

the consultative group on international agricultural research
technical advisory committee

report of
the tac quinquennial review
of the
international board for plant genetic resources
(IBPGR)

tac secretariat

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH

TECHNICAL ADVISORY COMMITTEE

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REPORT OF THE

TAC QUINQUENNIAL REVIEW OF THE

INTERNATIONAL BOARD FOR PLANT GENETIC RESOURCES (IBPGR)

TAC SECRETARIAT

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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THE EDINBURGH SCHOOL OF AGRICULTURE

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Rome.

13 May 1980

Dear Dr. Cummings,

I have pleasure in sending you herewith the report of the Quinquennial Review Panel of the International Board for Plant Genetic Resources.

As you know the TAC Secretariat had some difficulty in assembling the Panel and our deliberations were complicated by the complexity of the responsibilities of the Board. We were sorry to have lost the help of Dr. Blumenschein late in the proceedings, due to his illness. Dr. Åberg and I were most appreciative of the excellent way in which Dr. Zheni addressed himself, at very short notice, to the formidably complicated business before the Panel and of his valuable contributions to its deliberations. I had had, as you know, the good fortune to work with Dr. Åberg on the TAC mission to the Boulder Programme and express here my personal appreciation of his counsel. The whole Panel, and the Chairman especially, would also express very warm appreciation of the excellent services of Mr. Risopoulos of the TAC Secretariat; we owe him a great deal for his very competent help and guidance.

As you know, the IBPGR is a somewhat unusual component of the CG system. It has had to tackle a very wide mandate on a world-wide basis, with but little previous experience to guide it. It is, the Panel thought, greatly to its credit that it has done much of value in its first quinquennium, operating, of necessity in a practical, empirical sort of way. The Panel is in no doubt that TAC should reaffirm its confidence in the Board in its execution of a task that all agree to be of basic importance for the long term future of agriculture. At a more detailed level, as you will see, the Panel makes some suggestions as to ways in which it thinks that the Board might usefully revise its structure and methods of operation; it hopes that these proposals will commend themselves both to TAC and to the Board and, in particular, that the structural analysis and functional accounting that are described in the report will be useful. The Panel lays great stress on the value of the linkage between the IBPGR and FAO.

The frank and lively discussion with TAC during its 23rd meeting on the first draft of the Review report called attention to a few points which deserve a little elaboration here. The comments which follow may be regarded as a supplement or addendum to the report, clarifying some of the points raised by the TAC.

Dr. R.W. Cummings,
Chairman TAC.

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continued

First, there is the question of the degree of assimilation by the Board of the recommendations of the Boulder Panel. I believe - and explained in the TAC meeting - that this assimilation is, in effect, complete. The Boulder contract has been terminated, expenditure on computerized documentation has declined and the Board, in its current draft programme of work, has shifted its emphasis decisively to the development of descriptor systems and directories and the provision of *ad hoc* professional help to those in need. So far as one can judge, all this accords very well with both the spirit and letter of the review recommendations.

Second, the Panel's proposal concerning the appointment of a Strategy Advisory Committee generated the most discussion. It was pointed out that strategy could be regarded as a prime function of the Board itself so what need was there for such a committee? The point is taken but the Panel thought (and would adhere to the view) that: (a) the Board is beset by the manifold problems of resource allocation and decision-making which inevitably make the first call on the attention of any body, such as this, that has to run a complex and wide ranging operation; (b) scientifically the field is a diverse and changing one and it is hardly to be expected that the Board, impressive as is its range of technical expertise, could fully cover it; (c) such a committee would be advisory, it would have a questioning-provoking-stimulating role and it would in no way detract from the Board's ultimate authority. The Panel remains persuaded that such a Committee - which need not meet frequently - could be genuinely helpful to the Board.

The third point was this; TAC asked for clarification of the IBPGR proposals for extra Regional Officer posts. Drawing together what I said and Dr. Williams later amplified, the justification lies in the vital importance of influence and promotion as, in a sense, the central element in the Board's activities. A continued Board "presence" will be of increasing importance in initiating GRC activities and in sustaining momentum. There is already enough experience of one such officer to show that the right man in a receptive environment can be very valuable. As the work develops, Dr. Williams himself and his senior colleagues, already hard-pressed by much travel, will simply not be able to maintain the essential "presence". But the Panel, of course fully accept the point made in discussion: that a programme precedes a budget - any IBPGR proposals for new posts of this nature must first be argued on their merits in relation to the demands of the programme.

In addition to the points discussed above, I now wish to refer to the summary, presented by Dr. Williams of the views of his Chairman and members of the Executive Committee (but not of the Committee as a body, nor of the Board *per se*). First, I was pleased to note that the report was evidently regarded as being broadly, acceptable. Second, I note that doubts were expressed about the proposed strategy committee; but I think the Panel would wish to adhere to its views (amplified above). Third, the Panel would observe that Working Groups can be made to meet as often or as rarely as necessary and it would, I believe prefer to retain its recommendations despite the doubts about the change of title that had been expressed by some Committee members. Fourth, I was pleased to learn that there are no evident obstacles to the proposed change of title of the Executive Secretary. Fifth, it is good to learn that the "characterization"- "evaluation" distinction is acceptable and the Panel would adhere to the points made in para 4.3.4 that the former is basic to collection information, while the latter is a matter for the plant breeders: the two kinds of information

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Chairman TAC.

