ex post* impact assessment studies, unless this involves a joint initiative with the CGIAR System. Rather, the Panel would see considerable value in social and environmental impact studies. The former could be useful in clarifying human and distributional benefits and consequences, while the latter would complement the emerging emphasis on natural resource management. Possible complementary roles for the Impact Assessor could include liaison with regional and national decision-makers to increase general support for agricultural research, guidance on how to improve the social and environmental benefits of research, provision of popular as well as donor evidence of impact and coordination of CGIAR initiatives on impact assessment.

7.3. Gender

7.3.1. Achievements

In the last EPR there is no mention of issues relating to gender. Gender is also not specifically dealt with in the IITA Strategic Plan 1989-2000. This is somewhat surprising given the long experience IITA has had with farming systems research which explicitly should take into account gender-related issues. However, these apparent omissions have been rectified in IITA's most recent MTP (1994-98) where it is stated "gender analysis will be fully integrated into all IITA research, with a view to ensuring that new technologies meet the needs of all".

Predating the publication of the MTP, an informal Gender Committee was organized in IITA in 1993, which has met intermittently since then. A total of 14 IITA scientists have been involved in work planning, the anticipated outcomes of a gender consultancy (see Curry discussion below) were developed and two seminars on gender issues relating to postharvest work were delivered by two IITA scientists.

Two notable outcomes of the gender initiative have been the following:

- In January 1993, Dr. H. Feldstein (affiliated with the Gender Programme of the CGIAR Secretariat) visited IITA to assist the Group Training Unit in developing instructional materials that could be used in training NARS and IITA scientists on gender analysis.
- At the beginning of 1994, the CGIAR Secretariat Gender Programme, funded Dr. John Curry (an anthropologist with experience in gender and farming

systems research) to visit IITA to assist them in incorporating gender issues in their 1994 workplans.

The comprehensive Curry (1994)¹ report provides many insights into the perceptions, empathy and understanding of the potential for gender analysis amongst scientific staff in IITA. In addition, in using an analytical framework developed earlier by Feldstein, he evaluated the 1994 research portfolio in terms of the potential gains in research efficiency from adopting an end-user/gender perspective. This involved evaluating research activities using criteria important to end-users. Such criteria include value of information on current practices, timing, type and intensity of labour use, resource constraints and benefits, and user preferences for products or by-products. A few of the major points the Panel wishes to make about the status of gender issues, based on the Curry report and resulting from discussions with a number of scientists, are as follows:

- In general, there is a positive attitude among scientists to the importance of gender issues.
- However, there is often a lack of appreciation that consideration of gender issues can have a profound impact on research, particularly when it is on-station and has more of a strategic character; although discussions reported by Curry indicated considerable potential for greater appreciation, once scientists were sensitized. Many scientists' awareness goes little beyond appreciating the importance of taste in determining whether a particular variety is likely to be adopted.
- There was some frustration among many scientists that they were not familiar with the "methodologies" of gender analysis, sometimes complemented by the opinion that gender analysis was the responsibility of social scientists.
- In spite of the prominence of the farming systems research approach in IITA over a period of two decades, there is little in the way of published information relating to gender issues under practical farming conditions.
- There is considerable potential for gains in research efficiency in terms of incorporating an end-user/gender perspective. In the gender "audit" Curry reviewed a total of 722 research activities, of which 53% were assessed as deriving little or no increase in research efficiency from adopting an end-user/gender perspective. On the other hand, another 26% already deal with these issues or would benefit considerably from incorporating them into the research designs. The remaining 21% were assessed as potentially being able to experience some gain in research efficiency as a result of an end-user/gender perspective. As would be expected, the percentage of research activities likely to gain considerably in research efficiency through incorporating an end-

1 Curry, J., 1994. Report to IITA on Gender Consultancy, 27th January to 12th February.

user/gender perspective was highest for the RCMD (39%). Percentages were also high for CID (27%) and PHMD (19%).

- As one of the outcomes of the Curry consultancy, the plan was during the remaining part of 1994, i.e. after the Work Planning Week, for each programme to analyze how end-user/gender issues had been incorporated into the research methodology, with project leaders commenting on the progress made during the 1995 Work Planning Week. However, apparently this was not done because of a very full agenda influenced by matters relating to this EPMR.

A summary of the Curry report, together with his major recommendations was tabled at the December 1994 IITA Board meeting which recommended further initiatives be designed to build on progress already made. At the same time the report indicated that "gender issues will likely require annual reignition" unless gender-related expertise is institutionalized.

7.3.2. Assessment

IITA (with the help of the CGIAR Secretariat Gender Programme) is to be commended on the initiatives taken since 1993. A good start has been made but a lot still remains to be done. It is important to build on the momentum developed over the last two years.

In view of this, the Panel suggests six specific initiatives for consideration by the Gender Committee, some of which are similar to those proposed in the Curry report. As submitted to the IITA Board, they are:

- The Gender Committee should be formalized and consist of a membership reflecting the full spectrum of research and training activities represented at IITA. The objective of the Committee, which should be allocated a small operational budget to support its sponsored activities, should be to sponsor activities to increase awareness of end-user/gender issues among staff and to demonstrate that gender issues are of concern to everyone at IITA, not just one group.
- Efforts should be made to provide better document information relating to gender in earlier studies implemented by IITA, in order to provide relevant "local" case studies for the gender analysis training materials being assembled by the Group Training Unit. Material for these should be available not only from studies implemented in the past under the farming systems research programme but also from current work, e.g. surveys relating to the agroecosystems, the COSCA study for which plans exist to develop a report relating to gender issues, activities of the postharvest group, etc.

- Gender training courses/sensitization courses should continue to be implemented/made available by the Group Training Unit, to individuals/groups inside and outside IITA.
- Seminars on gender-related matters should be encouraged by individuals from within and outside IITA.
- The initiative on a "gender audit" of the research portfolio should be continued and ways sought to incorporate gender considerations more formally into the planning, implementation and evaluation of research programmes.
- When relevant, efforts should be made to ensure that gender issues are included in impact assessment exercises.

Given the tone of the above discussion and the implication that incorporating a greater gender analytical capacity into the mainstream of IITA's activities at this time requires developmental, sensitization and nurturing activities, the Panel proposes that a well-qualified short-term consultant be employed on a repeating basis, e.g. up to two visits per year for three years, to help provide this expertise. The Panel proposes that this person would work particularly closely but by no means exclusively, with the social science group in building up their expertise to carry major responsibility for gender-related issues after three years. The consultant should make the fullest possible use of expertise that is already resident in IITA, e.g. the Director of RCMD, staff in the Postharvest Engineering Unit, Training Unit, among others. At the same time the Panel **suggests** the person should be expected to facilitate the efficient implementation of the initiatives specified above and should be expected to interact extensively with technical scientists in the office and, when relevant and feasible, in the field. To help maximize efficiency and productivity, the person recruited should develop close working relationships with the CGIAR Secretariat Gender Programme (or its successor, if any), which could perhaps be approached for financing the initial visit(s) of the proposed consultant.

Given the fact that at least three of the four core social scientists in place and/or planned for IITA are likely to be economists, preference should be given for the consultant to be a gender specialist who represents another social science discipline.

The Panel believes that unless there is a sustained and systematic follow-up to the initiatives that have already been taken, little progress concerning gender-related issues will be made. This would be regrettable given the role of IITA as a "peer agricultural research institution" in West Africa.

Recommendation:

The Panel recommends that IITA appoint a short-term consultant for gender issues on a periodic basis to help sensitize/train/advise IITA research scientists in gender-related methodologies in order that gender concern is institutionalized.

CHAPTER 8 - CONCLUSIONS

8.1. Major Long-Term Accomplishments

IITA has undoubtedly become the main centre of excellence for agricultural research in tropical Africa. This broadly acknowledged fact stems not only from the magnitude of the research undertaken over the years since the Institute was founded, but also from the quality of its scientific staff and research output, the institutional continuity and the effective management of its operations. The breadth and strength of complementary research support from sister IARCs and other advanced institutions tapped by IITA's collaborative linkages have also contributed to its regional impact.

The Panel regards the consolidation and recognition of IITA as a powerful research institution in itself a major achievement, having significant implications for countries in tropical Africa because of the severe failings in agricultural production and food supply which confront many of them. Faced with very rapid population growth, these countries are experiencing falling agricultural output per caput, with the consequent need for food imports which are a drag on economic development. The intrinsic problem for agricultural growth in the region stems from the generally infertile and vulnerable nature of the soils and the high incidence of pests, weeds and diseases that determine a generally low production capacity of the natural resource base. Traditional slash-and-burn farming systems are becoming less viable and more environmentally destructive because of growing population pressure and the need to shorten the fallow periods. Importation of agricultural technologies from developed countries is not an answer because the agroecological and socioeconomic conditions make such technologies generally non-viable in the tropical African environment. Under these circumstances, research and development of locally adapted crop varieties and farm technologies become the most important means to break the low productivity trap of Africa's agriculture. This is IITA's basic mission, focusing particularly on the principal food crops and agroecologies of the region as directed in its mandate. It is a hard task to accomplish due to the basic scientific soil/plant/climate issues involved, the diversity of agroecosystems and the socioeconomic obstacles that constrain adoption and hence limit the range of new technological possibilities.

IITA has already made significant contributions over the years towards the understanding and solving of problems in this complex resource use and crop production situation, although its impact on crop yields obviously has not been anywhere comparable to the case of the cereals under irrigation that gave rise to the Green Revolution. In fact, given the poor resource base in the African situation, it is unlikely that crop productivity under small-scale farming conditions, relying mainly on biological inputs, can ever jump to very high levels. Whatever improvement is achieved will take time.

The main achievements of IITA since its founding include the following:

- Buildup and documentation of a substantial stock of scientific and practical knowledge about the resource base and the biological, chemical and physical processes, as well as the socioeconomic and cultural factors, that condition

agricultural production and its long-term sustainability in the humid and subhumid tropics of Africa. This knowledge is essential for the guidance, further development and enhanced probability of success of future research.

- Production of a steady flow of higher-yielding, improved varieties of the major foodcrops of concern (rice, cassava, maize, etc.) with better local adaptation to the various agroecological zones and better resistance to pests and diseases. Evidence has been provided, through studies and observation, of widespread adoption of IITA-improved varieties of all these crops. Estimates have been made in some cases (e.g. cassava) of their large impact in economic terms in Africa, as well as in terms of their contribution to improving the nutrition and well-being of the poor.
- Important advances in biological control of pests and in host plant resistance which have significantly improved crop productivity. The most dramatic and best-known case is the control of the cassava mealybug, accomplished in the 1980s; resistance to Maize Streak Virus and Black Sigatoka in plantains are other notable examples of successes in this area.
- New farming practices as alternatives to slash-and-burn agriculture, which are protective of the resource base, have been developed; specifically alley farming and "live" mulches. Though not generally adopted by farmers yet, these alternatives and new variants thereof may become increasingly attractive as agricultural conditions become more strained in the years ahead. Also, much has been learned about potential damage caused by certain farming practices, such as mechanical tillage or fertilization.
- The training of vast cadres of African scientists and technicians (over 8,000) to man the agricultural research systems (NARS) of the countries of West and Central Africa. The national capacity for research has also been enhanced through a variety of institution-building schemes, including networks, joint research, resident scientists, among others. The "demonstration effect" of IITA in the region probably has contributed also to raise the domestic appreciation of the NARS, if not their funding levels.

The Panel acknowledges the merit of this long-term record of achievements, especially in view of the fact that IITA had from the beginning a diffuse mandate and a difficult research mission to accomplish.

8.2. The Last Five Years

IITA has laboured under a socioeconomic scenario in Africa that has not improved appreciably since the early 1980s; which indeed, in respect of agriculture, may have in some measure deteriorated. However, demographic and economic projections indicate a fast-growing demand for food, which prompted the Institute to reassess its overall research problems, targets and approaches. This exercise resulted in the "IITA

Strategic Plan 1989-2000", which defined four basic programme strategies that were put into effect. They are: a focus on the humid and subhumid tropics of the continent, priority concern with the small family farm, an agroecological orientation and concentration on farming systems.

Nevertheless, within the above context, the Institute has undertaken some important programme and managerial changes during the past five years, in response to CGIAR Systemwide trends and in order to implement EPR and EMR recommendations, as well as for internal institutional reasons related to the appointment of a new Director General in 1990. **These changes constitute in themselves important accomplishments because they position the Centre better to face future challenges. The key changes include the following:**

- (a) **Broadening of the geographic or regional scope** of IITA's research beyond the traditional focus on the lowland humid and subhumid tropics of Central and West Africa, to include the mid-altitude humid and subhumid areas of East and Southern Africa.
- (b) **Further decentralization of research** as a means to step up the implementation of the ecoregional approach so as to focus more sharply on crop improvement, plant health, and resource and crop management research in the zones where the mandated crops are grown. Thus, IITA presently operates four new stations, besides its former three, including the Ibadan headquarters. This decentralization is also serving the purpose of reaching closer collaboration with the francophone countries of the region served by IITA.
- (c) **Completing the transfer of rice research to WARDA** (as of 1990), while maintaining effective participation on some aspects of germplasm management of this crop. Research focus was thus further narrowed to the current six crops of attention. Arrangements were clarified for stronger collaboration with sister IARCs that have also some of these crops in their mandates (e.g. CIAT, CIMMYT).
- (d) **Restructuring of the Institute's management**, organization and procedures, which notably improved the internal work environment, despite the severe financial stringencies for IITA at the time.
- (e) **Reorganization of the research programme** into Divisions and Programmes within Divisions, with some conceptual redefinitions, which are still evolving, especially in crop and resource management research which takes the strongest ecoregional orientation. New directors were appointed for all three Divisions.
- (f) **Changes in the programme budget planning and management system**, which is progressively being shifted towards a project-based (bottom-up) approach, eventually forming a soft-matrix structure. This is important as it will facilitate greater participation in programme development by scientists in an interdisciplinary fashion, thus enhancing the orientation to systems and ecoregional research sought in the Institute's Strategic Plan.

In sum, the Panel observes that the Institute has been substantially revamped and renovated over the past five years - though the process will need to continue for some time, as discussed in Chapter 4 - which leaves it reasonably well poised to proceed with its research without further major organizational disturbances.

Along with the important internal transformation achieved, IITA has maintained a good rate of research output over the five-year period. The principal achievements, as discussed extensively in Chapter 2, include the following:

- Continued production of improved germplasm of cassava, cowpea, maize, yam, and plantain and banana, which are passed on to the NARS for screening and local distribution to farmers.
- Demonstration of high-yield potential of new soybean lines in multilocal trials and of promiscuous nodulation of soybean with cowpea *Rhizobium* in the field thus opening up possibilities of widespread cultivation of soybean.
- Techniques to induce flowering in cassava landraces and in yam, which broaden the scope of the breeding programme.
- The development of methods to regenerate cowpea from cellular tissue, as a key step in eventually achieving genetic transformation.
- Identification and release of new exotic phytoseiid predators of the cassava green mite, which opens very positive perspectives for biological control of this serious cassava pest. This method for ecologically sustainable plant protection in cassava is being transferred to the NARS in Africa.
- Improvement of a screening method for maize downy mildew resistance has allowed rapid identification of resistant germplasm, which is now used by Nigerian NARS in the development of varieties to combat outbreaks of this disease.
- Development of integrated pest management of *Striga*, partly through breeding of maize and cowpea cultivars with tolerance to this parasitic weed and the identification of trap-crops able to stimulate *Striga* germination in the absence of the host.
- Development of high-yielding plantains cultivars with resistance to Black Sigatoka. (For this striking achievement, IITA received the 1994 King Baudouin Award.)
- In resource and crop management research, studies were completed on characterization of production systems in inland valleys, on production constraints for cereal farmers, on the introduction of legumes for fallow management and on determinants of sustainability in certain rehabilitated lands. Technological improvement of alley cropping has progressed with the inclusion

of new leguminous and woody species. An interesting development in these studies has been the use of novel analytical tools, such as GIS and computer-based decision models.

- The last stage of an Africa-wide collaborative study on cassava (COSCA) was completed, which shows that 60% of the area planted is with IITA-derived varieties. Improved cassava populations for further selection have been widely distributed to NARS in the region.
- IITA has developed prototype small tools and equipment for cassava processing, which are coming into use in some countries.
- Postharvest processes and foods and beverages have been developed for some of IITA's commodities, particularly cassava, soybean, plantain and banana. These open valuable new consumption and nutritional options, while expanding market opportunities for these crops.
- Training of researchers for the NARS continued at a strong pace, with approximately 2,400 persons having participated in courses and research activities conducted by the Centre.
- Support for national research has been provided through various means, notably through several regional research networks.

The Panel commends the Institute for its sustained delivery of research results and collaborative activities with the NARS, achieved while the Centre was adjusting to new directions and organizational modes and at the same time strengthening management and scientific staff. The Panel wishes to stress that some of the research findings have been of practical value to farmers, and are reported to be having an impact on the welfare of rural families and consumers alike.

In sum, IITA has shown over the past five years strong vitality, innovation and improved staff commitment and enthusiasm, notwithstanding the financial stringencies and consequent belt-tightening measures that it had to implement. The Panel considers that these achievements merit recognition and support within the CGIAR System.

8.3. Current Directions

As mentioned earlier, IITA developed its "Strategic Plan 1989-2000" which has set the course of the research programme for at least the current decade. Some adjustments were introduced to this long-term strategy in the Medium-Term Plan 1994-1998, in response to changing conditions and views in the interim. It should be noted however that most of the changes proposed have already been substantially implemented in the past few years - as was described in the foregoing section - so that the research

programme, with the exception of the resource and crop management part, can be expected to proceed without major alterations from its present composition and goals.