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continued

may occupy the same data base but they need not and often probably should not. We have added a sentence of elaboration on this point in our final report. Sixth, Dr. Williams said that his Executive Committee was satisfied that the Secretariat had adequate financial authority for the work in hand; with the information before it, the Panel, with respect, would disagree and would adhere to its recommendation. Seventh, the statement by Dr. Williams to the effect that the Board has already begun to develop a definite publications policy is satisfactory. Eighth, on research, it appeared that the Board had already appreciated the desirability of moving its selective support progressively toward the problems of perennial crops and so-called "recalcitrant seeds" and this, too, is clearly satisfactory.

I turn now to your own very useful notes on our report. Some of the main points are referred to above; others, of a more editorial nature, have been incorporated in the report as corrections. I would pick out for special reference your observation that the problems of quarantine and the need for an international legal framework for plant exchange might merit reference in the initial list of recommendations. I agree and feel sure that my Panel colleagues will also accept this useful suggestion. The problems are not yet clearly delimited because GRC work has yet to explore clonal crops on any considerable scale and because the idea of international legal commitment is yet only an idea. The Panel foresaw this as one of the several areas in which FAO support would be especially valuable (paras 4.5.4, 5.5.2).

May I conclude by reiterating my best thanks to colleagues on the Panel and to the TAC Secretariat, and my hope that the report will be useful to the Board, to TAC, and to CGIAR.

Yours sincerely,



N.W. Simmonds,
Chairman,
IBPGR Quinquennial Review Panel.

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REPORT OF THE
TAC QUINQUENNIAL REVIEW OF THE IBPGR

3 - 8 December 1979

1. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

1.1 General Conclusions

In general, the IBPGR has fulfilled its remit well, having: generated interest in and awareness of genetic resource conservation in many countries; furthered the cause at the technical level by means of meetings and publications; supported collecting and conservation activities in diverse crops, especially the staple cereals. It has done these things on a comparatively modest budget, building on foundations laid by FAO but without having detailed precedents to guide it in its operations; thus, it has essentially had to find its own way in the first quinquennium. The Board's role is catalytic and must remain so; it can promote, encourage, initiate and help but could not (with any conceivable funding) itself build and sustain the developing genetic resource conservation network. The IBPGR's functions are thus international in the widest possible sense; this being so, the Panel has identified the position of the Secretariat within FAO as a factor of great value, both in the past and for the future.

The IBPGR's achievements in the past quinquennium owe much to the efforts of Board members themselves, to a vigorous Executive Committee and, perhaps above all, to the devoted labours of the Secretariat.

With the benefit of historical hindsight, the Panel thinks it has identified a number of ways in which the Board's activities may be expedited in the coming years. These are set out in Section 5 of this report and summarized briefly below.

1.2 Summary of Recommendations

(1) The grand objective of the IBPGR should remain the development of a worldwide genetic resource conservation network devoted to the needs of world agriculture.

(2) CGIAR should reaffirm its interest in and continued support of the work of the Board.

(3) The IBPGR Secretariat should remain within FAO Headquarters and continue the close and fruitful collaboration that has obtained in recent years.

(4) The IBPGR should be encouraged to bring forward proposals for a modest enhancement of programme and consequently of expenditure during the next quinquennium.

(5) The Terms of Reference of the Board should be revised to take account of the experience of the past quinquennium and the contents of this report.

(6) Executive Committee meetings should be reduced in frequency and some of its too numerous responsibilities devolved, as indicated below.

(7) The Board should appoint a small Advisory Committee on Strategy/Programme to maintain a constant review of its programme; this Committee should include independent chairman and members.

(8) Other committees should be re-designated as working groups and invited to meet only when there is specific business to engage them.

(9) There should be no standing information-documentation committee (in contradiction of a recommendation of the Boulder report); necessary advice in this area of work should be had from consultants or appropriate working groups.

(10) The Board and its Strategy/Programme Committee (however entitled) should adopt, and be guided in their deliberations on resource-allocation by, the "functional accounting" proposed in this report.

(11) The post of Executive Secretary should be re-titled "Director"; the incumbent should be a full member of the Board and should have greater executive-financial responsibility.

(12) The Director should be encouraged to bring forward proposals for up to four new Field Officer posts and one Publications Officer when circumstances can be shown to justify the proposals.

(13) On planning and promotion aspects of its activities, the Board should: make a systematic effort to enhance awareness of and practical commitment to genetic resource conservation at government level; support appropriate professional meetings; develop a systematic publications policy; support a markedly enhanced training programme.

(14) In anticipation of foreseeable problems of exchange of plant materials, the Board should explore, in consultation with FAO, the idea of an international legal framework that would secure free access to collections and also the question of quarantine controls in relation to genetic resource conservation work.