The geographic area and ecoregions of IITA responsibility within Africa have been set as broadly as can be and the Centre has a big task just to consolidate and deepen its research activities in the regions incorporated more recently, especially the mid-altitudes of East and Southern Africa. **The Institute should resist the temptation of "following its crops" into areas throughout SSA which transgress its ecoregional mandate, but should rather establish effective collaborative agreements with other CGIAR centres where crop/ecoregion overlaps occur.**

By the same token, decentralization of the Institute's operational capabilities appears to be presently at its maximum reasonable level, with seven active stations, including headquarters. It may be expected that the relative emphasis of research may shift somewhat from its current balance and this would obviously need altering the size of some stations. **However, the Panel strongly advises that the Institute refrain from further major investments in buildup of infrastructure in outlying areas, that it adjust the administration to a decentralized mode, and that it concentrate on implementing vigorously the research activities it has laid out in its current Plans.**

The six crop commodities in the Institute's mandate (cassava, cowpea, maize, yam, soybean and plantain/banana) have well-defined research priorities and strategies, as do the plant health programmes, which are all reasonably consolidated at present and with a balanced ecoregional perspective. Researchers, however, must be alert to new challenges and opportunities and these may determine occasional shifts from present directions. Thus, it is probable that greater emphasis may progressively be placed on, say, soybean versus cowpea and maize. Similarly, IPM may be expected to receive greater emphasis than any of its component technologies. Dynamic programme adjustments, if well conceived, are a positive feature of research institutions and the Panel feels that IITA should not shy away from them, as long as it stays well-focused and within its mandate.

The research programme at IITA that needs greater attention in the re-direction of its past strategies is that of resource and crop management. This revision and rethinking is welcome because, as said earlier, the problems of resource use and sustainable farming production in the African humid and subhumid tropics are especially complex and intractable. IITA's resource and crop management programme seems rather to have lost its way over the past few years, concentrating too much on resource and ecosystem characterization studies, to the detriment of technological development efforts in conjunction with the crops and plant health research staff, that might generate viable farming practices and production systems for small farmers' adoption. **The Panel urges the Institute to devote particular attention to the definition of a clear programme strategy for research in resource and crop management, and to its implementation and follow-up.** This will require rebuilding the appropriate staff strength and making use of intermittent, top-level, scientific advice to ensure a sound foundation for this key area of the Institute's mandate. Since the Division concerned is driving the ecoregional orientation of IITA's research programmes, the importance of having a very sound and clear strategy for it cannot be overstated.

IITA currently continues to devote a substantial share of its resources to training and international cooperation for agricultural research. This is a key function because in the Institute's development strategy the NARS must play the crucial role of technological intermediaries between the IARC and the farmers, as ultimate clients of the research. **The Panel commends IITA for the contribution it has already made in this area and encourages it to sustain its international cooperation activities (as recommended in Chapter 3).**

The Panel also notes the strong collaborative ties established by IITA with many sister IARCs, such as ICRAF, CIAT, WARDA, etc., which enhance the CGIAR System's capacity to do research in a cost-effective way. IITA is encouraged to take part actively in the inter-IARC opportunities that are appearing in Integrated Pest Management, Systemwide ecoregional initiatives and plant genetic resources, etc.

8.4. IITA's Future Role

The sub-Saharan countries will have to rely heavily on their agriculture for a long time to come in order to maintain their fast-growing populations and to contribute to economic development. Research and technology transfer are crucial factors for the growth and sustainability of agriculture in the region, given the fragile resource base. Unfortunately, the economic weakness of most of the countries concerned and relatively low priority assigned by governments to their agricultural research do not permit its support at the level and scale that is needed for rapid agricultural improvement and expansion. In this typically vicious circle of development, external assistance focused on research for agriculture can play an extraordinary catalytic role.

IITA is called upon to continue providing the leadership for the massive international research effort required to move African agriculture forward. The Institute has a good record of continuity, scientific strength, and productivity, and an understanding of the region's problems and potential to fulfil the role suggested. IITA has gained a solid reputation in the region and is welcomed by the countries to assist them in the complex research tasks that are holding them back. The large investment already made by IITA in training national research scientists and in strengthening the NARS constitutes a big advantage for the future working of the Institute. In fact, it can now rely on a much better base of local research capability than it could have years ago; even if these NARS still lack sufficient domestic support, it can be hoped that they will be gradually strengthened. This capacity-building can be further stimulated through effective collaborative schemes with IITA, as is being done by means of networks, consortia, and other mechanisms (see Chapter 6).

The accumulated scientific and applied knowledge at IITA, not only on the complexities of the natural resources, but particularly in respect of the staple food crops and the socioeconomic conditions of the small farmers that grow them, gives the Institute both advantages and responsibilities that no other international agency based in the region can assume at this time. The task undertaken by IITA of promoting agricultural development while focusing directly on the resource-poor small farmers and on the

relatively cheaper food crops for local consumption is a difficult one, but with a high human welfare content. The Institute must also strike a careful balance between seeking technology for rapidly increasing production, with the development of farming practices that conserve the soil and permit the long-term sustainability of agriculture. IITA's linkages with science and research institutions of the developed countries, as well as other CGIAR centres, further augment its capacity to serve the region efficiently in the various aspects of this complex agricultural scene.

IITA's future role in Africa, holding to its current mandate, is also quite likely to continue because the crops it works on will remain in high demand by the people, regardless of the course economic development takes in the next decades. Most likely they will be fully used internally for direct human consumption, but eventually they can have alternative uses, giving rise to agroindustrial possibilities. The work on postharvest technology by IITA for some of the crops is an interesting start in this sense. Besides, IITA's research on the key problems of resource management is known to require long-term efforts, and only a fairly large and well-planned centre of an international nature can have the capacity to take on these resource and sustainability issues.

Within the CGIAR System, IITA's responsibility on the African humid and subhumid tropical agriculture has been clearly defined. But within this, the ecoregional approach to research must be further defined, made operational and implemented. IITA has already taken a lead in this direction. As the CGIAR expands the concept of ecoregionality on a Systemwide basis, IITA can be expected to play a key role on the subject. For this reason, **it is especially urgent that the Institute strengthen its resource and crop management research, which must serve as focal point or main channel for organizing and coordinating the ecoregional orientation stated in IITA Plans.**

Finally, in tracing its future course, IITA must recognize the overriding effect that economic policies have on agriculture and on technological progress. Hence, the Institute must seek to develop a limited capacity to analyze and understand the macroeconomic environment, as an input for its main agricultural research responsibility. The Institute is encouraged to invite IFPRI and ISNAR to collaborate with it on this aspect of CGIAR activities in Africa.

The Panel wishes to conclude by emphasizing the view that IITA is presently in a privileged position to serve the research needs of developing African agriculture and believes that big contributions can be expected to come from the Institute in the next few years. The Panel encourages the Institute to move forward into the next century with determination and clarity in the execution of its proposed research priorities and strategies.

ACKNOWLEDGEMENTS

The External Review Panel members wish to express their sincere appreciation to the Board, management and staff of IITA for their full and frank cooperation in every way throughout the course of the Review. The Panel is particularly grateful for their open and constructive attitude, and for the generous time and help given to us whenever requested.

The arrangements made for our visits to the Headquarters and to the regions were excellent and so were the visits to national programmes in Nigeria, Benin, Ghana, Côte d'Ivoire, Cameroon, Kenya and Uganda. We are grateful to IITA's staff for their assistance and hospitality during our country visits. We appreciate the cooperation received from IITA's collaborators and others in the national programmes who met us and shared their views and insights.

Dr. Lukas Brader, Director General, and Mrs. Frances McDonald, Assistant to the Director General, fully cooperated with the TAC and CGIAR Secretariats throughout the Review, from its planning stages to the completion of this report. They deserve our special thanks for this and for ensuring that our working environment and support facilities were always conducive for efficient performance. We also thank Dr. and Mrs. Brader for their kind hospitality.

The Panel wishes to acknowledge with sincere thanks the excellent work done by Ms. Dominique Veck-Rosignoli of the TAC Secretariat and Ms. Toyin Oke and Ms. Philomena Arabome of IITA, in the preparation of this report. They were ably assisted by Mr. Augustine Idoko.

Many IITA staff went beyond the call of duty to help the Panel during the different phases of the review. In particular, we express our thanks to: Mr. L. McDonald, Computer Manager at IITA for ensuring that our equipment functioned satisfactorily right up to the end; to Mr. David Sewell and Mr. Robert Williams, the pilots of the two IITA aircrafts for safely transporting us between destinations during our field visits in West and Central Africa during the Harmattan season; to Dr. Sagary Nokoe, of the IITA Biometrics Unit, for help in the statistical analysis of the information from the NARS survey on IITA's past and future programmes; and to Mr. Kim Atkinson, Head of Publications Unit at IITA, for his editorial assistance.

We gratefully acknowledge the help received from several of the staff of the TAC and CGIAR Secretariats, during the course of the review. We are particularly grateful: to Dr. Selcuk Ozgediz and Ms. Liz Field at the CGIAR Secretariat; and to Ms. Marioara Lantini and Ms. Jennifer Kitching-Parise, of the TAC Secretariat, for their valuable assistance during the planning and organization of the Review.

COMPOSITION OF THE PANEL AND BIOGRAPHICAL INFORMATION

Chair

Prof. Eduardo Venezian
Dean, Faculty of Agriculture
Catholic University of Chile
Santiago
Chile

Prof. David Norman
Department of Agricultural Economics
Kansas State University
342 Waters Hall
Manhattan, KS 66506 4011
USA

Members

Prof. Charles Cambridge
Professor of Management
California State University, Chico
1st & Normal Streets
Chico, California 95926
USA

Dr. William W. Wapakala
Kenya Representative
Farm Africa
P.O. Box 49502
Nairobi
Kenya

Dr. Graham Jenkins
Consultant
16 High Street
Hauxton
Cambridge CB2 5HW
England

Consultant

Mr. William Carlson
4620 Butterworth Place, NW
Washington D.C. 20016
USA

Prof. Samuel Jutzi
Faculty of Agriculture, International Rural
Development & Environmental Protection
Institute for the Production & Nutrition of
World Crops
University of Kassel
Steinstrasse 19
D-37213 Witzenhausen
Germany

Resource Persons

Dr. Paramjit S. Sachdeva
Projects Officer
The World Bank
1818 H Street, NW
Washington DC 20433
USA

Prof. Henri Maraite
Head, Phytopathology Unit
Faculty of Agricultural Sciences
Catholic University of Louvain
Place Croix du Sud, 2
B-1348 Louvain-la-Neuve
Belgium

Dr. Amir Kassam (Panel Secretary)
Senior Agricultural Research Officer
TAC Secretariat
FAO, Via delle Terme di Caracalla
00100 Rome
Italy

Name: Eduardo Leigh VENEZIAN (Chile)

Position: Dean, Faculty of Agriculture, Catholic University of Chile, Santiago

Expertise: Agricultural Economics; Education and Research Management

Education: 1952-56: Ing. Agr., Catholic University of Chile; M.Sc. (1959), Ph.D. (1962), Agricultural Economics, Iowa State University, Ames, USA; Post-Doctoral in Economics (1969-70), University of Chicago, USA.

Experience: 1959-62: Research Assistant and Associate, Iowa State University. 1962-65: Economist and Assist. Chief, Agric. Economics Unit, Organization of American States, Washington, D.C., USA. 1965-72: Agric. Economics Advisor for Mexico, Central America and the Caribbean Region, The Ford Foundation, Mexico, D.F. 1966-72: Part-time Professor, Agric. Economics Centre, Postgraduate College, Chapingo, Mexico. 1972-77: Agric. Advisor and 1974-77 Representative, The Ford Foundation, Brazil. 1977-85: Professor, Agric. Economics, Head of the Agric. Economics Department, and Director of the Research Division, Catholic University of Chile. 1986-88: Chief, Research Development Centre, Research and Technology Development Division, FAO, Rome. Since 1988: present position.

Member of numerous committees and review missions. Member of Boards of several Foundations and Business. Membership of various professional associations. Several honours and distinctions. Extensive travel throughout the world since 1951 in professional, academic and private activities. Member of the 2nd EPR of IFPRI (1990).

Name: Charles Desmond CAMBRIDGE (USA)

Position: Professor of Management, Department of Management, College of Business, California State University, Chico.

Expertise: General Management/Human Resource Management/Productivity Management

Education: B.A. Economics and Business Administration, Macalester College, St. Paul, Minnesota (1971); M.A. (1973), Ph.D. (1981) Industrial Relations, University of Minnesota.

Experience: 1977-78: Assistant Professor of Management, Department of Management and Labor, Cleveland State University. 1978 to present: California State University, promoted to Associate Professor in 1984 and full Professor in 1989. 1981-82: on leave from the University as Academic Advisor, Tom Mboya Labor College, Kisumu, Kenya. 1986-88: Academic Dean and Head of the General Management Department, Institute of Development Management, Botswana, Lesotho and Swaziland. 1991-93: Senior Research and Programme Development Officer, Research and Program Development Section, Enterprise Department, ILO, Geneva - responsible for all areas of human resources development, industrial relations, management development institutions and networks.

Numerous international consultancies and advisory missions in management/human resources development, industrial relations, strategic planning, and related policy issues in 35 countries. Participant in five project evaluation missions to Lesotho, Ethiopia, Sri Lanka and Nigeria. Has designed three UNDP management development projects in productivity, labour management cooperation and administrative reform.

Name: Graham JENKINS (UK)

Position: Consultant, Cambridge, England

Expertise: Crop Improvement, Research Management

Education: B.Sc. Agricultural Botany, Aberystwyth, Wales, 1953; Dip. Agric., Cambridge and Trinidad, 1955.

Experience: 1955-59: Rice Breeder, Badeggi, Northern Nigeria. 1969-79: Oat and Barley Breeder, Cereals Department, PBI, Cambridge. 1979-83: Scientific Adviser (Plant Breeding and Genetics), Agricultural and Food Research Council, UK. 1983-87: Head, Cereals Department, PBI, Cambridge. 1986-87: Deputy Director, PBI, Cambridge. 1987-93: Plant Breeding and Research Director, Plant Breeding International (Cambridge) Ltd. (Subsidiary of Uniliver, plc). Since October 1993: present position.

Has served on numerous planning and technical committees in the UK and the EC concerned with various aspects of plant breeding, genetic resources and intellectual property rights. Has consulted for CIMMYT, FAO and PBI. Member, 1983 and 1993 ICARDA reviews.

Name: Samuel Christopher JUTZI (Switzerland)

Position: Professor for Tropical and Subtropical Field Crop Production, Faculty of Agriculture, International Rural Development and Environment Protection, University of Kassel, Germany.

Expertise: Plant Sciences, Crop Physiology

Education: M.Sc., Dr.Sc. Plant Science and Agricultural Economics, Swiss Federal Institute of Technology, Zurich, Switzerland.

Experience: 1974-77: Agricultural Economics, Swiss Farmers' Union. 1977-80: Agronomist, Forage and Herbage Seed Production, University of Cochabamba, Bolivia. 1980-82: CIAT Research Associate in Bolivia and Brazil. 1983-90: Agronomist, ILCA, Addis Ababa, Ethiopia. 1987-89: Leader of ILCA Research Programme for African Highlands and Coordinator of ILCA's Animal Traction Research Thrust. 1990: Coordinator of ILCA's Research Thrust on Animal Feed Resources. Since 1990: present position.

Participant of review missions to Bolivia, Ghana, Ethiopia, Rwanda. Member of CIAT Board of Trustees (1992-98).

Name: William W. WAPAKALA (Kenya)

Position: Consultant, Nairobi, Kenya

Expertise: Agronomy and Resource Management

Education: B.Sc. Agric. (1961) Punjab University, Lahore, Pakistan; M.Sc. Agric. (1963) Faisalabad (former West Pakistan Agricultural University, Lyallpur).

Experience: 1964-65: Agricultural Chemist, Ministry of Agriculture, Kenya; 1965-66: Experimental Agronomist in charge of all Agronomic Research in the Coffee Research Foundation. 1966-68: Soil Chemist, Ministry of Agriculture. 1968-74: Senior Research Officer, Ministry of Agriculture Headquarters, in charge of Administration and Training in the Ministry's Research Division. 1974-75: Senior Soil Chemist, Ministry of Agriculture. 1975-84: Director and Head of Agronomy Section, National Sugar Research Station, Kibos. 1985-86: Chairman, Task Force to Reform the National Agricultural Research System (KARI), and Deputy Director for Crops, Soils and Water Management Research, KAR. 1989-92: Station Manager, Mbita Point Field Station, ICIPE.

Member, 3rd CIMMYT EPR (1988). Member, International Soil Science Society; and International Federation of Agricultural Research Systems for Development (Chairman for African Charter).

Name: Henri M.M. MARAITE (Belgium)

Position: Chairman, Department of Applied Biology and Agricultural Products, Faculty of Agricultural Sciences, Catholic University of Louvain, Belgium.

Expertise: Plant Pathology, Crop Protection, Integrated Pest Management

Education: Engineer in Agronomy (M.Sc.) with specialization in forestry (1965), Ph.D. in Agronomy with specialization in plant protection (1969), Catholic University of Louvain, Leuven.

Experience: 1970-85: Lecturer, Senior Scientist, Associate Professor. Since 1985: Head, Phytopathology Unit. 1986: Professor of Phytopathology. 1992: Chairman, Department of Applied Biology and Agricultural Products. All at the Catholic University of Louvain. Postdoctoral stay at Purdue University, USA (1972) and Instituto Biologico de Sao Paulo, Brazil (1976).

Research experience covers host-parasite relationships, epidemiology and control of bacterial and fungal diseases of crops in temperate and tropical regions, fungicide resistance, applied entomology, organization of research and extension in crop protection for cereals, roots and tubers, banana, grain legumes, rice and vegetables. Has consulted for several international organizations, and has (or had) collaborative research projects with CGIAR centres including CIMMYT, IITA, ICRISAT and IPGRI.

Name: David NORMAN (UK)

Position: Professor of Agricultural Economics and Rural Sociology, Kansas State University (KSU), Manhattan, Kansas, USA.

Expertise: Agricultural Economist

Education: N.D.A. (Royal Society UK) (1961); B.Sc. Wye College, London University (1961); M.Sc. (1963), Ph.D. Oregon State University (1965).

Experience: 1965-1976: Head of Rural Economics Research Unit and Research Fellow to Professor and Head of Department of Agricultural Economics, Ahmadu Bello University, Northern Nigeria. 1977-1982: Associate to full Professor, Department of Economics, Kansas State University. 1982-90: Chief of Party, MIAC/USAID Agricultural Technology Improvement Project, Gaborone, Botswana. 1991-Present: Professor, Department of Agricultural Economics, Kansas State University. Frequent consultancies, participation in seminars and workshops including those of CIMMYT, CIP, ICRISAT, IITA, ILCA, IRRI. Farming systems research major orientation. Member of 2nd EPR (1986) and 3rd EPMR (1992) of ILCA. Participates frequently in design and evaluation missions for donors funded projects (ODA Netherlands, FAO, etc) in Africa, Asia, and Latin America.

**TERMS OF REFERENCE FOR EXTERNAL REVIEWS
OF CGIAR CENTRES**

BACKGROUND

The Consultative Group on International Agricultural Research (CGIAR) has charged its Technical Advisory Committee (TAC) with the responsibility of conducting External Programme Reviews (EPRs) of those International Agricultural Research Centres (Centres) that it supports financially. The CGIAR has assigned a similar responsibility to its Secretariat for External Management Reviews (EMRs).

TAC and the CGIAR Secretariat normally discharge these responsibilities by commissioning either separate panels or a joint panel to conduct the reviews. In commissioning panels, neither TAC nor the CGIAR Secretariat delegates its responsibility for reviews, but both use panels to facilitate the process. Panels submit their reports for consideration by TAC and the CGIAR Secretariat before they are transmitted to the CGIAR. While the main recommendations made by panels are normally endorsed both by TAC and the CGIAR, such endorsement cannot be presumed by either the panels or the Centre under review. Equally, as autonomous institutions, Centres are not obliged to implement the endorsed recommendations. In practice, however, they usually implement most, if not all of them.

PURPOSE

Through its support of International Centres, the CGIAR aims to contribute to increasing sustainable crop, livestock, fish and tree production in developing countries in ways that improve the nutritional level and general economic well-being of low-income people. The purpose of external reviews is to help to ensure that the Centres continue to implement strategies and programmes that are relevant to these goals; that they maintain or enhance their record of achievement; and that they are efficiently managed. In these ways, external reviews reinforce mechanisms of accountability within the System.

EPRs and EMRs are also essential components of the CGIAR's integrated planning process. The context in which they are undertaken is to be found in the document "Review Processes in the CGIAR".

THE REVIEW

Against this background, the panel is requested to make a thorough and independent appraisal of the Centre and all its activities, following the broad topics below, as well as the appended list of questions and guidelines. Panels are encouraged to set their findings in the broader context of the CGIAR System, where this is relevant to the activity or programme under review.

A. Recent Evolution of the Centre

Important changes affecting the Centre since the previous external review.

B. Mandate

The continuing appropriateness of the Centre's mandate in relation to the mission and goals of the CGIAR.

C. Strategy and Programmes

The policies and strategies of the Centre, their coherence with CGIAR strategies, and the mechanisms used for monitoring and revising them.

The extent to which the Centre's strategy is reflected in its current programmes; the rationale for any proposed changes by the Centre and their implications for future activities.

The quality of current programmes and activities.

D. Centre Guidance, Values and Culture

The overall effectiveness of the Centre's Board of Trustees in governing the Centre, and the effectiveness of leadership throughout the Centre.

The Centre's guiding values and culture, and their influence on the Centre's performance.

E. Programme Organization and Management

The mechanisms in place at the Centre to ensure the excellence of the programmes and cost-effective use of resources.

The adequacy of the Centre's organizational structure, and the mechanisms it uses to manage and coordinate its research programmes and related activities.

F. Resources and Facilities, and their Management

The financial resources available to the Centre in relation to its present and future programmes.

The land, laboratories and services available for supporting the programmes.

The Centre's human resources.

The Centre's information resources and facilities.

G. External Relationships

The Centre's relationships with national research systems¹ in developing countries.

Collaboration with advanced institutions in research and training, in both the public and private sectors.

Collaboration with other CGIAR Centres and international agricultural research institutions, and undesirable overlap of activities.

The Centre's relationships with the government of its host country or countries and with institutions therein.

H. Achievements and Impact

The Centre's overall impact, its contribution to the achievement of the mission and goals of the CGIAR, and the methods used for making such assessments.

Recent achievements of the Centre in research and other activities.

The potential of the Centre's current and planned activities for future impact.

THE REPORT AND RECOMMENDATIONS

Panels are requested to prepare succinct reports in plain language (understandable to non-technical readers), in which factual material is kept to the minimum necessary to set the conclusions in context. Reports should include clear endorsements of the Centre's activities where appropriate, as well as recommendations and suggestions for changes.

Recommendations should be justified by the analysis and approved by panel members. Recommendations for increases in staff or activities should be accompanied by analyses of their resource implications. Reports should be formally transmitted to the Chairman of TAC and the Executive Secretary of the CGIAR by panel Chairs.

National research systems include all those institutions in the public and private sectors, including universities, that are potentially capable of contributing to research related to the development of agriculture, forestry and fisheries.

LIST OF QUESTIONS FOR EXTERNAL REVIEWS

These questions supplement the Terms of Reference and illustrate the types of question the panel should consider in each category. They apply to most, but not necessarily to all CGIAR Centres. In addition, TAC and the CGIAR Secretariat usually compile a short list of questions that are specific to the Centre under review. In preparation for each review, the questions are circulated to the members of the CGIAR and the Centre inviting them to comment and, if considered essential, to add supplementary questions. The panel is not required to answer all questions explicitly, but to take them into account in making its own assessment of the most important ones.

A. Recent Evolution of the Centre

1. What important changes have taken place in the Centre since the previous external review? What were the principal reasons for change? What are the likely effects of these changes on the future performance of the Centre?
2. How responsive was the Centre to the previous review.

B. Mandate

3. How appropriate are the Centre's operational mandate and mission statement in relation to the changing mission and goals of the CGIAR?
4. How well do the present and planned activities of the Centre relate to the mandate and the mission of the Centre?

C. Strategy and Programmes

5. Does the Centre have an up-to-date and well-reasoned strategy statement? In particular, does it:
 - (a) reflect a thorough understanding of the needs of the Centre's principal clients and of the relevant activities of its partners and collaborators?
 - (b) take into account the major changes expected to occur in the Centre's external environment?
 - (c) spell out the Centre's aims and objectives in different programme areas and provide a clear justification for them?
 - (d) take into account the Centre's internal strengths and weaknesses and the financial constraints likely to be faced?
 - (e) provide a clear justification for the future scale of the Centre's operations?

6. Are national authorities satisfied with the Centre's strategy and did they have adequate opportunity to contribute to its formulation?
7. Does the Centre's allocation of resources to its programmes reflect the priorities appropriately? Are the planned directions and priorities within programmes appropriate?
8. Does the Centre's strategy sufficiently take into account the determinants of sustainable production, the alleviation of poverty and preservation of the quality of the environment?
9. Has the Centre analyzed the operational implications of its future strategy and priorities in terms of finance, staff and other aspects?
10. How well is the Centre's current strategy reflected in its programmes and activities?
11. How successful has the Centre been in reaching its major objectives in each major programme area since the previous external review? Have the approaches adopted been the most appropriate for the problems to be solved? What has been the quality of the Centre's work in each programme area?
12. How effectively does the Centre's training programme meet the needs of national research systems?
13. How much attention has the Centre paid to gender considerations in planning and implementing its programme activities. Is this adequate?
14. Does the Centre give appropriate attention to post-harvest technology?
15. Has the Centre made adequate provisions from its core funds for work on genetic resources? How effectively is this work exploited for the benefit of developing countries?

D. Centre Guidance, Values and Culture

16. Is the Centre's legal status appropriate for fulfilling its mission?
17. How effective has the Centre's board been in determining policy and providing oversight? How effective has it been in managing its internal affairs (e.g., planning, internal board structure, member selection and development, managing meetings, etc.)?
18. Are board-management relationships based on openness, respect for each other's roles, and mutual trust? Does the board regularly assess and provide feedback on the performance of the director general on the basis of explicit and objective criteria?

19. How effectively has the Centre been led by the director general and the management team since the previous external review? How well do senior managers work as a team?
20. What principal guiding philosophies appear to shape the action of the board, management and staff? Are they conducive to high performance? (Among others, consider attitudes towards creativity, accountability, efficiency, and organizational change.)
21. What are the main features of the Centre's current organizational culture? Do aspects of this culture serve as barriers to performance? Is the Centre's organizational culture in harmony with its strategy, structure and management practices?

E. Programme Organization and Management

22. Has the Centre developed an organizational structure suited to good programme performance? What coordination mechanisms are in place? Are they effective? Are there alternative structures that could serve the Centre better in the future in the light of the Centre's strategy?
23. How effectively are the Centre's decentralized activities linked with those at the headquarters? Do the staff outside the headquarters have adequate opportunities to contribute to overall planning and decision making?
24. How effective are the Centre's strategic and operational (i.e. medium term and annual) planning processes? How well are they linked to budgeting? Do these processes ensure sufficient consideration of the views of the Centre's clients and other key stakeholders?
25. Does the Centre have an effective planning and management system for projects or activities?
26. How effective are the Centre's programme monitoring and internal review systems and processes? Does the Centre have an effective peer review or a similar quality control process?
27. Do staff work effectively in teams? Do the structure and operating procedures of work-groups facilitate cooperation and teamwork?
28. Do the Centre's programme organization and management processes ensure efficiency and internal accountability? Are they conducive to innovation?

F. Resources and Facilities

29. How effective has the Centre been in organizing, staffing and managing its human, financial, administrative and information resources?

Human Resources

30. Has the Centre been able to attract and retain international and local staff of the highest calibre? Is the turnover rate one that ensures programme continuity as well as healthy infusion of new staff into programmes?
31. Does the Centre have appropriate personnel policies for international and local staff stationed at the headquarters and outside it? Are they seen to be fair and consistent? (Consider policies for staff recruitment, orientation, compensation, performance planning and assessment, career development, tenure, spouse employment, retirement, etc.)
32. Does the Centre actively promote recruitment, retention and career development of women? Are there barriers to women's advancement in the Centre?
33. How successful are managers and supervisors in managing people? In particular, how skilful are they in planning, coordinating and delegating work, communicating effectively, and motivating, developing and rewarding staff?
34. How satisfied are staff at all levels with their jobs? How are morale, trust, communication and teamwork perceived among the staff?

Finance

35. How successful has the Centre been in securing funds for its activities? How stable is the Centre's funding? Does the Centre have a fund-raising strategy, and how effectively is fund-raising managed?
36. Does the proportion of the Centre's budget received as restricted funding distort the Centre's strategy and the priorities accorded to its various activities?
37. How effective are the systems and processes used for financial management of headquarters and field operations? (Consider financial planning, analysis, reporting and control, accounting, budgeting, internal and external auditing, and cash and currency management.)
38. How strongly is financial management linked with programme management? How much financial responsibility do the programme staff have?

Administration

39. How successful has the Centre been in establishing an administrative infrastructure that meets the needs of staff in an efficient manner?

40. How cost-effective are the systems and policies used for managing the Centre's:
- property (e.g., maintenance, development, construction, rental);
 - general services (e.g., security, housing and dormitories, food services, transport, travel services);
 - procurement operations (e.g., foreign and local purchasing, receiving, stores)?

Information

41. How successful is the Centre in acquiring, generating and managing the information it needs for decision-making, communication and integration of activities?
42. How effectively are information services and technology managed? (Consider computerization, telecommunications, records management, archives, library, and documentation.)

G. External Relationships

43. How successful has the Centre been in managing its relations with:
- clients in developing countries;
 - institutions in the host country of its headquarters and of its substations in other countries;
 - public and private sector institutions in developed and developing countries (including other CGIAR centres);
 - donors, the CGIAR and TAC;
 - the media and the general public?
44. Is the Centre's strategy for collaboration with national research systems appropriate considering the sizes and stages of development of these systems? Are the priorities for collaborative work accorded to individual countries (in particular, the host country) appropriate? Does the Centre actively promote a strategy of collaboration in international research with national systems and regional research organizations?

H. Achievements and Impact

45. What mechanisms does the Centre have in place to monitor its achievements and impact? Are these adequate?
46. How does the need to demonstrate impact influence the Centre's priorities and strategies? Is there a tendency for long-term consideration to be sacrificed for short-term gains?

47. What have been the most notable achievements of the Centre since the previous external review?
48. What benefits have developing countries derived from the Centre's work since the previous review? What contributions has the Centre made to strengthening national research systems through training, institution building, collaborative research and technical assistance?
49. What is the Centre's potential for further impact, given its planned activities? Do these justify continued donor support for the Centre? Is there a case for increasing the Centre's funding level? Could funding be reduced without seriously affecting the Centre's potential for further impact?

LIST OF INSTITUTIONS VISITED AND PERSONS MET

1. BENIN (5 December 1994)

IITA - Benin

Mr. Bob Akinwumi, Engineering
Dr. Christian Borgemeister, Post-Doctoral Fellow, Entomologist
Dr. Braima James, Coordinator, ESCaPP
Dr. Georg Goergen, Post-Doctorate Fellow, Biosystematist
Dr. Winfred Hammond, Technology Transfer & Training Unit
Mr. Thomas Haug, Mass Rearing Expert
Ms. Birgit Kristensen, Associate Expert
Dr. Jurgen Langewald, Post-Doctoral Fellow
Dr. Chris Lomer, Leader, Biological Control Programme, Insect Pathologist
Mr. Benoît Megevand, Entomologist Associate Expert
Dr. William Meikle, Post-Doctoral Fellow
Prof. Wester Modder, Entomologist (vs)
Dr. Peter Neuenschwander, Director, PHMD
Mr. Jacob Quaye, Station Administrator
Dr. Manuele Tamo, Leader, Habitat Management Programme
Mr. Marc Versteeg, Research Liaison Scientist, RCMD
Dr. Steve Yaninek, Acarologist
Mr. Matthias Zweigert, Head, Technology Transfer & Training Unit
Mr. M. Dumont, CIRAD-CA, Yam Characterization

Institut National de Recherche Agronomique Benin, Ministry of Agriculture

Dr. E. Houssou, Director
Dr. G. Agbahungba, Deputy Director

Ministry of Education

Prof. N. Aho, Minister of Education and Director of the Comité de Suivi

Service de Protection des Végétaux (SPV), Porto Novo

Mr. Yacouba Bouraïma, Ingénieur Agronome
Mr. Aimé Bokonon-Ganta, Ingénieur Agronome
Mr. Jean-Charles Heyd, Chef de Mission Allemande, GTZ/SPV
Mr. André Houssou, Contrôleur de l'Agriculture
Dr. Chabowu Lawani, Chef, Service de Protection des Végétaux
Mr. Symphorien Saizonou, Ingénieur Agronome

2. CAMEROON (4-6 December 1994)

IITA Station for Humid Forest Zone Research (Mbalmayo Station)

Dr. Emmanuel Atayi, IITA Resident Representative

Dr. Doyle Baker, Director RCMD

Mr. Stan Claassen, Station Manager, HFS/IITA

Dr. Stefan Hauser, Soil Physicist/Biologist, HFP/RCMD

Dr. Jacqueline Henrot, Special Project at HFS, AB-DLO/IITA

Mr. Nakato M. Kidza, M.Sc. Student

Dr. Neal Menzies, Consultant Soil Chemist, University of Queensland

Ms. Lindsey Morgrove, Student Researcher in Soils

Mr. Nkem Johnson Ndi, Research Associate (Soil Physics)

Dr. Ousseynou Ndoye, Agr. Forest Economist, HFP/RCMD

Mr. Edward Ngallame, Agricultural Technician (Soil Chemistry)

Mr. Tarcisius Nyobe, Ph.D. Student

Mr. Edward Nyoge, Technician

Dr. Isabelle Rivière, Crop Ecologist

Mr. Nicodeme Tchamou, Botanist (Research Associate)

Dr. Stephan Weise, Weed/Vegetation Management, Programme Leader,
HFP/RCMD

Institut de Recherche Agronomique (IRA)

Dr. J. Ayuk-Takem, Director

Mr. François Kaho, Agronomist

Mr. Blaise Nguimgo, Agronomist

Dr. Pauline Zekeng, Agronomist

International Centre for Research in Agroforestry (ICRAF)

Dr. D. Duguma, Regional Coordinator

Dr. D.O. Ladipo, MPT Specialist

Dr. T. Tiki Manga, ASB and AFNETA Coordinator

Ministry of Science and Technology

Dr. Jean-Blaise Nyobe, Director of Research

3. COTE D'IVOIRE (8-10 December 1994)

Food Crops Research Institute (FCRI)

Dr. Sylvestre A. Aman, Soil Scientist, IDESSA-DCV, AFNETA

Dr. N'Dri Coulibaly, Chercheur, Filières Racines-Tubercules

Dr. Sékou Doumbia, Chef du Département

Ms. Alice Ngoran, Chercheur, Filière Céréales

Ms. Boni N'Zué, Chercheur, Filière Racines-Tubercules

Mr. Johan Stessens, Chercheur Agro-économiste, IDESSA-K.U.LEUVEN

Mr. G. Subreviue, Chercheur, Filière Racines-Tubercules

Mr. Gbatto Topka, Chercheur, Filière Racines-Tubercules

Dr. Kassoum Traoré, Directeur Scientifique

IITA - Côte d'Ivoire (WARDA Facilities)

Dr. B. Badu-Apraku, Maize Breeder, West and Central Africa Maize Research Network (WECAMAN)

Dr. A. Diallo, IITA/CIMMYT Maize Breeder

Dr. J. Fajemisin, Maize Breeder, Research Liaison Scientist

IITA - Ferkessedougou Station

Mr. Anoh F. Assamoi, Sorghum Breeder, IDESSA

Mr. Bamadou Coulibaly, Technicien, IITA-WECAMAN

Mr. Nienfoun Siaka Coulibaly, Technicien, IITA-WECAMAN

Mr. Yagouba Dosso, Technicien, Striga

Mr. Bernard Koffi, Site Supervisor

Mr. Kouatto Kouatto, Sorghum Breeder, IDESSA

Mr. Berthé Nouhoun, Mass Rearing

Mr. Yves Gnenerama Sekongo

Mr. Valentin Zana Soro, Technicien

Institut des Savannes (IDESSA)