(15) On research and action aspects of its activities, the Board should: continue its selective support of research but more towards the problems of perennial crops that are either clonal or have short-lived seeds; continue to support collecting activities on priority crops (and on minor ones when there is specific reason to do so) but be prepared to reduce somewhat its collecting effort in favour of conservation activities; enhance its support of conservation, emphasizing, as it does now, the provision and maintenance of equipment within building provided locally; reduce its commitment to information/documentation work (in line with the main findings of the Boulder report), emphasizing the development of descriptor lists along with the related idea of "characterization".

2. INTRODUCTION

2.1 Background

2.1.1 This report is addressed to the Technical Advisory Committee (TAC) of the Consultative Group on International Agricultural Research (CGIAR). The Panel notes that CGIAR, an international consortium of governments, banks and foundations, funds the International Agricultural Research Centres (IARCs) and associated institutions, under the technical advice from TAC. The above centres and institutions are subject to quinquennial review by independent panels which report to TAC and so to the CGIAR. Terms of reference are given below; briefly they are to assess the achievements of the first five years of the IBPGR and to make recommendations for future policy.

2.1.2 One area of work of the IBPGR has already been reviewed and will not be the subject of detailed report here. This is the documentation work (IS/GR programme) commissioned by the IBPGR at the University of Colorado at Boulder, Colorado, USA. The TAC Panel which reviewed this work (Prof. E. Åberg, Chairman, Dr. J. Warren, Dr. N.W. Simmonds) visited Boulder in April 1979 and their report (Appendix V) was substantially accepted by the Executive Committee of the IBPGR (Refs 9 and 10) but has yet to be discussed by the Board as a whole.

2.1.3 The Quinquennial Review Panel was finally composed of Prof. N.W. Simmonds (Chairman), Prof. E. Åberg and Dr. M.S. Zehni. The Panel went through several late changes of membership before it was finally constituted. Earlier, it had been hoped that it would be led by Dr. M.S. Swaminathan, who had to withdraw because of his important new functions with the Government of India. Later, Dr. A. Blumenschein unfortunately had to withdraw because of illness and his place was taken, as short notice, by Dr. Zehni. Mr. S.A. Risopoulos, Deputy Executive Secretary, TAC, acted as secretary to the Panel.

2.2 Terms of Reference

Terms of reference may, as noted above, be briefly paraphrased by saying that they are to assess the performance of the past five years and to make recommendations for such changes as may be desirable. There follow the terms of reference verbatim:

"On behalf of the Consultative Group, to assess the content, quality, impact and value of the overall programme of the Board and to examine whether the operations being funded are being carried out in line with declared policies and to acceptable standards of excellence.

It is hoped that the review will inter alia assist the Board itself in planning its programmes and ensuring the validity of its research priorities.

In pursuance of the main objective, defined above, the Mission is requested to give particular attention to the following aspects:

- (i) The mandate of the Board, its appropriateness and the interpretation thereof with respect to:*
 - (a) the immediate and long-term needs for improved food supply and human welfare in developing countries;*
 - (b) present and possible future areas of work.*

- (ii) The relevance, scope and objectives of the present programme of work and budget of the IBPGR and of its forward plans for the next five years in relation to:*
 - (a) its mandate and the criteria for the allocation of resources as defined by TAC;*
 - (b) the ongoing activities of other international institutes and organizations, and of relevant national institutes in co-operating countries and in others where the work of the Board has bearing;*
 - (c) the policy, strategy and procedures adopted by the Board in carrying out its mandate, and the mechanisms for their formulation;*
 - (d) the Board's rationale for its present allocation of resources, its present and future overall size, and the composition and balance of the programme in the fields of exploration, collection and conservation, training, documentation, information exchange and related cooperative activities.*

- (iii) The content and quality of the scientific and related work of the Board with particular reference to:
 - (a) the results of past exploration, collection and conservation;
 - (b) the current and planned work on collection and conservation;
 - (c) the documentation, information exchange and training programmes, their methodologies and the participation of genetic personnel therein;
 - (d) the adequacy of the support and other facilities;
 - (e) the management of the scientific and financial resources of the Board and the coordination of its activities.

- (iv) The impact and usefulness of the Board's activities in relation to:
 - (a) the present and potential impact of the exploration, collection and conservation work conducted by the Board;
 - (b) its information exchange and training programmes;
 - (c) cooperation with national genetic resources, plant breeding and development programmes;
 - (d) cooperation with other international institutes and organizations.

- (v) Constraints on the Board's activities which may be hindering the achievement of its objectives and the implementation of its programmes, and possible means of reducing or eliminating such constraints.

- (vi) Any specific questions which concerned members of the CGIAR, co-operating institutions, the Chairman or Executive Committee of the Board may request TAC to examine.

On the basis of its review, the Mission will report to the Chairman of TAC its findings and its views on the need for any changes in the basic objectives or orientation of the Board's programme elements, and on means of improving the efficiency of operations, and will make proposals for overcoming any constraints identified under item (iv).

While the Mission should feel free to make any observations or recommendations it wishes, it must be clearly understood that the Mission cannot commit the sponsoring organization, viz. the CGIAR/TAC."