Dr. Koffi Goli, Directeur Général

Dr. Félix Coulibaly, Directeur Général Adjoint

Mr. Kassoum Traoré, Sous-Directeur Scientifique

Ms. Alice Ngoran, Agronomie du Maïs

Ministry of Agriculture

Dr. B. Ouayogode, Director of Scientific Research

West Africa Rice Development Association (WARDA)

Dr. Peter Matlon, Director of Research

4. **GHANA** (6-7 December 1994)

Biotechnology & Nuclear Agricultural Research Institute, Ghana Atomic Energy Commission, Legon

Dr. Delphina A. Adabie Gomez, Head, Department of Animal Sciences,

Cocoa Research Institute of Ghana

Dr. Beatrice Padi, Entomologist

Council for Scientific and Industrial Research (CSIR) Secretariat

Prof. W.S. Alhassan, Director General

Mr. Biney, Secretary to the Director General

Prof. K.A. Haizel, Chief Technical Advisor, CSIR/NARP

Dr. S. Koli, Acting DDG, Agriculture Research

Dr. Odei, Chair, Deputy Director General, Agricultural Research

Mr. Saka, Secretary

Crops Research Institute (CRI), Kumasi

Mr. K. Amoo-Baffoe, Ministry of Food and Agriculture (MOFA), Ashanti Region

Dr. F.O. Anno-Nyako, Virologist

Dr. B. Asafo Adjei, Legume Breeder, GGDP Coordinator

Mr. S.R.K. Ashiamah, Ext. Communication Specialist, MOFA/CRI

Mr. Kofi Boa, Agronomist

Dr. O.B. Hemeng, PRO/Coordinator, NRTCIP & Plantain Project

Mr. A.F.K. Kissiedu, Agronomist (Root/Tuber)

Dr. K.O. Marfo, Legume Breeder, Savanna Agricultural Research Institute (SARI)

Dr. M. Owusu-Akyaw, Entomologist

Ms. Regina Sagoe, Agronomist (Root & Tuber)

Dr. P.Y.K. Sallah, Maize Breeder

Food Research Institute (FRI)

Mrs. Abigail Andah, Acting Director

IITA - Ghana

Dr. M.A. Hossain, Legume Breeder

Dr. Petra Schill, Entomologist

Dr. J.B. Suh, Entomologist and Research Liaison Scientist

Plant Protection and Regulatory Services Dept. (PPRSD), MOFA

Ms. Eunice Adams, Assistant Director, PPRSD

Dr. David Q. Annang, Agricultural Economist, PPRSD

Dr. Ben Blay, Pathologist, PPRSD

Dr. A.R. Cudjoe, Senior Agricultural Officer, Entomologist, PPRSD

Mr. Poa-Kwesi Entsie, PPRSD

Ministry of Food and Agriculture (MOFA)

Hon. Victor Atsu-Ahedor, Deputy Minister Crops

Mr. S. Korang Amoako, Director, Department of Extension

Mrs. E. Ashitey, Rep. Director, Women in Agriculture

Mr. H.P. Batsa, Agr. Director, Agric. Eng. Service Dept.

Dr. S.K. Dapaah, Chief Director

Mr. G.A. Dixon, Director, Dept of Plant Protection & Regulatory Services,
MOFA

Dr. Franklin Donkoh, Deputy Director, DAES

Mrs. Ester Kwawu, Regional Director, GAR

Dr. F. Ofori, Director, Department Crop Services

Dr. P. Schroder, Advisor, GTZ

Sasakawa Africa Association & Global 2000

Mr. Toshiro Made, Programme Officer

University of Ghana, Legon

Dr. K. Afreh-Nuamah, Entomologist, Agric, Research Station, Kade
Prof. J.N. Ayerley, Department of Crop Science
Mr. L.L. Delimini, Ghana Soil and Water Management
Mr. E. Dosoo, Agricultural Officer, Department of Crop Sciences
Dr. D. Wilson, Department of Zoology

5. KENYA (7 December 1994)

Centro Internacional de la Papa (CIP)

Dr. Peter Ewell, Regional Representative

International Centre for Research in Agroforestry (ICRAF)

Dr. Pedro Sanchez, Director General
Dr. Roger Leakey, Deputy Director General and Director of Research
Dr. Kwesi Atta-Krah, Coordinator, AFRENA

Kenyan Agricultural Research Institute (KARI)

Dr. J. Kabira, Coordinator, Roots & Tubers Programme
Mr. J. Kamau, Coordinator, Cassava Programme
Dr. A. Mailu, Deputy Director, Crops and Soils Programme
Mrs. M. N. Wabule, Assistant Director, Horticulture/Industrial Crops

International Centre for Insect Physiology and Ecology (ICIPE)

Dr. H. Herren, Director General
Dr. A. Hassanali, Principal Research Scientist
Dr. S. M. Lux, Senior Research Scientist, Biocontrol Programme
Dr. W. Overholt, Head, Biocontrol Programme
Dr. K. V. Sheshu Reddy, Programme Leader, Crops Pest Research Programme

6. NIGERIA (2-4 December 1994 and 24 April 1995)

Bauchi State Agricultural Development Project (BSADP)

Ms. Mallam Dauda Abdullahi, Assistant Director Agronomy
Mallam M. G. Ahmaj, Deputy Director, Extension, BSADP Headquarters
Engr. Ibrahim Babbaji, Director, Fadama, BSADP
Ms. Jummai Bappah, Programme Officer, Development Exchange Centre (NGO)
Ms. H.M. Gadam, Assistant Director, WIA
Mr. Yakubu D.G. Hassan, Officer-in-Charge, Blacksmith Program
Engr. A.D. Kwatra, Irrigation Engineer
Engr. Ahmed A. Maigari, Farm Mech. Officer
Mallam R.Y. Massam, D/Agric., BSADP
Mallam A. Umar Tilde, Assistant Director, Extension
Mallam Mohammed Tufail, Irrigation Agronomist, BSADP Headquarters
Mallam Bala O. Suleiman, Director PME
Ms. Rista Y. Yakubu, Deputy Director Research
Dr. I.O. Akobundu, IITA, MSP
Mr. Ishaya B. Bajama, Village Leader, Bajama Village, Alkalari LGA, Bauchi

Dr. R.J. Carsky, IITA, Ibadan
Ms. L. Halos-Kim, IITA, Ibadan
Dr. B.T. Kang, IITA, Ibadan
Mr. Ado Lawal, Assistant Leader, Community Farmers, Bajama Village, Bauchi
Dr. M. Manyong, IITA, MSP
Dr. N. Sanginga, IITA, MSP

Federal Ministry of Agriculture and Natural Resources (24 April 1995)

Dr. Alhaji Gambo Jimeta, Honourable Minister
Prof. A. Adesina, Honourable Minister of State for Agriculture
Dr. A.G. Lamorde, Director General
Dr. Adamu Aliyu, Director, Department of Agricultural Sciences
Dr. B.A. Adelaja, Director, NIHORT, Ibadan
Mr. J.O. Apochi, Agricultural Sciences Department
Dr. I.I. Dafwang, NAERLS, ABU, Zaria
Dr. I.E. Ero, Director, FRIN., Ibadan
Dr. E.N.O. Iwuafor, IAR, ABU, Zaria
Dr. B.A.O. Ogunbodede, IAR & T., Ibadan
Mr. Patrick S. Ogundare, IITA, Abuja
Dr. J.E. Okeke, NRCRI, Umudike, Ummahia
Mr. O.G. Olabanji, Lake Chad Research Institute, Maiduguri
Dr. S.M. Misari, Director, NCRI Badeggi
Mr. Mohamed Magaji Senahi, Department of Agricultural Sciences

IITA Kano Station

Dr. Olupomi Ajayi, Entomologist, ICRISAT-Kano
Dr. S. Blade, Agronomist
Dr. L.C. Dempster, IITA/ODA Virologist
Mr. G.I. Diggol, Kano State, Ch. ADB, Ministry of Agriculture
Dr. I. Ekanayake, Physiologist
Prof. A.M. Emechebe, Director, Institute of Agricultural Research (IAR), ABU, Zaria
Dr. D.A. Florini, Pathologist
Dr. S.C. Gupta, Breeder, ICRISAT
Mr. Wm C. Mayaki, Officer-in-Charge, IAR, ABU, Kano
Dr. D.S. Murty, Breeder, ICRISAT-Kano
Dr. B.B. Singh, Cowpea Breeder, Officer-in-Charge
Dr. R. Tabo, Agronomist, ICRISAT-Kano
Dr. T. Terao, Physiologist (JIRCAS), IITA-Kano

National Root Crops Research Institute (NRCRI), Umudike

Dr. O.B. Arene, Plant Pathologist, Assistant Director, Planning, Monitoring and Evaluation
Dr. T.N.C. Echendu, Entomologist, Coordinator IITA/ESCAPP-Nig. Project
Mr. O.M. Ejimonye, Secretary
Dr. John Ikeorgu, Agronomist, Coordinator Farming Systems Programme
Mrs. E.M.A. Mbanaso, Plant Physiology and Tissue Culture
Dr. Boniface O. Njoku, Soil Scientist, Coordinator, Ginger Programme

Dr. E.C. Nnodu, Coordinator Cassava Programme
Mr. H.N. Nwokocha, Plant Pathologist, Coordinator Sweet Potato Programme
Dr. S.O. Odurukme, Agronomist, Assistant Director, Farming Research and Extension Department
Mr. J.E. Okeke, Agronomist, Root Crops Research
Dr. O.O. Okoli, Acting Director
Dr. Elmer Okoro, Abia State, ADP, Umuahia, Nigeria
Dr. G.C. Orkwor, Agronomist, Coordinator Yam Programme

National Agricultural Research Systems (NARS) and related Personnel

Dr. Stanley Akele, NAOC-Green Rivers Project
Prof. 'Bosel Okoli, UNIPORT
Mr. A. Lawrence, Shell Extension Service

Port Harcourt - Onne Station

Dr. Piers Austin, Head of IITA Research Farms Unit and Onne Station Manager
Dr. J.H. Crouch, Breeder and Molecular Biologist
Dr. S. Ferris, Plantain Postharvest Specialist
Dr. C. Gauhl, Plant Pathologist
Dr. F. Gauhl, Plant Pathologist
Dr. M. Gichuru, Soil Fertility Scientist
Dr. R. Ortiz, Breeder/Geneticist, Officer in Charge, Onne Station

7. UGANDA (8-9 December 1994)

IITA's East and Southern Africa Regional Centre (ESARC), Namulonge

Dr. Dirk Vuylsteke, Research Team Leader
Dr. Cliff Gold, Entomologist
Mr. Paul Hartley, Project Manager
Mr. Pheneas Ntawuruhunga, Head, Cassava Programme, ISAR, Rwanda/ESARC
Dr. Jim Whyte, EARRNET Coordinator

National Agricultural Research Organization (NARO)

Prof. Joseph Mukiibi, Director General

National Agricultural and Animal Research Institute (NARO), Namulonge

Mr. Antony Bua, Socio-Economist, Cassava Programme
Dr. Richard Gibson, Cassava Virologist, NRI
Dr. Justus Manywoha, Research Officer, Breeder, Maize Programme
Dr. Bill Khizzah, Breeder, Cassava Programme
Dr. I. Kikafunde, Maize Economist
Dr. W.K. Ndyababo, Programme Research Officer, Animal Nutritionist
Dr. William Nyanado, Acting Director
Dr. James A. Ogwang, Entomologist, Head, National Biocontrol Programme
Dr. Ssemakula-Nankenja, Breeder, Cassava Programme
Mr. P. Tukamuhabwa, Breeder, Soybeans/Beans
Dr. Romeo van de Grift, Food Technologist

National Banana Research Programme, Kawanda

Dr. E. Karamura, National Coordinator, Breeder

Ms. Imelda Kashaija, Nematologist (Banana)

Dr. Israel Kibirige-Sebunya, Director, KARI

Ms. Joséphine Namayanda, Nematologist (Root Crops)

SURVEY ON IITA PROGRAMMES

1. APPROACH

In June 1994, on behalf of the Fourth IITA External Programme and Management Review Panel, the Executive Secretary of TAC distributed questionnaires to 250 individuals, in various institutions in the different regions of sub-Saharan Africa, who had professional or official links with IITA's research and related activities. The basis for selection of participants was the mailing list provided by IITA.

The objective of the survey was to elicit respondents' opinion on:

- (a) the importance to them of various programmes and activities of IITA over the past five years (i.e. 1989-93);
- (b) expected importance of IITA's work during the Medium-Term Plan (MTP) period (i.e. 1994-98);
- (c) the value of IITA's collaborative mechanisms, particularly Networks and Country Projects; and
- (d) their views on IITA's mission and goals; on IITA's long-term research strategies and priorities for crop improvement and for the development of sustainable production systems; and
- (e) their satisfaction regarding their interactions with IITA during its last medium-term planning exercise.

Respondents were asked to evaluate IITA's programmes and collaborative mechanisms (i.e. objectives a, b and c above) in terms of a ranking using the scale: 1, not valuable; 2, slightly valuable; 3, moderately valuable; 4, very valuable; 5, extremely valuable. Each programme was evaluated in terms of research, training and information dissemination activities. Respondents were asked to evaluate their views on IITA's mission and goals, and on long-term research strategies and priorities (i.e. objective d above) on the scale: 1, do not agree; 2, slightly agree; 3, moderately agree; 4, mostly agree; 5, completely agree. Respondents were asked to evaluate their opinion on their satisfaction with regard to their interaction with IITA during its last medium-term planning exercise (i.e. objective e above) on the scale: 1, not satisfactory; 2, slightly satisfactory; 3, moderately satisfactory; 4, mostly satisfactory; 5, completely satisfactory.

In addition to the above numerical evaluation, respondents were requested to comment on IITA's strengths and weaknesses, and on IITA's major contributions to their respective countries.

2. RESULTS

Although responses were anonymous, the respondents were asked to indicate their current position, their regional location, and relationship and period of association with IITA. Of the 60 responses received (representing some 25% return), 35 were from West Africa, 12 from Central Africa and 8 from East Africa and Southern Africa. The regional location of the remaining 5 responses could not be identified. Of the total, 31 respondents were research scientists or managers, and the rest were administrators and policy-makers. There were 34 respondents with more than 5 years of association with IITA, whereas 45 respondents had more than 2 years of association. There were 11 respondents who were active collaborators of IITA, and another 23 respondents had participated in IITA organized workshops. In all, there were 52 respondents who were users of IITA generated information.

Responses by programme area for each activity type (i.e. research, training and information dissemination) for the past five years are summarized in Table 1, and for the MTP period in Table 2. Responses IITA's collaborative mechanisms (i.e. Networks and Country Projects); IITA's mission and goals; long-term research strategies and priorities; and interactions with national collaborators during the last medium-term planning exercise are presented in Table 3.

2.1. Numerical Evaluation

Table 1 records the combined score assigned by respondents for all IITA's activities for the past five years (1989-93). The overall score for all activities combined was 3.6 (above moderately valuable). The overall scores for crop improvement activities, plant health management activities, and resource and crop management activities were similar, i.e. 3.6, 3.5 and 3.5 respectively.

In terms of specific programmes within crop improvement, the cassava and maize programmes were considered the most valuable (mean overall scores of 4.0 and 3.8 respectively), and banana/plantain and soybean programmes the least valuable (3.1 and 3.3 respectively). Within plant health management, the biological control programme was considered the most valuable (3.8) and the habitat management programme the least valuable (3.0). Within resource and crop management, determinants of sustainability in cropping systems programme was the least valuable (3.2), whereas the rest of the programmes were ranked higher but received similar scores (3.5 or 3.6).

Overall, research scientists placed relatively lower values than administrators/policy-makers on IITA's activities (3.3 vs 3.6 respectively for research and information dissemination; and 3.3 vs 3.5 respectively for training).

Table 2 records the survey results on IITA's activities during its current 1994-98 MTP period. All activities were rated generally higher than those during the past 5 year period. The overall assessment for all activities combined was 4.1 (very valuable) against 3.6 (above moderately valuable); for crop improvement activities it was 4.0 vs 3.6

respectively; for plant health management activities, 4.1 vs 3.5 respectively; for resource and crop management activities, 4.1 vs 3.5 respectively.

Among crop improvement activities, higher overall importance was given to cassava and maize programmes (4.2) followed by cowpea; banana/plantain and yam programmes were given lower importance (3.7 and 3.8 respectively). Among plant health management activities host plant resistance and biological control programmes were given higher importance (4.2 and 4.1 respectively); habitat management programme was given lower importance (3.8). Among resource and crop management activities, biology and control of weeds and biology and fertility of soils were given higher importance (both 4.3); alley cropping was given lower importance (3.8).

There was insignificant difference in the mean responses between scientists and administrators/policy-makers on IITA's activities: research, 4.0 vs 3.9; training, 4.0 vs 3.9; information dissemination, 4.2 vs 4.1.

Table 3 records the responses on IITA's: collaborative mechanisms (networks and country projects); mission and goals, long-term research strategies and priorities, and interactions with national collaborators during the last medium-term planning exercise. With regard to collaborative networks, respondents considered CORTIS and COMBS to be more than "very valuable" (mean scores 4.2 and 4.2 respectively), and ESARRN to be less than "moderately valuable" (2.9). SAFGRAD, AFNETA and SPALNA were considered less than "very valuable" (3.9, 3.8, 3.8 respectively).

With regard to collaborative country projects, respondent considered IITA's strengthening research capacity as "very valuable" (4.0) and information dissemination as nearly "very valuable" (3.9). Strengthening institution capacity was considered less than "very valuable" (3.6), and strategic and long-term planning to be "moderately valuable" (3.1).

Respondents were "mostly in agreement" (mean score 4.0) with IITA's mission and goals. They were less than "mostly in agreement" (3.8) with the statement "IITA has a sound long-term strategy for the improvement of its mandate crops and for the development of sustainable production systems, and its priorities are clearly defined". The respondents consider the interaction with IITA during the last MTP exercise to be more than "moderately satisfactory" (3.3).

2.2. Respondents' Comments

Respondents comments on IITA's strengths and weaknesses, and IITA's major contributions provide further supplementary insights to some of the views summarized above. The following is a selection of comments to indicate respondents' views, and to note some interesting individual comments.

(a) Strengths:

- Crop improvement; multidisciplinary training; knowledgeable scientists and good working environment. (West Africa)
- Strong and result-oriented research and support team. (West Africa)
- Research in crop improvement. New cassava varieties leading to increased profits. (West Africa)
- Dissemination of information, collaborative trials, training, capacity for organization and planning; crop development and improvement. (Central Africa)
- High level of organization; data bank, training and information dissemination. (Central Africa)
- Good researchers; knowledge of topics. (East Africa)
- Qualified scientists; access to information and funds; impressive collection of germplasm. (Central Africa)

(b) Weaknesses

- Political instability in host country; mandate crop not for international trade; inadequate contacts with national systems. (Central Africa)
- Must improve on stability of researchers; high scientist turnover. (Central Africa)
- NARS not adequately involved; puts more emphasis on field research than research management. (West Africa)
- Lacks research in physical and biophysical factors of production. (East Africa)
- High staff turnover due to job insecurity and absence of career development in the system. (West Africa)
- Lack of joint planning with NARS; IITA distant from East Africa, thereby reducing interaction; mandate overlap with other CGIAR centres thereby resource use efficiency reduced. (East Africa)
- Research on agronomy of mandate crops not strong enough. (West Africa)

(c) Major contribution:

- Biocontrol of cassava mealybug. (Central Africa)
- Immense contribution on research and training. (Central Africa)
- High yielding varieties; manpower development and revival of cassava industry through mealybug control. (West Africa)
- Release of improved varieties of maize, soybean and cassava. (West Africa)
- Dwarf cowpea cultivars released for commercial production. (East Africa)
- Research through AFNETA and ESARRN; training and information dissemination. (East Africa)
- Development of improved and high yielding crop varieties of cowpea and cassava; disease and pest control. (West Africa)

Table 1: Survey on HTA Programmes for the Past 5 years (1989 - 1993)

Programme Area	Research	Training	Information	Mean
Crop Improvement				
1. Cowpea	3.7(0.17)	3.6(0.16)	3.5 (0.19)	3.6(0.10)
2. Soybean	3.3(0.18)	3.0(0.21)	3.4 (0.20)	3.3(0.11)
3. Cassava	4.1(0.16)	4.0(0.13)	4.0 (0.15)	4.0(0.08)
4. Maize	3.9(0.14)	3.6(0.17)	3.8 (0.17)	3.8(0.09)
5. Banana/plantain	3.1(0.23)	3.1(0.27)	3.0 (0.24)	3.1(0.14)
6. Yam	3.4(0.18)	3.5(0.18)	3.6 (0.23)	3.5(0.11)
Mean	3.6(0.07)	3.5(0.07)	3.6 (0.08)	3.6(0.04)
Plant Health Management				
1. Biological control	3.7(0.21)	3.8(0.22)	3.8(0.19)	3.8(0.12)
2. Host plant resistance	3.5(0.22)	3.6(0.23)	3.6(0.23)	3.6(0.13)
3. Habitat management	3.1(0.26)	3.0(0.29)	3.1(0.26)	3.0(0.15)
Mean	3.5(0.13)	3.5(0.14)	3.5(0.13)	3.5(0.08)
Resource and Crop Management				
1. Characterization of environments, resources and constraints	3.6(0.19)	3.5(0.19)	3.6(0.19)	3.6(0.11)
2. Adaptability and adoptability of alley cropping	3.5(0.20)	3.6(0.19)	3.5(0.20)	3.5(0.11)
3. Adaptability and adoptability of improved cropping systems	3.6(0.21)	3.6(0.19)	3.7(0.18)	3.6(0.14)
4. Determinants of sustainability in cropping systems	3.2(0.22)	3.3(0.24)	3.1(0.26)	3.2(0.14)
5. Development of resource management models and decision support system	3.1(0.24)	3.6(0.22)	3.7(0.23)	3.5(0.14)
6. Biology and fertility of soils	3.6(0.22)	3.5(0.24)	3.6(0.27)	3.6(0.14)
7. Biology and control of weeds	3.3(0.23)	3.5(0.19)	3.7(0.27)	3.5(0.13)
Mean	3.5(0.08)	3.5(0.08)	3.5(0.09)	3.5(0.05)
Overall Mean	3.6(0.05)	3.5(0.05)	3.6(0.05)	3.6(0.03)

Note: Values in table are mean scores, with standard error of the mean in ()

Scale: 1 - not valuable; 2 - slightly valuable; 3 - moderately valuable; 4 - very valuable;
5 - extremely valuable

Table 2: Survey on IITA Programmes for the Current MTP (1994 - 1998)

Programme Area	Research	Training	Information	Mean
Crop Improvement				
1. Cowpea	4.0(0.16)	4.0(0.16)	4.3(0.12)	4.1(0.08)
2. Soybean	3.7(0.15)	3.7(0.16)	4.0(0.15)	3.8(0.09)
3. Cassava	4.3(0.15)	4.1(0.16)	4.3(0.16)	4.2(0.09)
4. Maize	4.2(0.12)	4.1(0.13)	4.3(0.11)	4.2(0.07)
5. Banana/plantain	3.8(0.20)	3.6(0.21)	3.8(0.21)	3.7(0.12)
6. Yam	3.7(0.20)	3.8(0.18)	3.9(0.20)	3.8(0.11)
Mean	4.0(0.07)	3.9(0.07)	4.1(0.06)	4.0(0.04)
Plant Health Management				
1. Biological control	4.0(0.15)	4.1(0.15)	4.2(0.14)	4.1(0.09)
2. Host Plant Resistance	4.1(0.14)	4.2(0.12)	4.3(0.11)	4.2(0.07)
3. Habitat Management	3.8(0.17)	3.8(0.17)	3.8(0.17)	3.8(0.10)
Mean	4.0(0.09)	4.1(0.09)	4.1(0.08)	4.1(0.05)
Resource and Crop Management				
1. Characterization of environments, resources and constraints	4.0(0.14)	4.0(0.13)	4.1(0.15)	4.0(0.08)
2. Adaptability and adoptability of alley cropping systems	3.7(0.16)	3.8(0.15)	4.0(0.16)	3.8(0.09)
3. Adaptability and adoptability of improved cropping systems	4.2(0.11)	4.2(0.09)	4.3(0.10)	4.2(0.06)
4. Determinants of Sustainability in cropping systems	4.1(0.14)	4.1(0.15)	4.3(0.12)	4.2(0.09)
5. Development of resource management models and decision support systems	4.0(0.14)	3.9(0.14)	4.1(0.15)	4.0(0.08)
6. Biology and fertility of soils	4.4(0.12)	4.2(0.14)	4.2(0.14)	4.3(0.08)
7. Biology and control of weeds	4.2(0.12)	4.3(0.11)	4.3(0.11)	4.3(0.06)
Mean	4.1(0.05)	4.1(0.05)	4.2(0.05)	4.1(0.03)
Overall Mean	4.1(0.03)	4.0(0.03)	4.2(0.03)	4.1(0.02)

Note: Values in table are mean scores, with standard error of the mean in ()

Scale: 1 - not valuable; 2 - slightly valuable; 3 - moderately valuable; 4 - very valuable;
5 - extremely valuable

Table 3 : Collaborative Mechanisms (Networks and Country Projects) and General Considerations**Networks**

1. Collaborative Group on Maize Based Systems (COMBS)	4.0(0.28)	1 = not valuable
2. Collaborative Group on Root and Tuber Improvement (CORTIS)	4.2(0.16)	2 = slightly valuable
3. Semi-Arid Food Grains Research and Development (SAFGRAD)	3.9(0.20)	3 = moderately valuable
4. East and Southern African Root Crops Research Network (ESARRN)	2.9(0.55)	4 = very valuable
5. Alley Farming Network for Tropical Africa (AFNETA)	3.8(0.21)	5 = extremely valuable
6. Soil and Plant Analytical Laboratory Network of Africa (SPALNA)	3.8(0.31)	
Overall Mean	3.8(0.11)	

Country Projects

1. Strengthening Research Capacity	4.0(0.17)
2. Strengthening Institutional Capacity	3.6(0.26)
3. Information Dissemination	3.9(0.19)
4. Strategic and Long-term Planning	3.1(0.35)
Overall mean	3.7(0.12)

General Considerations

1. Assessment on mission and goals	4.0 (0.10)	1 = not agree or satisfactory
2. Agreement on long-term strategy	3.8 (0.10)	2 = slightly agree or satisfactory
3. Assessment of effectiveness of interactions	3.3 (0.19)	3 = moderately agree or satisfactory
		4 = mostly agree or satisfactory
		5 = completely agree or satisfactory

Note: Values in the table are means, with standard error of the mean in ()

DOCUMENTS PROVIDED TO THE REVIEW PANEL

A. Documents Provided by the TAC and CGIAR Secretariat

1. Review Process in the CGIAR, 1988
2. Report of the Third External Programme Review of IITA
3. Report of the Third External Programme and Management Review of the West Africa Rice Development Association (WARDA) - (as an example of a recent review)
4. TAC Priorities and Strategies Paper - Parts I and II
5. Relevant extract from TAC 59 report on IITA MTP submission.
6. Relevant extract from Review and Approval of Centre Medium-Term Plans
7. Report of the Stripe Study of Genetic Resources in the CGIAR
8. The Role of Biotechnology in the CGIAR
9. The CGIAR in the 21st Century: Options for Structural Change
10. 1992 CGIAR Annual Report
11. CGIAR Directory
12. 1990 EMR of IITA
13. 1993 volume of "CGIAR - The Boards of Trustees of the International Agricultural Research Centers"
14. "Organization and Management of the CGIAR System: A Review" (Ozgediz, 1993)
15. CGIAR 1993 Financial Report
16. Review and Approval of Center Medium-Term Plans 1994-98
17. 1993 ICW Summary of Proceedings and Decisions
18. 1993 Core Program Funding Update (June 28, 1993)
19. Re: Trends in CGIAR Funding -- Preliminary Observations (May 24, 1993)
20. Re: Overhead Recovery
21. Re: Financial Management Indicators
22. Accounting Policies and Reporting Practices Manual
23. CGIAR Resource Allocation - Annual Budget Manual for 1993
24. IITA Draft 1993 Financial Statement
25. CGIAR Governance and Organization: Is There a Need for Change?
26. Interim Recommendations on Organizational Matters
27. Sustainable Agriculture for a Food Secure World: A Vision for the CGIAR
28. "Governance and Management of the CGIAR Centers" (Ozgediz, 1991)

B. Standard Documents Provided by IITA at the Request of the TAC and CGIAR Secretariats

Documents provided by the IITA prior to the Panel's initial Briefing

1. 1993 IITA Annual Report
2. IITA 1989 - 2000 Strategic Plan
3. IITA 1989 - 1993 Medium - Term Plan

4. The 1995 Programme and Budget document
5. The current Organizational Chart
6. IITA agreements with other centers and institutions on cooperative activities
7. List of on-going and recently completed contracted projects
8. Papers summarizing the main achievements, constraints and impact of IITA programmes 1990 - 1994 by Division
9. Summary of:
 - actions taken in response to the last External Management and Programme Reviews; and
 - other significant management changes IITA since the last External Review

Documents provided by the Center at the time of the Panel's initial visit

1. International Staff list with summary of qualifications
2. Summary of Staff minimum qualifications, characteristic for generic titles
3. Table summarizing staffing pattern, with the number of staff in each category per programme and location for the current year, and an indication of the male: female ratio in each staff category
4. IITA Library and Documentation Center - a summary
5. Reports of major planning conferences, internal reviews, expert meetings, etc., which have had a major influence on the direction of the specific programmes of the Centre
6. Charter and other basic documents establishing the Center, along with subsequent amendments
7. A paper describing the evolution of the mandate of the Center over the years
8. Table showing composition of the Board over the last five years, along with an indication of the term of office of current members and their roles on the Board
9. The Board handbook
10. Set of minutes covering Board and Board committee meetings since the last External Review (and reports of Board committees to the full Board if not included in the minutes)
11. Description of the internal management structure, including the composition and terms of reference of each committee
12. Set of minutes of the meetings of the Director General's management committee covering the period since the last External Review
13. Staff manual or a description of current personnel procedures for international and locally-recruited staff
14. Table showing allowances, benefits, and salary ranges for each category of staff
15. Local compensation surveys used by IITA
16. Table showing personal data on internationally recruited staff by programme, including each job title, incumbent's location, tenure, gender, nationality, age, salary over the last three years, and source of funding (Names to be excluded)
17. Tables summarizing turnover of staff over the last five years by staff category
18. List of international staff vacancies and how long positions have been vacant
19. Reports of external auditors, including management letters, and financial officer's reports to the Board since the last External Review
20. Most recent internal audit reports

21. Internal management reports or reports written by consultants on assets of the Center's management that are of a non-confidential nature
22. Brief description of IITA's:
 - management information systems and procedures
 - library and documentation systems
 - archives and records management systems
 - computer and information technology systems and procedures
23. Summary information on each administrative and finance unit
24. Annual Report - 1993 Plant Health Management Division
25. Annual Report - 1993 Plantain and Banana Improvement Program
26. Archival Report - 1989 - 1993 Root & Tuber Improvement Program
27. Legislation Governing & Legal Status of IITA in Nigeria
28. IITA Project Summary Sheets & Research Protocols
29. Crop Improvement Division - EPMP Briefing session
30. IITA Review & Planning meeting - 1990 - 1994
31. IITA's Publications Review Panel and Publications output of IITA scientists:
A retrospective summary

APPENDIX VI

ASSESSMENT OF IITA'S PROGRESS IN IMPLEMENTING THE RECOMMENDATIONS OF THE 1990 EXTERNAL REVIEW

The 1990 External Programme and Management Review made 36 recommendations of which 19 were on programme and 17 on management.

IITA's response to the 1990 Review have been taken into account in appropriate sections of the Report, and are tabulated in this Appendix together with this Panel's comments and implementation scores.

Of the 36 recommendations, IITA has implemented 21 recommendations in full, and 19 partially. Six recommendations have not been implemented.

1. PROGRAMME RECOMMENDATIONS

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 1 - The Panel recommends that IITA establish a capacity for crop management research outside the systems groups and which addresses the better understanding of plant-soil interactions.	Response 1990: IITA acknowledges the Panel's view that crop management research (CMR) should be strengthened, but would prefer to do so within the framework of the "Systems Research Groups." This is not just a superficial difference with the above recommendation, but it reflects a significant divergence in view of the fundamental basis of the Systems Working Groups. IITA's philosophy regarding the Systems Working Groups is that they provide a systems approach to issues of food production for small scale farmers. This involves more than simple descriptive diagnosis of these farming systems, but rather analyses which lead to an understanding of the farmers' needs, their resources and their current and potential uses of these resources. This quantitative diagnosis and feedback role is coupled with adaptive research and "descriptive" diagnosis, through on-farm activity carried out in collaboration with NARS. In contrast, the Panel's recommendations focus on the adaptive research function. IITA believes that their approach would move research back to conventional On Farm Client Oriented Research (OFCOR) as practiced by NARS. The Panel rightly saw the adaptive function devolving to the NARS as they develop increasing strength, and thus recommend the eventual termination of the Systems Research Groups. IITA differs in that it believes that such devolvement should free resources for the Systems Working Groups. This would enable them to increase quantitative analyses of farming systems with a longer term perspective and particular orientation to the on-farm sustainability of improved technologies. IITA believes that effective systems research is critically dependent on teams of scientists (representing biological and social sciences) working within the same unit, on the same project, in a concerted effort. Hence IITA's modification of the Panel's recommendation concerning the structure of this research. Response 1994: Since the last EPMR, attempts have been made to implement the systems working groups, but difficulties have been encountered not because the rationale was faulted, but because their organizational structure lacked a sustaining element and the groups' operational structure did not fit a zonal framework. The need for a research structure with an ecoregional mandate persisted until the reorganization of the Resource and Crop Management Division (RCMD) into two programmes along agroecological zones, the Moist Savanna Programme and the Humid Forest Programme. This reorganization provided the needed impetus to implement the Institute's research within an agroecological framework. Thus the former systems working groups became subsumed in the new research programmes. This made it possible for IITA to maintain both a geographical focus in its technology development efforts and a systems perspective in its resource management research. Within each of these broad agroecological zones, IITA has undertaken a tripartite research initiative on characterization and	2

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	diagnosis, analysis of operational processes in the ecosystems, and development of technologies based on principles derived from these analyses. The agroecological framework has encouraged inter-divisional cooperation, thus making it possible to fit improved varieties and plant health management practices to specific requirements of the major agroecosystems within IITA's mandate area. These activities are carried out at various levels in partnership with NARS in each of the two main agroecological zones. Panel's Comments: The recommendation has been addressed by the structural reorganizations of RCMD in 1991 and 1992.	
Recommendation 2 - The Panel recommends a shift from a crop to a zonal base for the systems groups.	Response 1990: The Systems Working Groups were established three years ago to provide integration and a systems focus to the research of the Institute. They were explicitly recognized as an institutional innovation that would require careful assessment and possible modification after a three year trial period. The review of the Systems Working Groups started with the Internal Programme Review of RCMP in 1989. The Panel noted the "strong debate ongoing in the Institute on improving the operational effectiveness. The Systems Working Groups were established three years ago to provide integration and a systems focus to the research of the Institute. They were explicitly recognized as an institutional innovation that would require careful assessment and possible modification after a three year trial period. The review of the Systems Working Groups started with the Internal Programme Review of RCMP in 1989. The Panel noted the "strong debate ongoing in the Institute on improving the operational effectiveness of the SWG" and the fact that "one option under consideration is reorienting them from a crop to a zonal base." The Panel has contributed constructively to this evaluation process, and IITA agrees with their recommendation that SWG should shift to a zonal base, concentrating within these zones on the major food crop systems within IITA's commodity improvement mandate. Response 1994: The Humid Forest and Moist Savanna Programmes of RCMD reflect IITA's implementation of the Panel's recommendation. Each programme concentrates on the management of both the resources and the major food crop systems within IITA's agroecological mandate area. Panel's Comments: The recommendation has been addressed through the creation of the two zonal programmes in RCMD in 1993.	2