To these terms of reference TAC has added the following specific questions:

- (i) What is the long-term future of the Information Science/Genetic Resources programme at Boulder, Colorado and the level of Board investment for its services in the light of:

- (a) *the likelihood or otherwise of continuing validity and use by the IARCs of the EXIR programme for genetic resources and taxonomic data;*
 - (b) *the rate of issue and acceptance of the programme;*
 - (c) *the cost to users of the service, once initiated with IBPGR funds;*
 - (d) *the need for the Board to maintain an Advisory Committee to IS/GR;*
 - (e) *the requirements for advising and consulting on the use of the system and of continuing research, respectively;*
 - (f) *the extent to which the programme may perform services for the storage and retrieval of genetic information as compared to its advisory services to other centres in establishing systems for storage and retrieval of genetic data.*
- (ii) A. *Are the priorities for collection and other activities, as accepted by the Board, in terms of countries/regions and crops still valid?*
- B. *What are, or should be, the responsibilities of the Board with respect to:*
- (a) *Forest genetic resources?*
 - (b) *Genetic resources of industrial crops for which international research and production provision exist e.g. cotton, jute, etc.?*
 - (c) *Commercial crops for which no such international bodies exist, e.g. oil palm and coconut (cf. Board's preliminary consultations), tea, rubber, cocoa, etc.?*
 - (d) *Neglected species of known or suspected economic potential, e.g. cereals, roots, pulses, etc. of limited current utility - many medicinals - fibres of restricted use, etc.?*
- (iii) (a) *How effective has the Board been in activating/catalyzing national programmes of collection, conservation and other activities rather than the regional centres and programmes originally foreseen in its early Terms of Reference?*
- (b) *If the Board is sponsoring, or contemplates sponsoring, regional genetic resources centres, what complementarities exist between these and others sponsored by national or bilateral initiative?*

- (c) *If part of the Board's role is to set standards through catalytic activity only, and then re-direct its funds elsewhere, what will be its remaining needs for continuing long-term financing?*
- (iv) *What is the Panel's view on the possible long-term role of the IARCs as genetic resources centres?*
- (v) *What should be the role of the Board (if any and bearing in mind the sovereign rights of cooperating countries) with respect to the plant quarantine/phytosanitary aspects of international germplasm transfer?*
- (vi) *The possible long-term needs of staffing for the Board both at Headquarters and in the field?*
- (vii) *Is the present structure, with a permanent Secretariat but no full-time Executive Director, the most satisfactory form of organization of this activity?*

2.3 Operation of Panel

The Secretariats of IBPGR and TAC provided the Panel with extensive documentation during the summer of 1979. Some of it referred to the Board per se and its workings (listed in Section 8 herein); the rest referred to local or regional activities in the field and is enumerated separately in the three regional reports (Appendices I-III). The three regional reports refer to: (i) Southwest Asia and the Mediterranean area (Prof. E. Åberg, Dr. K.S. Dodds and Mr. L.H.J. Ochtman); (ii) Latin America and North America (Dr. W.F. Kugler and Mr. P.J. Mahler); (iii) South and Southeast Asia (Prof. N.W. Simmonds and Mr. S.A. Risopoulos). It will be understood that the three regional reports present facts and opinions as found, so that views expressed there need not necessarily coincide with the collective findings of this Panel. These journeys were of great value, not only for the factual information obtained, but also for the 'feel' that they afforded of genetic resource conservation activities at the working level.

Besides the documentation mentioned above, the Panel also had before it the report of the Boulder Mission (Appendix V) and of a short visit by Prof. N.W. Simmonds to Birmingham University, U.K., to learn about the M.Sc. course in Conservation and Utilization of Plant Genetic Resources (Appendix IV).

The Panel met in FAO, Rome, on 3-8 December 1979, to prepare this paper. It had a valuable collective discussion with the Executive Committee of the IBPGR, namely: Mr. R.H. Demuth (Chairman of the Board), Dr. G. de Bakker

(Vice-Chairman), Dr. O. Brauer, Dr. A.B. Joshi, Prof. L. Kähre and Ir. W.F. Kugler. In preliminary discussions, the Panel had several talks with the Executive Secretary of the IBPGR (Dr. J.T. Williams) and a collective discussion with the staff of the IBPGR Secretariat.

The Panel had a most useful and instructive exchange of views with the Assistant Director-General of the Agriculture Department, FAO, Dr. D.F.R. Bommer, and met with Dr. O. Brauer and Mr. R. Pichel, Director and Deputy Director of the Plant Production and Protection Division of FAO, and with Mr. R.L. Willan, Senior Officer, Plantation Forest Tree and Gene Resources, Forestry Department, FAO. The Panel had the benefit of the guidance of the TAC Executive Secretary, Mr. P.J. Mahler, and Deputy Executive Secretary, Mr. S.A. Risopoulos.

On the last day the Panel met with the Chairman and Executive Secretary of the IBPGR. The Panel Chairman outlined the main conclusions that had been reached and a very useful discussion ensued.