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 3 - The Panel recommends that, in collaboration with CIAT, IBPGR and the Genetic Resources Unit, a characterization of the most important African cassava varieties is undertaken without delay	Response 1990: IITA agrees with this specific recommendation for the formal characterization of important African cassava varieties. There are now more than 1500 clones in collections held by various African NARS, and 400 clones at IITA in Ibadan. For the collections held by IITA, the Institute will allocate resources for their characterization without delay, and will share the records with IBPGR and CIAT. Because the other collections in Africa cannot be easily moved from the countries where they were collected, their characterization must be done <i>in situ</i>. This is a large task for which assistance from IBPGR will be sought. That the characterization of this African genetic resource has not been systematically carried out does not mean that the resources are not formally used for the improvement of cassava in Africa. IITA has systematically introduced as seed, genes of this material through selective hybridization <i>in situ</i> of improved clones with the best materials of the local collection and through seed collections in the country which are transferred to IITA. Some of these materials used and maintained as breeding lines, will also be added to the cassava collection being characterized by IITA. Response 1994: A computerized database, developed with the software ORACLE, was established in 1991 to document information on cassava genetic resources. IITA then began a more concerted effort to characterize cassava germplasm. By year ending 1993, 400 accessions of cassava planted at IITA, Ibadan had been characterized and evaluated for up to 57 agro-botanical descriptors (31 shoot characters, 11 inflorescence characters and 15 root characters). The 400 accessions comprised African land races (102 accessions), pre-1988 introductions from Brazil and CIAT (63 accessions) and pre-1988 hybrids between local and exotic germplasm (235 accessions). The pre-1988 dating identifies germplasm movement from Latin America which occurred before the CIAT liaison scientist post was established at IITA. In the course of this characterization work, it was found that 18 African local materials, 25 accessions from IITA old breeding materials and one accession from CIAT appeared highly resistant to ACMV. Work on agro-botanical characterization has continued in 1994. Over the forthcoming five year period, 2000 accessions of cassava will be characterized. In 1992 and 1993, the cassava breeding programme characterized the IITA improved (elite) clones and the breeding lines which had reached the uniform yield trial (UYT) evaluation stage or beyond. An archive is available giving details of this characterization and the associated database is held by TRIP. The intention is that national programmes will have copies of this database. Currently a test version on diskette (database and 'help' documentation) has been given to the EARRNET Coordinator to determine its usefulness.	1

Recommendations	IITA's Response and Panel's Comments	Score
	The database covers up to 69 descriptors for two batches of germplasm: (1) 428 improved clones and breeding lines which were evaluated at three locations (Onne and Ibadan in Nigeria, and Niaouli in Benin); (2) 566 improved clones and breeding lines which were evaluated at the IITA Humid Forest Station at Mbalmayo, Cameroon. We are aware that the above information only partly satisfies the recommendation of the last EPMR. That panel focused their attention on the collection, characterization and documentation of African land races, envisaging one centralized place for conservation of this germplasm, presumably IITA, Ibadan. In reality, we cannot assemble landraces from all relevant African countries at one single location owing to quarantine regulations for germplasm movement and the prohibitive time and costs that would be required to comply with them. The scale of what is required makes the objective (a consolidated collection) untenable, certainly in the medium term. But there is a positive side to this. A number of national programmes have decent collections and we are aware that we could assist them to do more. We have in fact already made progress in this direction in Nigeria, Uganda, Benin, Cameroon, Congo, Guinea and Ghana (GRU Annual Report, p 4-6 and Table 1 refers). We can see that comprehensive adoption of a strategy of decentralized collections and centralized documentation could work. Probably a special project approach would be the best way to achieve faster progress in this area. We can nevertheless report progress in conservation of African land races even if not quite as envisaged by the last EPMR. Panel's Comments: Proportion of African landraces is rather low in those characterized so far. The Panel does not see why a centralized collection should not be considered in the long run.	
Recommendation 4 - The Panel recommends that IITA should provide stronger support for its plantain and banana breeding programme at Onne with the major focus on the development of black Sigatoka resistance in plantain.	Response 1990: The Institute appreciates the support and high praise given by the Panel for recent research achievements with plantains, and will continue to provide strong support for this work. Indeed, urgent action has been taken to recruit a pathologist within TRIPP primarily for work on black Sigatoka disease of plantains and a short list of three candidates has already been drawn up. In addition, a senior administrative officer is being recruited for the management of the Onne station. Response 1994: Actions taken, and research outputs since the EPMR of 1989 have conformed entirely with the EPMR recommendation. Black sigatoka resistance in plantain has been a major research focus over the past five years. A breeder/geneticist joined the research team of the Plantain and Banana Improvement Programme (PBIP) in January 1992, replacing a <i>Musa</i> agronomist. A plant pathologist (one post, two persons) for <i>Musa</i> was appointed in January 1991. The entire research team of PBIP (CID) and the <i>Musa</i> pathologists of the Host Plant Resistance Programme (HPRP /PHMD) are based at the Onne	2

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	High Rainfall Station, the main site for IITA's plantain and banana research for the humid lowland tropics. At the same time, the relationships between diseases, banana weevil, and nematodes are being addressed in the East African highlands and West African lowlands through special project support. Commencing in 1992, the Belgium Administration for Development Cooperation has funded a project for the upgrading of Onne Station. Additional research land (20 ha) has been acquired and fenced. Infrastructural improvements include expansion of office facilities, improvements in laboratory space, housing including hostel accommodation for trainees, and road improvements. This project will be completed by the end of 1994. By 1991, four years after the crossing programme began, a number of interesting tetraploid hybrids (3x x 2x crosses) had been selected for advanced evaluation. By 1992, fourteen improved tropical <i>Musa</i> plantain hybrids (TMPx) with BS resistance and offering three times the yield of existing varieties were submitted for registration to Journal Hortscience to place them in the public domain (HortScience 28(9): 957-959, 1993). Based on excellent progress in breeding for BS resistance in the period 1987 to 1993, combined with new findings on <i>Musa</i> genetics, IITA submitted the research for the King Baudouin award in March 1994. Panel's Comments: Full and adequate response. IITA received the 1994 King Baudouin Award for the development of high yielding Black Sigatoka resistant plantain. The Panel notes that while pathologist(s) have been appointed to Onne, the interaction with CID is unsatisfactory.	
Recommendation 5 - The Panel recommends the inputs of an entomologist and a pathologist to the Grain Legume Improvement Programme at Kano as soon as possible.	Response 1990: A pathologist appointed to GLIP in 1989 has a primary research focus on cowpeas in the cereal system of the savanna zone where Kano is located. Research on the control of cowpea insect pests for this zone is a different and more complex issue. The Institute's major thrust in this programme, described in the Medium Term Plan, is to seek host-plant resistance to cowpea pests. In making difficult choices for the allocation of scarce resources, priority in entomological research in this programme has therefore been given to the search for sources of resistance. This work, which includes the study and collection of wild <i>Vigna</i> species, is conducted at the Ibadan headquarters and is linked to collaborative research with advanced biotechnology laboratories in Europe and the United States. A systems analysis of cowpeas and its pests with their associated enemies in the cereal-cowpea systems of the savanna zone is presently a component of the work of the Biological Control Programme. Such	2-

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	work will identify opportunities and needs for further studies to develop components for integrated pest management for the savanna. Response 1994: The analysis of pests and associated natural enemies is done in the Habitat Management Programme (HMP) and covers both savanna and forest zones. Another entomologist and pathologist working on cowpea are in HPRP. Priorities are being discussed on the basis of information from HPRP/HMP, in close collaboration with CID and the scientists of the Biotech Unit. The final modalities of this priority setting still have to be worked out. Panel's Comments: The pathologist is based at Ibadan and is also the Head of the Seed Health Unit. Complementary pathology input from Seed Health Unit and a post-doctoral fellow in bacteriology. Entomological input through post-doctoral fellow and support from Host-Plant Resistance programme at Ibadan and Habitat Management programme at Cotonou.	
Recommendation 6 - Given the widespread and increasing importance of Striga and other parasitic weeds to IITA mandate crops, the Panel recommends the appointment of a Striga biologist as soon as possible.	Response 1990: IITA agrees with the Panel's assessment of the importance of Striga. Unfortunately the CGIAR is currently underfunded so that the Institute is unable to proceed to implement all the priorities in the Medium Term Plan. However, while management had to impose a freeze on new recruitment in 1990, the Trustees approved an exception to permit an appointment in the maize programme to deal with Striga and other pathogens. Management has decided that first priority should be given to the recruitment of a pathologist with special interest in Striga for the maize programme. If funds are available in 1990, a second exception will be made to permit the recruitment of a Striga biologist, but this may have to be delayed until 1991. Response 1994: A Striga biologist has been appointed in PHMD. Striga is being tackled in a Research Working Group involving all three divisions This Working Group has become an excellent example of how a complex problem can be effectively addressed in a multi-disciplinary manner. Panel's Comments: The multi-disciplinary working group on Striga has obtained valuable results.	2
Recommendation 7 - The Panel recommends in view of the important economic constraints caused by pathogens the input of a pathologist at the international scientist level to the Maize Research Programme.	Response 1990: It should be noted that the maize research programme pathologist left the Institute in December 1989. Highest priority is therefore given to the recruitment of a replacement, as described in the response to recommendation 6. Response 1994: Constraints in maize are being compared in HMP. Pathology has acquired special urgency with the increasing spread of downy mildew in Nigeria, occupying a good part of the time of a pathologist. Additional studies in HMP concern stored maize, where <i>Aspergillus</i> and post harvest pests, among them the newly introduced larger grain borer, interact. The streak resistance project, on the	2

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	other hand, is winding down and being transferred to NARS. Finally, a Seed Health Unit has been developed in PHMD., under the leadership of a HPRP pathologist, with major involvement in maize. Panel's Comments: Screening technologies for downy mildew were developed and focus is now on post-harvest problems.	
Recommendation 8 - The Panel recommends in transferring the IITA Rice Research Programme to WARDA that: (i) WARDA appoint and fully support a rice breeder to be based IITA as of 1 January 1991 in order to complete the evaluation, documentation and successful transfer of rice germplasm to the Association, and that (ii) the INGER liaison scientist be transferred to WARDA as soon as office, laboratory and field facilities are available, in order to service African requirements as an IRRI/WARDA activity from the Association's headquarters in Côte d'Ivoire. The full cost of the INGER programme shall be the responsibility of WARDA and IRRI as of 1 January 1991.	Response 1990: IITA is pleased that its excellent relations with WARDA are recognized. The location of a WARDA rice breeder at the Ibadan campus would be welcome. This would permit effective use of the rice paddies developed at the IITA Ibadan station which represent a considerable investment of CGIAR resources. It would also strengthen inter-center collaboration, particularly for systems research for the inland valleys. The transfer of the IRRI liaison scientist responsible for INGER from IITA to WARDA is in line with policy agreed upon between the three Centers. IITA would like to see the transfer implemented as soon as possible because significant resources of the Institute are devoted to this work (housing, laboratories, land, and seed stores). Response 1994: The INGER liaison scientist is still located at IITA due to disagreement between IRRI and WARDA about the overall operation of INGER in Africa. Further proposals have been prepared recently and arrangements have now been worked out for the transfer at the latest in early 1995.	2
Recommendation 9 - The Panel recommends that the Biological Control Programme evolves into a Biological and Integrated Control Programme (BICP) and that a Thematic Working Group on Plant Protection is established, including all plant protectionists, no matter where they are located.	Response 1990: IITA has been conscious to promote more contacts between scientists of the same discipline, and it agrees with the concept of the Thematic Working Group. IITA prefers to name the proposed programme the Pest Management Programme to reflect the entire concept within which Biological Control is an important component. Response 1994: All plant protection activities are now concentrated in the new Plant Health Management Division, which collaborates closely with the Crop Improvement and Resource and Crop Management Divisions. The new Division replaces the suggested Biological and Integrated Control	2

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	Programme and favors a holistic approach. It encompasses three programmes, namely the Biological Control Programme (BCP), the Habitat Management Programme (HMP) and the Host Plant Resistance Programme (HPRP). This latter programme constitutes a logical enlargement of the recommendation. Through this action the institute acknowledges that entomologists and pathologists have a larger role in their collaboration with breeders than the production of insects for homogeneous infestation or the development of scoring scales. Though this support role remains, new dimensions are being added in the HPRP, namely the study of resistance mechanisms and interactions of these resistance mechanisms with biological control and habitat management. The HMP goes beyond studies on cultural control and focuses on the study and later exploitation of interactions at all tropic levels between the crop, other crops, and the environment (fallow fields, natural vegetation). In addition to these vertical structures, the institute has started to develop horizontal projects of various topics executed by scientists drawn from several Programmes within the various Divisions. In PHMD, the implementation of this project structure is complete; but some of the cross-divisional linkages still need to be worked out. In PHMD, there are generally two types of projects. In a first step, pests, diseases, or weeds of a particular region are characterized and losses attributed. In a second step, according to the results of the characterization, particular pest problems are being tackled through integrated pest management. Special emphasis then is either on biological control, on habitat management, or on resistance breeding, the latter in collaboration with CID. Panel's Comments: The creation of PHMD is a success in increasing collaboration among plant protectionists for development of IPM strategies with CID and RCMD inputs.	
Recommendation 10 - The Panel recommends that IITA secures as soon as possible a location for conservation of its valuable yam collection.	Response 1990: The greater part of IITA's yam germplasm is already safely preserved in vitro, and the entire collection will soon be so in the near future. IITA agrees with the need to duplicate it and to provide better facilities for the storage of tubers. IITA proposes to discuss with the IBPGR the duplication of the yam germplasm at a suitable West African national programme. This discussion must include the need for funding to enable the national programme to receive the collection. Response 1994: Responsibility for the conservation and management of yam germplasm was transferred from TRIP to GRU at the end of 1990. In 1991 and 1992, yam germplasm management focused on the improvement of the field gene bank conservation technique, using minisett propagation combined with intensive care of the germplasm in the field and in storage. Details are reported in the GRU Annual Report for 1992 (section 4 refers).	0

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	In order to strengthen the conservation of yam biodiversity, a proposal has been developed for yam germplasm collection and conservation. Submission to possible donors was a joint undertaking between IITA and IPGRI. The proposal is linked to NARS through the African Yam Network which was inaugurated in 1993. Panel's Comments: It is not clear what progress has been achieved with IBPGR with regard to the duplication of the yam germplasm. No duplication location yet identified.	
Recommendation 11 - The Panel recommends that IITA seeks funds to ensure the conservation of its unique bambara groundnut collection.	Response 1990: IITA agrees that the conservation of its unique Bambara groundnut collection is important. However, the crop is not presently within the focus of IITA's research, nor is the Institute able to allocate the resources needed for the essential evaluation, documentation and preservation implicit in the term "conservation". In response to this recommendation the Institute will therefore take up the matter with IBPGR. Response 1994: The present collection of 2000 accessions of bambara groundnut (<i>Vigna subterranea</i>) is preserved at -20°C for conservation. Over 1200 accessions have been characterized with up to 46 descriptors. This information and the passport data are available in a computerized database. Some 50 selected germplasm accessions are kept in active collection (5°C) for distribution on request. Demand for seeds of this crop is relatively high. During the past 10 years, IITA has distributed 1349 samples of the germplasm to researchers world-wide. During 1988-1993, we received 47 requests from Nigerian scientists and supplied 538 samples to them. Panel's Comments: A proposal has been formulated.	1
Recommendation 12 - The Panel recommends that IITA defers activities in molecular biotechnology at Ibadan and concentrates on cellular biotechnology, cytogenetics and modern serology.	Response 1990: IITA accepts the recommendation to defer activities in molecular biotechnology, with the exception of the use of RFLP probes. The Institute places high priority on the use of RFLP probes as "enabling techniques" for its current breeding programmes. There are already a number of advanced laboratories collaborating with IITA in developing probes that will be of use in marking genes for African specific constraints. The Institute has developed plans for the use of such probes, and several of its scientists are experienced in the necessary method. IITA will send the necessary germplasm to the advanced laboratories that will construct the probes. Because the use of RFLP probes requires a radio-isotope laboratory, IITA is renovating a suitable facility away from the crop improvement laboratories that will be a component of the biotechnology unit which will include cellular biotechnology and eventually cytogenetics.	0

Recommendations	IITA's Response and Panel's Comments	Score
	Response 1994: The Biotechnology Research Unit (BRU) was formally opened in November 1990. Additional facilities (laboratory, containment rooms and screenhouse) were recently completed which will enable IITA to expand biotechnology research. In the four year period (1991-94) research was undertaken in four main fields: cellular biotechnology, cytogenetics, modern serology and molecular markers. The first three fields accord with the EPMR recommendation. Research in the fourth field was anticipated in IITA's response at the time of the EPMR. Onwards from 1993, IITA assisted the Nigerian Government to develop Biosafety Guidelines. These were submitted for ministerial signature in April 1994. With the increased effort to identify insect resistance genes in wild <i>Vigna</i>, we anticipate that we move into the field of molecular cloning in one year's time. Building on existing links with advanced institutions, we expect some sharing of information and research materials e.g. gene promoters and selection markers. Panel's Comments: Molecular biotechnology is now the major component. The recommendation has been ignored.	
Recommendation 13 - The Panel recommends that IITA appoints a second statistician.	Response 1990: The Institute agrees with the concern expressed by the Panel about the need for a second biometrician. Indeed, this need was expressed forcibly in recent internal programme reviews at IITA. The search process has been in progress since mid-1989, and interviews of two potential candidates have been held. Response 1994: The position of a second biometrician was never filled in part because several scientists made extensive use of packaged computer softwares for their data analysis. The need for a second biometrician was however kept under review and was to be met whenever it was judged necessary. There is a need for the Biometrics Unit to have capacity to get into mathematical modelling and programming. This second international position could be used with cost savings, by hiring a postdoctoral fellow, or by establishing a consultancy arrangement with a biometrics group of another research institute, e.g. the Institute of Arable Crops Research at Rothamsted, UK. Panel's Comments: Budgetary constraints have prevented action.	0