3. THE FUNCTIONS OF THE IBPGR

3.1 Historical

The fact of genetic erosion and the consequent need for conservation was becoming apparent to a few perceptive workers from the late 1940s onwards. But it was not until the 1960s that FAO initiatives brought the matter to public consciousness and generated both understanding and a sense of urgency.

Many people contributed, none more so than Sir Otto Frankel, Prof. J.R. Harlan, Prof. J.G. Hawkes and Dr. J. Vallega, sometime Director of the Plant Production and Protection Division of FAO, working through meetings and publications largely sponsored by FAO. The first international meeting on plant exploration and introduction was held in Rome in July 1961. The FAO Panel of Experts on Plant Exploration and Introduction was officially established in 1965 pursuant to a decision of the Governing Bodies of FAO.

Two conferences on crop genetic resources were held in 1967 and 1973 at FAO Headquarters and led to a recommendation that a global network of crop genetic resources centres should be established.

In the sixties FAO published a series of books and reports on genetic resources (some with the assistance of the International Biological Programme), developed a regional project for genetic resources conservation in Southwest Asia with the assistance of UNDP and began to compile inventories

of the major collections. A post-graduate training course on Conservation and Utilization of Plant Genetic Resources was inaugurated at the University of Birmingham, U.K., and received its first students in 1969.

A key event of the first decade of international concern for plant genetic resources was the establishment by FAO of a Crop Ecology and Genetic Resources Unit in 1968.

A plan of action to collect, conserve and document genetic resources failed to receive support from UNDP, but FAO's concern for genetic resources preservation was reflected in the recommendations of the United Nations Conference on the Human Environment held in Stockholm in 1972. This Conference gave FAO a responsibility to assist in the establishment of an international resources programme and UNEP (the United Nations Environment Programme) a partial responsibility for plant resources and called for all countries to participate in it.

Under joint sponsorship of FAO, the World Bank and UNDP, CGIAR (with a provision for a Technical Advisory Committee) was formed in 1971 with responsibility for the nascent chain of IARCs. On an invitation from FAO to consider the possibility of establishing a network of genetic resource centres, TAC convened the Beltsville meeting of 1972 under the chairmanship of Sir Otto Frankel. The result was, ultimately, not the network of nine centres that the Working Party proposed but the foundation of the IBPGR as a new component of the CGIAR system. The IBPGR was founded in 1974 and its progress over the quinquennium to 1979 is charted in its annual reports (Refs 2-6).

From its first effective year of operation (1975) it spread the net of its activities fairly widely over the general field of promoting interest and awareness by way of meetings, publications and training: five Crop Advisory Committees and two Working Groups were established, systems of descriptors initiated, training courses and attendance at the M.Sc. course on Conservation and Utilization of Plant Genetic Resources promoted, technical reports and newsletters published; the Board also started what was to become a major commitment to information/documentation systems, drawing in Dr. D. Rogers (then with FAO), and his colleagues at Boulder, Colorado, for the purpose. At the more practical level, since the immediate establishment of a network of centres was plainly infeasible (and would have been premature anyway), the IBPGR concentrated on supporting collecting activities on priority crops, on the encouragement of cooperative regional activities and, where suitable, on the development of regional storage systems (or national ones serving in a regional capacity).

Administratively, the Board was serviced by a small Secretariat (supported in and by FAO) under Mr. R. Pichel (Chief, Crop Ecology and Genetic Resources Unit, Plant Production and Protection Division) and,

later, with a Deputy Executive Secretary, Dr. J.T. Williams, in charge of day to day affairs. Subsequently (1978) Dr. Williams became Executive Secretary, with somewhat enhanced staff and responsibilities but the office remains physically in, and substantially supported by, FAO Headquarters.

Over the years, expenditure has grown from 53 k\$ (1974) to about 2.8 M\$ (prov., 1979), as shown by the summary breakdown in Table 1. Aspects of this table will be examined later and the Panel merely note here that it gives a useful general picture of the rather wide span of activities adopted from the outset, of the rapid growth of the operation as a whole and an indication of priorities as measured by expenditure.

3.2 Terms of Reference

The Board's Terms of Reference are given below verbatim and the Panel notes that they can be briefly paraphrased as follows: to do anything, within the limits of available resources, to promote, in a wisely balanced fashion, the conservation of genetic resources of useful plants throughout the world, with special reference to important economic plants.

The following is quoted from ref. (8):

"The Board will have responsibility, under the authority of the Consultative Group on International Agricultural Research, for recommending policies and developing programmes in close collaboration with and with the help and advice of FAO to meet the following objectives:

1. *To identify general and specific needs for exploration, collection, conservation and evaluation of plant genetic resources with particular reference to species of major economic importance and their wild and cultivated relatives, to determine priorities among them, and to ensure to the fullest possible extent that the materials conserved are made available for plant breeding and other scientific activities as required;*
2. *To establish standards, methods and procedures for exploration and evaluation and to determine minimum standards for conservation and regeneration of stocks of both seeds and vegetative material;*
3. *To arrange for replicated storage of seed and vegetative stocks;*
4. *To promote technical meetings;*
5. *To promote training activities at all levels;*
6. *To develop a world-wide network of institutions, organizations and programmes able and willing to contribute to the above objectives;*
7. *To promote the articulation of ongoing programmes so as to avoid unnecessary duplication and to fill in gaps;*

8. *To strengthen the programmes of existing institutions and to encourage the establishment of new organizations, institutions and programmes to the above ends, where necessary, particularly in the areas of major genetic diversity;*
9. *To promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections;*
10. *To make appropriate recommendations with respect to computerized information storage and retrieval systems, taking into account their suitability for an effective international genetic resources network, and their compatibility with existing systems already in operation at some regional and national centres;*
11. *To estimate the annual financial requirements of those parts of genetic resources programmes not already adequately covered.*

The Board's activities will be confined exclusively to achievements of the foregoing objectives."

3.3 Classification of Functions

The Panel understood that TAC had had some difficulty in following the logical sequence and progress of IBPGR activities, when using the budget breakdown as reflected in Table 1, whereby regional activities (item 2) would in fact include conservation, meetings and training activities, which are also recorded under items 5, 6 and 7. A more logical classification was indeed necessary for the Panel's purpose but none was available. Accordingly, one is presented here (Figures 1 and 2 and Table 2) and is made on the basis of the subsequent analysis (Chapter 4). It will also (para 5.2) form the basis for suggestions as to how the Board might help both itself and TAC by enhancing the clarity of formulation of priorities and of annual reporting.

The Panel believes that the content of Figure 1 and Table 2 will be self-explanatory but recognizes: (a) that the arrowed relationship in the Figures could readily (but not usefully) have been made more complicated; and (b) that the nine functions listed in Table 2, though reasonably discrete, cannot be absolutely so; thus there will sometimes be some doubt as to whether a given Secretariat activity bears on the work of the Board itself or on an outside function or, again, there may be a question as to whether a given publication is designed to inform and influence or to train; but the Panel thinks that such uncertainties will prove to be few and unimportant.

Table 1. Historical Budget Analysis ^{1/}

Item	Actual, k\$					Ests. k\$		Totals ^{2/}	
	74	75	76	77	78	79	80	74/78	79/80
1. Information	-	193	413	412	452	475	336	1470 (33)	811 (16)
2. Regional	-	-	104	185	642	930	1095	931 (21)	2025 (39)
3. Other activities	-	82	79	220	190	200	220	571 (13)	420 (8)
4. Forestry	-	-	-	-	-	56	(80) ^{3/}	0 (0)	(136) ^{3/} (3)
5. Conservation	-	-	32	130	73	200	265	235 (5)	465 (9)
6. Meetings	-	45	39	64	60	80	100	208 (5)	180 (4)
7. Training	-	22	54	68	61	95	110	205 (5)	205 (4)
8. Administration	53	143	157	166	237	372	377	756 (17)	749 (14)
9. Miscellaneous	-	4	39	12	-	115 (249) ^{4/}	100 (521) ^{4/}	55 (1)	215 (4)
TOTALS	53	489	917	1257	1715	2772 (2523) ^{5/}	3124 (2683) ^{5/}	4431 -	- 5206 ^{5/}

Notes: 1/ From Review and Mid-Term Report, 1979 (Refs. (8) - (11)).

2/ With rounded percentages in brackets.

3/ Guesstimates.

4/ Inflation provision, unallocated.

5/ Totals, less inflation provision.