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 14 - The Panel recommends that IITA management encourage the publication of the findings of IITA research in peer-reviewed, international scientific journals.	Response 1990: IITA agrees with the Panel's concern about the publication of research findings, and will continue its efforts to improve the situation. Among the steps which have been taken to achieve this are: the consideration of scientists' refereed publications record in their annual evaluation and salary adjustments; research organized into clearly defined projects, for each of which there is the expectation of a published result and; an internal peer review of papers submitted for publication to ensure high scientific standards. Response 1994: This recommendation has been implemented fully. A system for internal peer review of research papers was established in December 1989. It has worked well, a considerable proportion of the papers published by IITA scientists now appears in peer-reviewed scientific journals or as book chapters that are readily available to the external scientific community. See also the list of IITA staff publications. Panel's Comments: Production of refereed journal articles has steadily increased during the review period. However, the publication record varies enormously with individuals.	2
Recommendation 15 - The Panel recommends that wherever possible, Research Leaders be relieved of undertaking travel for other than primarily scientific purposes.	Response 1990: Management recognizes that travel by IITA research leaders has been extensive and attributes this partly to the need to support IITA outreach projects and NARS in Africa. In fact, the demand for such services has always been greater than IITA staff have been able to meet. IITA agrees, however, that some of this travel has been at the expense of their responsibilities to their research programmes at headquarters. This has been an important reason for initiating the Research Liaison Scientist scheme which will relieve directors of some of their responsibility to travel in response to requests from NARS. Research travel budgets for 1990 have already been reduced. Response 1994 : Research leaders' (Programme Leaders, Unit Heads) professional travel is now entirely work-related.	2

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 16 - The Panels recommend that: research management at IITA should be reorganized to bring the crop-based working groups fully into the research structure to enable collaborative research projects based on cropping systems to involve scientists from Resource and Crop Management (RCM), Crop Improvement (CI), and Biological and Integrated Control (BIC). 1. Research projects should have a leader drawn from any part of the collaborating team whether from RCM, CI or BIC and that projects should be of fixed duration with evaluation points and a budget: the portfolio of projects should be dynamic with continual turnover. 2. Research Leaders who are close to the working scientists should be responsible for the research groups working on resource management and crop management, crop improvement and biological and integrated control: they will ensure that research quality and output are high. 3. There should be three Directors respectively for Resource and Crop Management, Crop Improvement and Biological and Integrated Control: this will reduce the heavy load presently borne by the DDG(R) and enable him to delegate and to concentrate to a greater extent on broad strategic issues.	Response 1990: IITA invited the two panels to contribute to current discussions underway by management on the organizational structure of the research programme. It was clear the present structure impaired the DDG(R)'s ability to deal with longer-term issues of research policy and planning, but this problem had been deferred until recently when other related issues had been resolved. IITA appreciates the efforts the two panels devoted to this important issue. Management benefited greatly from the constructive interaction with the panel chairmen in the discussion of alternative organizational arrangements. The specific recommendations in the chapter, written jointly by the two panels, are welcomed as useful contributions to the advancement of deliberations on this topic. Brief comments on the five specific points follow. 1. IITA agrees with the concept of research projects as described in the chapter, and several such projects are being developed. 2. IITA agrees that research leaders should be close to the working scientists; in fact, they should be "hands on" scientists themselves. This is amplified in the answer to recommendation 15 in the EPR on travel. 3. The organization structure recommended will be discussed internally at all levels of the research programme before final recommendations are formulated by management for consideration by the Board of Trustees in April. 4-5. IITA appreciates the panels' strong support for its decentralization of research and for the Farm Unit, as well as their endorsement of planned arrangements for management of the substations and the farm. Response 1994: In the course of 1991 the crop-based working groups were transformed into the humid forest programme and the moist savanna programme, which included most of the staff of the Resource and Crop Management Division (RCMD). Staff of the other two research divisions are closely cooperating with these programmes. 1. In the course of 1993 all the research activities undertaken by IITA were organized into projects with well defined objectives, expected outputs, time frames and manpower requirements. In line with the ecoregional approach of the CGIAR, these projects have been grouped according to five research domains (crop improvement and agronomy, integrated pest management, systems development and management, soils and vegetation management, and diagnosis and impact), and three agroecological zones (humid forest, moist savanna and mid-altitude).	2

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
4. The Institute confirms its intention to have each substation in the control of an active scientist designated as Officer-in-Charge who should report to the DDG(R). 5. The Farm Unit, as the principal research tool of the Institute, should report to the DDG(R).	2. Each research division is divided into programmes that are headed by programme leaders. These programme leaders are selected in consultation with the programme members, the present research leaders indeed are hands-on scientists. The new structure places responsibility for research coordination in the Research Directors Committee and has, with general approval, eliminated the post of a single DDG(R). Through the fact that two of the three research directors are now located outside Ibadan, the proposed decentralization has gone far beyond what was envisaged in 1989. Recent developments confirm the wisdom of this decision. The Institute needs, however, some more discussions and decisions to come to grips with the requirements imposed by such decentralisation. In addition certain Research Working Groups have come into being: Striga; Post-harvest; Cowpea Wide-Crosses and Biotechnology; Legumes. Members of the Research Working Groups are partly or fully involved in the subject matter concerned and come from various divisions. The team of the East and Southern Africa Regional Center (ESARC) has some similarity to a research working group except that the Research Team Leader has official recognition (i.e. an additional salary remuneration). Given the nature of the ESARC project, this official status clearly is needed. Each Research Working Group, (except ESARC) has a divisional reporting channel through the Chairperson of the Group: <i>Striga</i> to PHMD; Post-harvest and Cowpea to CID; and Legumes to RCMD. Working Groups do not have cost center codes but budgets have been allocated to them from time to time e.g. <i>Striga</i> Working Group had a budget in 1993. ESARC has a multi-disciplinary work plan and budget. 3. In 1991 three research divisions were established: Crop Improvement (CID), Plant Health Management (PHMD) and Resource and Crop Management (RCMD). The three division directors, together with the DDG for international cooperation and the DG constitute the Research Directors Committee (RDC). This committee is chaired by the DG. The DDG research upon his departure to IRRI in the course of 1991 has not been replaced, his functions being overtaken by the RDC and the DG. 4. Each of the substations is headed by an Officer-in-Charge, who is an active scientist, except for the Cotonou Station which is headed by the Director of PHMD. 5. The Farm Unit now reports to the Director of CID.	

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 17 - The Panel recommends that future Resident Scientists are appointed as IITA core staff and wherever possible drawn from existing personnel.	Response 1990: IITA has been seeking to minimize the differences between scientists supported by core funds and scientists on outreach projects supported by special-project funds. To this end, IITA proposed in its Medium Term Plan that about half of the Resident Scientists be classified as "essential" or "core" staff. The TAC rejected this proposal, with the consequence that all Resident Scientists will continue to be classified as "desirable" and to be dependent upon special project funding. While IITA must continue to employ Resident Scientists on the basis of contracts with bilateral donor agencies, it will endeavor to provide conditions of service as similar as possible to those of "core" staff. The terms of employment of Resident Scientists are identical to those of core staff, but the support services that can be provided for them are strictly limited by the terms negotiated with individual donors. There has been some transfer of scientists between core and special project positions, and it is agreed that this should be done whenever possible. Response 1994: During the last EPR in February 1990, IITA had a total of 37 staff classified as Resident Scientists. Since then, all the projects have been phased out with the exception of the Ghana Grains Development Project, and only one additional project, the Rwanda socio-economics project with one staff, has been implemented. Therefore, to date, IITA employs only two Resident Scientists. As a result, even with its willingness to do so, IITA could not fully implement the Panel's recommendation because only one resident scientist was recruited during the period under review. The sharp decrease in number of Resident Scientists is due to (1) the end of the two large institution-building type projects in Cameroon and Zaire, and IITA had decided that it will no longer be involved in such large projects (2) the general improvement at NARS level in Africa of scientific capability because of the considerable efforts made in training during the past 20 years by countries themselves, donors and CGIAR centers. However, with the recruitment of network and outstation scientists significant progress has been made during the period under review. In addition to the Research Liaison Scientist scheme, PHMD established a Technology Transfer and Training Unit (TT&TU) with special project funding, which developed an informal network of national biological control programmes. Recently, these programmes have become the basis for the wider implementation of plant protection activities, but the focus remained on biological control. Activities are planned jointly by scientists from different organizations within a country, joined in a national committee, and IITA scientists. In each country, biological control activities are only undertaken on demand from this committee. Apart from the support of technical activities (importation of beneficials, release, and monitoring, impact assessment) TT&TU assists national programme development and training (courses, degree related training), to enable participating countries in developing their own projects with or without IITA involvement.	1

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 18 - The Panel recommends that the Research Liaison Scientist scheme be reviewed and rejustified after two years of operation.	Response 1990: The Panel has accurately captured the rationale for the new Research Liaison Scientist scheme in paragraph 2 of page 68 of their report. To quote: "The production of new technologies by IITA should be demand pulled, the clients being the NARS and ultimately the farmers of the region." Thus, IITA needs ongoing monitoring of demand for technology. Such demands will be influenced primarily by the general macroeconomic environment, by the resource endowments of the farming community, and by the capacity of the NARS to respond to farmers' needs. Because this is a new scheme, it will be reviewed after two years as a matter of standard Institute policy. Response 1994: In April 1991, following intensive discussion within the IITA community and a broad endorsement by the Board of Trustees, the Research Liaison Scientist (RLS) scheme was revised, decentralized and restructured. RLS are now based in carefully selected host countries based on agroecologies, logistics and absorptive capacity for IITA technologies: Ferkessedougou (Côte d'Ivoire) for the moist savanna, Kumasi (Ghana) for the forest savanna transition zone, Cotonou (Benin) for the coastal savanna, and Brazzaville (Congo) for the humid forest. In addition to resident research activities, consistent with host NARS priorities, they have liaison responsibilities for the host NARS and IITA. and additional lead neighbouring NARS. Because of political problems, the RLS office in Congo has been temporarily closed. The new scheme will be reviewed in 1995.	2
Recommendation 19 - The Panel recommends that unless the existing and sound agreement between IITA and CIMMYT for maize research in Africa can be operated productively in 1990, TAC advise the system and the donors that the two Institutes have failed to resolve their differences.	Response 1990: The Institute notes the recommendation on page 70 of the report, and confirms its commitment to the agreement with CIMMYT which it believes to be sound and workable. IITA is in the process of operationalizing it, and is moving forward with plans to develop a sub-station in Côte d'Ivoire. A CIMMYT adjunct breeder has already joined the IITA office operating in Côte d'Ivoire. Response 1994: Differences between IITA and CIMMYT have been resolved. In early 1993, soon after the arrival of the CID Director, the Director of the CIMMYT Maize Programme, Dr. D. Hess visited IITA. He was accompanied by Dr. D. Jewell (CIMMYT entomologist, who was transferring to CIMMYT's Africa-base in Harare) and Dr. A. Diallo (CIMMYT plant breeder based in Côte d'Ivoire). After several discussion sessions, an agreement was drafted, along similar lines to that of 1988. After some further revisions, it was endorsed by all parties (dated 24 November 1993). The CIMMYT varieties which are developed in Côte d'Ivoire are routinely included in the IITA West and Central Africa Regional International Trials. Panel's Comments: The Agreement between IITA and CIMMYT defines the division of labour rather than collaboration. Lowland maize breeding activities of CIMMYT maize breeder (for West Africa) introduces again a certain element of overlap with the Ibadan-based Maize Improvement Programme.	1+

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

2. MANAGEMENT RECOMMENDATIONS

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 20 - Upon gazetting of the headquarters agreement, IITA should initiate efforts to get the decree modified to include the agreement and reflect the recommendations of the 1983 EMR as it relates to the role of the two Foundations.	Response - 1990: The Decree has been amended twice since it was first promulgated on July 27, 1967. The most recent amendment was in October 1989. IITA agrees that it would be desirable to tidy up the decree in respect of the role of the two foundations. Since the process of amending the decree is a major undertaking this will be done when it is necessary to amend the decree for other additional reasons. Response 1994: The changed role of the foundations, the headquarters agreement and other relevant modifications have been included in an amendment to the decree. This amendment has been approved by the authorities concerned, but the official publication is still pending.	2-
Recommendation 21 - Members of the Board of Trustees should make every effort to interact informally with their scientists, trainers and other specialists to improve their understanding of the Institute's work.	Response 1990: The Board of Trustees has already adopted several ways of interacting with staff — working lunches, breakfasts and dinners during Board meetings; going on field trips; being observers at internal reviews; arriving early before and leaving late after Board meetings with the purpose of having discussions with individual staff members. However, the Board continues to explore further ways of interacting with staff. Response 1994: Board members continue to be encouraged to interact with staff. Panel's Comments: The steps taken are useful, but given IITA's complexity, additional efforts are needed.	1+
Recommendation 22 More participatory forms of management should be instituted at IITA.	Response 1990: The Board is particularly pleased to note that the panel mentions that "no praise is too high for the determination and skill with which the present Director General has planned and carried through major improvements in the personnel, fiscal and management processes at IITA." It may be that the style adopted to accomplish these improvements gives rise to the impression of a top down style of management, but it was, in the Board's view, the appropriate way to bring order to what the panel rightly describes as a "disturbed system". Notwithstanding this impression IITA reviewed its communication processes in 1989. In consequence its Executive Management reinforced its commitment to programme meetings of all its scientific and professional staff. In addition, fora were established to involve junior staff in a consultative mechanism which cut across all programmes. Currently, no cross programme body exists for scientific and professional staff and the appropriate form is still being examined. The suggestion of creating a scientific council will be considered. At the same time IITA intends to reinforce its efforts to stimulate its monthly scientific seminars to become more interactive. IITA does not believe that mechanisms alone can stimulate greater freedom of debate which it agrees is essential for a healthy research institute. It will continue to encourage free exchange of views and to demonstrate by its response that this is an essential element of its management process.	2-

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	Response 1994: In 1991, management requested IITA employees to form three new associations: The Senior Staff Association, The Management Staff Association and the International Staff Association. The associations comprise national senior staff grades 6 to 10, national management staff grades 11 to 15 and Internationally recruited staff respectively. The primary objective of these associations is to encourage discussions among their respective constituents on matters of concern and convey these and related recommendations to management. Each association has a governing group elected by the members and a constitution formulated and agreed by the members. The staff associations have been active and meetings are held regularly. The International Staff Association (ISA) in particular has been meeting and interacting with management on a regular basis. This association was very much involved with the revision of the Internationally Recruited Staff Personnel Policy Manual. The Senior and Management Staff Associations meet with management at least two times annually. There is no staff association for regular staff. Regular staff of Pay Grades 1 through 6 belong to a national agricultural workers union. The Executive Management Committee (EMC), the Management Consultative Committee (MCC) and the Research Directors' Committee (RDC) now have formalized Terms of Reference that were reviewed by and discussed with the International Staff Association (The MCC is referred to as the General Management Committee, or GMC, in the 1990 External Review). These clearly define membership, periodicity of meetings, scope of activities, and minutes distribution. The DDG(IC) is now a regular member of the RDC. Detailed minutes are now kept of each MCC meeting. The lack of a record of this committee's meetings was criticized by the 1990 External Review panel: "Moreover, no record is kept of the GMC's (MCC's) business although the Institute describes it as being involved in.....the formulation of policies and decision making.....". The Director General organizes an annual Work Planning Week in February. During this week, all division directors, programme leaders, and scientists discuss the detailed research agenda to be followed the upcoming year. A representative from management attends all Community Council meetings. Although this is not a group associated with the official activities of the Institute, the nature of the IITA community requires community issues be heard and acted on before they affect community morale which, in turn, has a negative effect on research.	