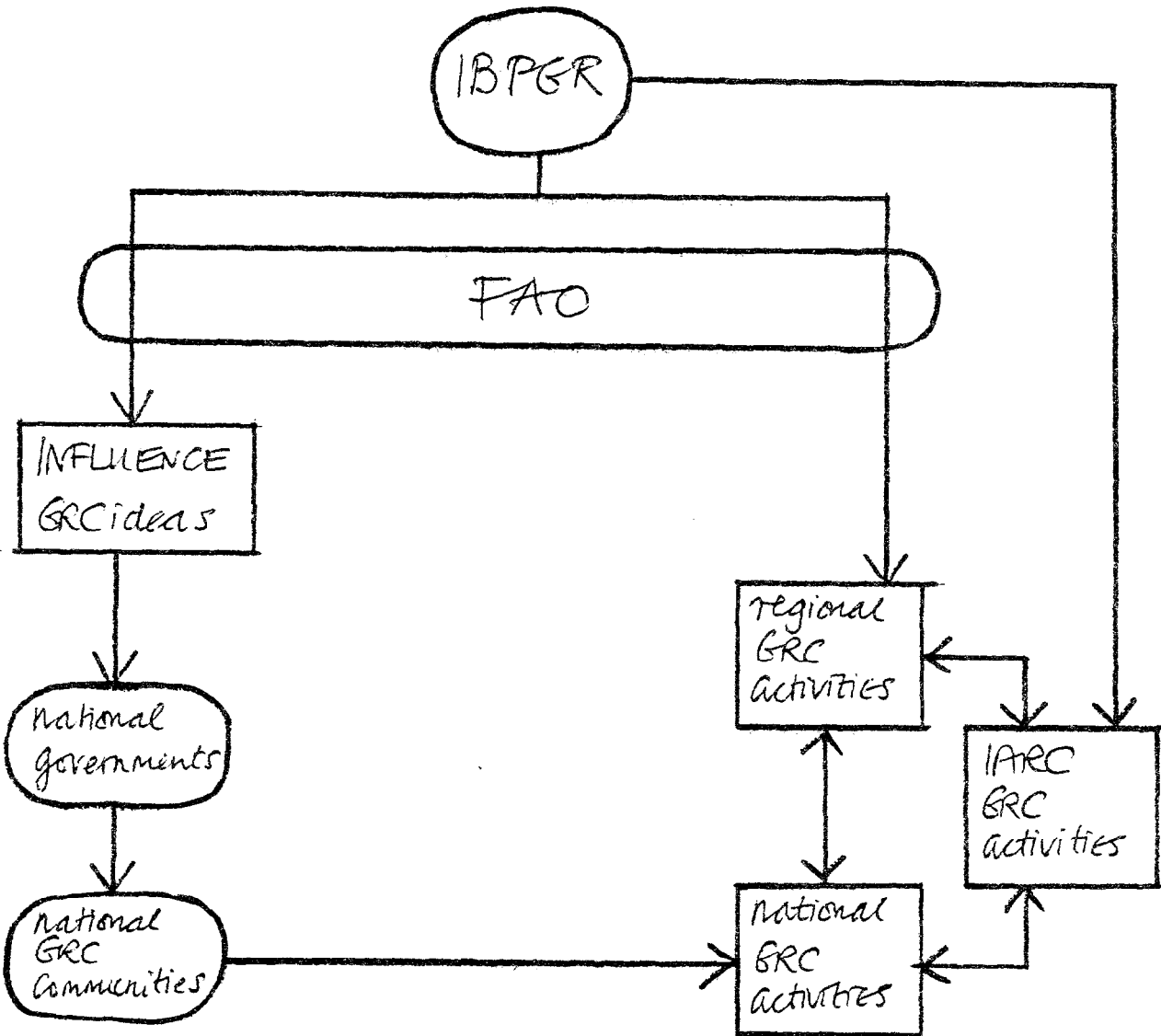


FIGURE 1. Functions of the IBPGR, (1) INFLUENCE (GRC = genetic resource conservation)