Recommendations	IITA's Response and Panel's Comments	Score
	Panel's Comments: Considerable progress has been made in setting up these mechanisms.	
Recommendation 23 - IITA should examine by internal review the management of the International Cooperation Programme to assess where improvements in efficiency can be made and take appropriate action.	Response 1990: IITA recognizes that management of the International Cooperation Programme which comprises widely scattered components throughout diverse countries with poor communication is both complex and difficult. It is particularly aware that "back-stopping" of a large number of resident scientists by Ibadan-based scientists has not always been sufficient. The problem will decrease in future because the Medium-Term Plan indicates that it is the intention to more than halve the number of resident scientists over the next few years. IITA does not believe that the difficulty arises from the line of reporting of Resident Scientists or the possibility that there may be "crossed lines of reporting" regarding the DDG(IC) and DDG(R). The two DDG's are closely located and frequent liaison should minimize the amount of "crossed lines of reporting". Appointment letters clearly set out reporting relationships. As already indicated, managing the International Cooperation Programme is an extremely complex and challenging task and IITA agrees that an internal review is necessary. Response 1990: Since the last EPMR of IITA, three important steps have been taken to address internally the management of the now International Cooperation Division. 1. In April 1990 a discussion paper was prepared for the Board on "Interactions between International Cooperation and Research Programmes in strengthening National Agricultural Research Systems". It looked critically at all the mechanisms used by IITA to collaborate with NARS, including Research Liaison Scientists(RLS), Resident Scientists(RS), Visiting Scientists and Training. It analyzed how effectively Research Programmes(RP) and International Cooperation were interacting in the implementation of these mechanisms. It concluded that (1) there was little support from RP for the RLS scheme, (2) technical backstopping of outreach scientists working in special projects as Resident Scientists was insufficient and (3) overall commitment of RP to training was uneven, many scientists viewing training as not being a part of their duties, but as added responsibilities on top of their research activities. 2. To follow up on issues raised by the April 1990 paper and to try to address the shortcomings identified, a new paper was prepared for discussion by the Board in April 1991 on "Relationships between IITA and NARS in Africa: an issues paper". The different mechanisms were assessed against three criteria: impact of IITA research, contribution to IITA research efforts, and cost effectiveness. The following decisions were taken: (1) to phase out IITA's involvement in large institution building projects, (2) to concentrate work on small resident teams and research networks and to address the backstopping issue by integrating backstopping visits into the research programmes' annual workplans and (3) to decentralize the RLS scheme. The status of the implementation of these is reported in the document dealing with the EPR recommendations (recommendations 17 and 18).	1

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	3. The December 1990 Board meeting took the decision to conduct an internal review of the Training Programme. The review was conducted from 26-28 November 1991. It reconfirmed that training at IITA was a research based activity. It was recommended to decentralize production-oriented group training, in concert with NARS. This recommendation has been vigorously pursued during the last two years. In addition a set of steps has been taken to better integrate training and special project management at the Institute level, and to cope with budget reductions faced by the Institute. 1. Consistent with the management structure adopted for research, an International Cooperation Division(ICD) was formally created. 2. The former position of Director of Training has been eliminated, reducing the international positions in training from 3 to 2. The new head of training has been redesignated as Leader of the Training Programme. 3. In view of the termination of several outreach projects with resident scientist staff (only 2 remaining as of August 1994), one of the two Project Coordinator positions has also been eliminated. 4. The DDG of International Cooperation is member of the Research Directors Committee and brings to the Committee technical and management issues of the projects under his supervision. Panel's Comments: The reviews were done in 1990 and 1991, but follow-up has achieved mixed results.	
Recommendation 24 - Systematic evaluation of scientific staff be given priority by management, programme leaders, scientists, and the Human Resources Department.	Response 1990: This recommendation reflects IITA management's view. The systematic evaluation of scientists is a high priority and steps are already in hand to improve this process, namely the establishment of criteria by which contribution to research can be evaluated. Response 1994: Human resources administers a staff appraisal system covering senior and management grades of national staff as well as internationally recruited staff. For internationally recruited staff, this system takes into account the differences between scientific and support responsibilities. For scientific staff, the system comprises individual detailed goals and objectives set by the respective division director following the broad outlines of the Medium Term Plan and, more specifically, the annual Work Planning Week mentioned in the Senior Management section above. These goals/objectives must be agreed to by the scientists concerned. Individual goals/objectives are then given priorities or "weights", thus imparting work focus as desired by the division director. Goals and objectives are reviewed periodically as required. The annual appraisal is the division director's evaluation of a scientist's performance with respect to the goals/objectives agreed at the beginning of the period. These are discussed with the Director General before a final appraisal score is established.	1+

Recommendations	IITA's Response and Panel's Comments	Score
	For support staff, the system is similar, but the goals and objectives are related to the tasks required of the department concerned. These are established by the department head in collaboration with the DDG-Management. In all cases, the concerned individual must agree to the goals. As with scientists, these are reviewed periodically as required and a final score given at the end of the period. These are reviewed by the DDG-Management and the Director General. The primary objectives of the staff appraisal system are to provide a mechanism whereby directors can communicate their objectives to staff, obtain agreement from staff on how to reach those objectives, control progress, and take corrective actions or make changes as work is performed. Ideally, the system will "drive" staff resources toward agreed Institute objectives. The system requires the involvement of all staff starting with the Director General and ending with the staff member responsible for the research or support activity. Panel's Comments: The evaluation system has been formalized, but its effective implementation is still a problem.	
Recommendation 25 - The Human Resources Department give priority to management development of managers and scientists.	Response 1990: IITA is pleased that the panel endorses its work in this area. Currently senior staff participate in CGIAR training programmes. IITA is now developing a programme of resource management training for its scientists. It is intended to run such courses at IITA using resources from UK based business schools. Exploratory discussions are already in progress with London and Cranfield Business Schools. Response 1994: As reported after the 1990 EMR, IITA currently sends senior internationally recruited staff to CGIAR sponsored management training programmes. This training is allowed to be put in practice by management changes that were initiated in 1991: Prior to 1991, many of the management tasks within scientific and support programmes were relegated to the administrative and human resources departments of the Institute. These included all aspects of personnel management such as remuneration policies, recruitment, staff promotions, disciplinary actions, and appraisals; capital budgets/policies and control; and operating budget planning/control. As a result, many management activities were identified with individual "personalities" instead of with transparent, policy driven systems through which managers/scientists could have direct access to management processes and affect strategic action on issues of concern. In 1991, major management processes were "opened" to include representation from both research and support staff: - Human Resources: An Establishment Committee was formed. Members of the committee included representatives from all major divisions and programmes (10 management members). This is a standing committee and has the following Terms of Reference:	1

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	The Establishment Committee examines IITA's objectives, assesses actual existing and projected non-international manpower resources in Nigeria, and recommends allocations to programmes/divisions on a three-year cycle. The existence of this committee is not only helping to dissipate dissatisfaction with past personnel management practices, but is involving all layers of Institute management in the personnel management process, thus providing "hands-on" management training. All managers are part of the staff disciplinary process. - Capital and Operating Budget Planning/Policies/Control: In addition to human resources, all managers are involved in capital management and budget planning/control. Budgets are done on an annual basis in collaboration with the Director of Budget & Finance and the DDG-Management. Once the capital and operating budgets are agreed, the individual division directors, programme/unit heads, and managers are responsible for control of those budgets. Management, as a team, discusses and agrees on policies affecting capital and budget spending. Control is placed in the hands of all managers through the monthly Financial Information System reports. Panel's Comments: Senior managers have been sent for training, but the management development function has not yet been institutionalized.	
Recommendation 26 - The policy of offering continuing employment to international staff be changed to renewable fixed-term contracts.	Response 1990: This recommendation is noted. Greater definition of contract terms has been a major achievement in 1989 and the issue of fixed term is one which the senior management is continuing to debate. Response 1994: This recommendation has been put into effect by IITA Board ruling. All internationally recruited staff at IITA now have renewable, fixed-term contracts. Any contract renewal beyond 11 years total requires approval from the IITA Board of Trustees. Contracts are for periods of 1, 2, 3, 4, and 5 years depending on contract type.	2

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 27 - The Board of Trustees approve a resolution outlining the borrowing powers of the Director General. The Board of Trustees should also approve an investment policy outlining the financial instruments in which IITA may invest and any limitations they wish to place on the level of investment in any one institution.	Response 1990: IITA agrees with both recommendations and appropriate resolutions will be placed before the Board of Trustees at its April 1990 meeting. Response 1994: The IITA Board of Trustees, in the April, 1990, meeting, passed resolutions governing the investment policy of IITA, securities in which IITA may invest, and borrowing powers of the Director General.	2
Recommendation 28 - The current budget process continue to be reviewed to ensure that the budget reflects the goals of the Institute, that the process of budgeting is simplified and consultative and provides only the necessary information to monitor the performance, and that the process is automated.	Response 1990: IITA strongly supports this recommendation which endorses the user orientated process which is already under way. Response 1994: The IITA budget attempts to reflect the Medium Term Plan. Each annual budget is planned by the Director of Budget and Finance in collaboration with the research division directors, the DDG's, and the Director General. Once agreement is reached, the budget is presented to the Board of Trustees for approval. Over the past several years, approved budgets have had to be modified due to funding shortfalls. Necessary modifications are performed in collaboration with the same team of managers. Reporting of operating costs compared to budget, by cost center, is monthly and a budget report is presented and discussed at each Executive Management Committee meeting by the Director of Budget and Finance. Budget control is possible through the cost center reports issued by the automated Financial Information System to each cost center manager. The budget planning process is presently being modified to make it even more user oriented. This will involve starting the process earlier in the planning period, thus allowing managers below director and DDG level to become more involved.	2-
Recommendation 29 - The system personnel be instructed to review the reasons for the lengthy processing time and to make whatever adjustments are necessary technically to improve the software. This should be followed up by transferring the FIS System staff to Computer Services.	Response 1994: IITA is aware that the reasons for the long processing time are a combination of several factors including: the size of the chart of accounts; the large number of cost centers; the high volume of transactions; and hardware capacity. IITA agrees that it is ultimately desirable to combine the FIS staff and the staff in Computer Services into a single unit. Response 1994: The reasons processing time is lengthy are already presented under the 1990 response. The first three items have been thoroughly reviewed by the Director of Budget and Finance and have been modified to the extent possible given the nature of the Institute's reporting requirements. The	1

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
	head of Computer Services, the Director of Budget and Finance, and the head of Internal Audit are presently investigating the best hardware/software environment that will resolve the last item. This investigation involves visiting sister institutes that have upgraded their systems. It is expected the new system will be in place by middle 1995. Presently, FIS is viewed as one user, among many, of Computer Services. Combining these staff with Computer Services may not be desirable in a multi-user environment in which the final system architecture will be a decentralized network. This issue will be further reviewed as the new system architecture and operating environment become familiar. Panel's Comments: Users remain concerned about this.	
Recommendation 30 - The immediate creation of a task force to review the number of accounts required and to determine the level of detail required in monthly reports. It is doubtful that more than 10 line items are required to manage a project or department.	Response 1990: Any reduction in the number of accounts must recognize the reporting requirements of individual donors who sometimes require significantly more detailed information than could be provided by 10 line items. By the time this report is presented a task force of IITA will already have reviewed the number of accounts required. Response 1994: As mentioned above, this review has been done.	2-
Recommendation 31 - When and only when the above two steps have been taken and management is satisfied that it has done what can be done to streamline the process, should it consider a minor upgrade to the hardware which would then be able to operate the latest version of the software package currently in use. The cost of this investment definitely appears desirable as it would provide more on line capability, speed up the processing time and is not considered unduly expensive.	Response 1990: IITA agrees that once these steps have been completed it will then be appropriate to consider upgrading the system. Since the cost of such upgrading is unknown any upgrading will be dependent on budgetary considerations. Response 1994: Computer industry hardware and software advances have overtaken this recommendation. The changes envisioned by the Institute include a complete replacement of hardware from a centralized mainframe CPU to decentralized networked PC's or minicomputers. The software will also be entirely new in order to be compatible with the new system architecture. The software will not be a proprietary product, but a standard FIS package. Panel's Comments: VAX upgrade is being purchased.	0

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 32 - The Institute should refrain from making a large investment on any new mainframe for the FIS. All major new investments should be in establishing decentralized systems which are interactive and more user friendly.	Response 1994: The direction the Institute is now taking, as stated above, is in complete agreement with this recommendation. Panel's Comments: VAX Alpha is being purchased.	0
Recommendation 33 - Assuming the operating costs are acceptable, IITA proceed with the purchase of a telephone satellite dish and establish the controls necessary over the use of the facilities.	Response 1990: IITA is presently investigating the cost implications of using a telephone satellite communications system and will adopt such a system if expected operating costs are shown to be consistent with budget constraints. IITA is also investigating other possible ways of improving international communications using new network systems available in Nigeria such as "EXECNET". Response 1994: The recommendation was implemented in 1991 with the purchase of an INMARSAT facility allowing the Institute to communicate via satellite in three different modes: voice, email and fax. Use of the system is controlled by the executive office which records user time and affects charges to appropriate user budgets. Total operating costs of this system are included in FIS reports.	2
Recommendation 34 - Management place a high priority to the improvement of Materials Management in general. We support the actions taken to date to strengthen this function and believe further support will be required for some time.	Response 1990: Recruitment of an experienced Materials Manager in March 1989 was a first step in the process of making the needed improvements. Much needs to be done and is being accomplished on a phased basis. The overall aim is to improve further control over purchasing, standardizing materials and equipment supplies, reducing inventory levels and eliminating all unnecessary paper work. This is a major undertaking. Response 1994: As reported to the EMR panel in 1990, IITA had created a Materials Manager position in 1989. This position was judged to be Management Staff level PG 14 by the Establishment Committee mentioned in Chapter 6 above (Only three nationally recruited staff have pay grades higher than 14), thus attesting to the importance of that position in the Institute. In 1993, all PPS stores and PPS purchasing were placed under the responsibility of the Materials Manager. This was the last phase of placing all purchasing, outside small local purchases, and all IITA, Ibadan materials stores under the control of the Materials Manager. The Materials Manager has issued a purchasing policy manual. This department continues to refine purchasing procedures, establish approved supplier lists, set minimum/maximum stock levels, and standardize imported materials clearing procedures. This department also maintains close relations with IITA's two buying agents in the UK and the US. Panel's Comments: The addition of a professional materials manager has been a positive development, but system needs further improvement.	2-

Score: 0 - not implemented, 1 - partially implemented, 2 - fully implemented

Recommendations	IITA's Response and Panel's Comments	Score
Recommendation 35 - The publications arrangements be carefully reviewed by establishing a Publications Committee and perhaps by centralizing the publications budgets.	Response 1990: IITA agrees a mechanism must be established to determine priorities between scientific and other publications. This mechanism could be a Publications Committee which, after consideration of priorities, would make decisions based on editing and printing capacity, internal/external printing costs, time constraints, and budget controls. The suggestion that publication budgets be centralized is being examined by management. Response 1994: The publications programme was carefully reviewed shortly after the External Review of 1990, and again during the Internal Review of Information Services held during 23-25 April 1992. As a result, the publications programme has been streamlined and a Publications Committee established. The matter of centralizing all publications budgets was discussed extensively. It was concluded that a centralized budget might lead to avoidable bureaucracy in our circumstances; therefore, research divisions may budget for certain publications. Panel's Comments: The Committee has not met so far.	0
Recommendation 36 - IITA establish a Library Policy against which to assess the long-term space requirements of the Library and if necessary provide additional space by reexamining the use of existing buildings.	Response 1990: IITA accepts the need for a Library Policy. This policy will be developed by management for approval by the Board of Trustees. The need for additional library space must be determined from the policy and its impact on the quantity/scope of publications held. Response 1994: A new Library Policy was approved by the Board of Trustees at its April 1990 meeting. A small amount of additional space (30 square meters) was provided for the Library, but the overall space requirements have not been fully met due to budget constraints.	2

GLOSSARY OF ACRONYMS

ABU	Ahmadu Bello University
AC	Audit Committee
AFNETA	Alley Farming Network for Africa
ASB	Global Initiative on Alternatives to Slash and Burn
AGDC	Administration générale de la coopération au développement (Belgium)
BCP	Biological Control Programme
BoT	Board of Trustees
BSV	Banana streak virus
CGIAR	Consultative Group on International Agricultural Research
CCB	Cassava bacterial blight
CGM	Cassava green mite
CMV	Cassava mosaic virus
CID	Crop Improvement Division
CIDA	Canadian International Development Agency
CIMMYT	Centro Internacional de Mejoramiento de Maiz y Trigo
CIP	Centro Internacional de la Papa
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CNP	Cyogenic potential
COMBS	Collaborative Group on Maize-Based Systems Research
CORAF	Conférence des responsables de la recherche agronomique africains et français
CORTIS	Collaborative Group for Root and Tuber Improvement Systems Research
COSCA	Collaborative Study of Cassava in Africa
DG	Director General
DGIS	Directorate General for Development Cooperation (Netherlands)
EARRNET	East African Root Crops Research Network
EC	Executive Committee
EEC	European Economic Community
ESARC	East and Southern African Regional Centre
ESARRN	East and Southern Africa Root Crop Research Network
ESCaPP	Ecologically Sustainable Cassava and Plant Protection
GLIP	Grain Legume Improvement Programme
GTZ	Deutsche Gesellschaft für Technische Zusammenarbeit
HCN	Hydrocyanic acid
HFP	Humid Forest Programme
HM	Habitat Management Programme
HPRP	Host Plant Resistance Programme
IAR	Institute of Agricultural Research
ICD	International Cooperation Division
ICIPE	International Centre for Insect Physiology and Ecology
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDESSA	National Agricultural Research Institute for the Savannas
INIBAP	International Network for Improvement of Bananas and Plantain
INRA	Institut National de Recherche Agronomique
IPGRI	International Plant Genetic Resources Institute

IPM	Integrated pest management
IRDC	International Development Research Centre
IRRI	International Rice Research Institute
ISNAR	International Service for National Agricultural Research
ISRIC	International Soils Research and Information Centre
JICA	Japan International Cooperation Agency
MIP	Maize Improvement Programme
MSP	Moist Savanna Programme
NARES	National Agricultural Research and Extension Service
NARS	National Agricultural Research System(s)
NBCPs	National Biological Control Programmes
NC	Nominating Committee
NGO	Non-governmental organization
NRCRI	National Root Crops Research Institute
NRI	Natural Resources Institute, UK
ODA	Overseas Development Administration (UK)
ORSTOM	Institut Français de Recherche Scientifique pour le Développement en Coopération
PASCON	Pan-African Striga Control Network
PBIP	Plantain and Banana Improvement Programme
PC	Programme Committee
PEDUNE	Protection écologiquement durable du niébé
PEU	Postharvest Engineering Unit
PHMD	Plant Health Management Division
RENACO	West and Central Africa Cowpea Research Network
RAPD	Random amplified polymorphic DNA
RCMD	Resource and Crop Management Division
RFLP	Restriction fragment length polymorphism
RLS	Research Liaison Scientist
SAFGRAD	Semi-Arid Food Grains Research and Development
SARRNET	Southern Africa Roots Crops Research Network
SADC	Southern Africa Development Community
SGRI	Systemwide Genetic Resources Initiative
SGRP	Systemwide Genetic Resources Programme
SHU	Seed Health Unit
SPAAR	Special Programme for African Agricultural Research
SPALNA	Soil and Plant Analysis Laboratories Network for Africa
SPIPM	Systemwide Programme for Integrated Pest Management
SSA	Sub-Saharan Africa
SSY	Senior Staff Year
TAC	Technical Advisory Committee
TRIP	Root and Tuber Improvement Programme
TT&TU	Technology Transfer and Training Unit
UNEP	United Nations Environment Programme
WARDA	West Africa Rice Development Association
WECAMAN	West and Central Africa Maize Research Network