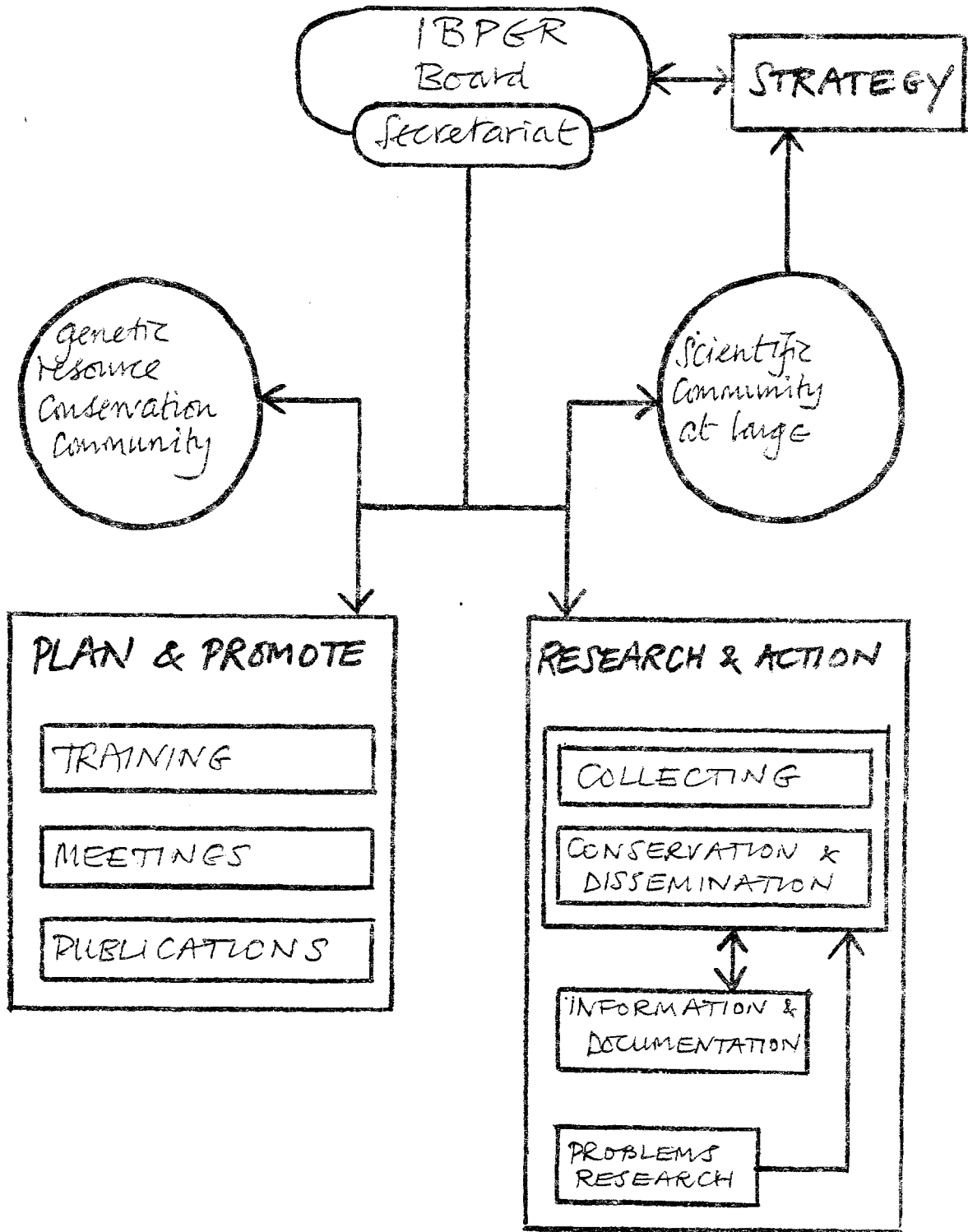


FIGURE 2. Functions of the IBPGR (2).

Table 2. Classification of IBPGR Functions

(Refer to Figures 1 and 2)

<u>Heading</u>	<u>Item</u>	<u>Observations</u>
Plan and promote	1. Influence	Promote GRC concepts at government level, invoke FAO guidance and help in doing so; seek to influence national policies; promote regional and IARC activities.
	2. Meetings	Scientific gatherings; committees and working groups, whether <u>ad hoc</u> or recurrent; essentially technical in character (e.g., descriptor lists).
	3. Publications	Designed to inform (technical reports, directories, descriptor lists, etc.); admin. reporting excluded.
	4. Training	Support of long courses (e.g. M.Sc.), short <u>ad hoc</u> courses, individual study, wholly or partly funded by Board.
Research and action	5. Research	Grants to support research on technical GRC problems (e.g. storage mechanics, seed physiology, clonal meristems, etc.).
	6. Collecting	Organization and support of and direct participation in collecting expeditions.
	7. Conservation & dissemination	Provision of grants for facilities or staff for maintenance of collections and distribution of materials.
	8. Information & documentation	<u>Ad hoc</u> support of research on and implementation of appropriate DSR systems in relation to characterization of collections.
Strategy & support	9. Administration	Board and Committee meetings not directly assignable to the functions above; strategy and programme formulation; routine reporting; Secretariat "housekeeping".

Abbreviations: GRC = Genetic Resource Conservation
DSR = Data Storage and Retrieval

4. SURVEY OF PAST PERFORMANCE

4.1 Introduction

4.1.1 General

In this section the Panel sets out its thoughts on performance to date, using the classification of functions given above (Table 2) as a logical review framework. It is realized that because of the mainly catalytic role of the Board, useful quantitative measures of performance are not always evident in this chapter. It follows that, in reviewing the past performance of the Board, measurable results will have to be assessed as well as less tangible effects. However, the Panel had had extensive regional travel which had put it in contact with national and regional research institutions, international research centres, high level government officials and scientists. It had also had the benefit of extensive discussions with the IBPGR Executive Committee and Secretariat, with FAO Directors and Technical Officers. This made the dual assessment referred to above, if not easy, at least possible.

4.1.2 Preliminary observations

In five years the IBPGR has made good progress on the foundations laid by FAO. It has generated awareness at all levels from governments to workers in the field; has promoted training, collecting, conservation and research; and it has helped to spread the idea that genetic conservation, if it is to be effective, must be truly international in character but built on secure national foundations. In general, it has operated in the only possible way, by what might be called enlightened empiricism, defining priorities to be sure, but putting its money where results could be expected. All this is a substantial achievement which deserves praise. The Panel assumes that the one substantially misplaced effort in relation to documentation work has now been corrected and devotes this chapter to a more detailed review of achievements, reserving recommendations for Chapter 5. As a broad indication of the disposition of resources over crops, areas and activities Table 3 will be found helpful. It refers to 1978 but it may be taken as indicative of the historical patterns of resource allocation.

4.2 Plan and Promote

4.2.1 Influence

The Panel has come to view influence as a vital function, indeed the most important single function of the Board, because it is only by deep commitment of the institutions concerned that enduring programmes can be developed. The importance of this activity cannot be over-emphasized. The

Board has not the resources to do more than initiate and catalyse. Furthermore, some constraints to the development of collections and the free exchange of materials can only be mitigated at government level: thus, some poor countries with potentially valuable genetic resources (e.g. in Africa and Latin America) feel increasingly unhappy about permitting the export of such resources without a visible quid pro quo; and the emerging problems of international quarantine (especially for clonal materials) have yet to be fully appreciated. Influence, at all levels, but especially at that of government, is therefore, vital.

It would seem that the Board has had some difficulty in finding the proper balance of its activities in this respect. The Beltsville proposals, because they envisaged the immediate establishment of regional centres prior to national interest and commitment were unrealistic and recognized to be so by TAC and IBPGR. So far, the Board has largely approached the matter at the technical level of influencing knowledgeable scientists and civil servants by way of meetings and publications. This has worked very well in Southeast Asia where governments are aware and there is excellent regional commitment; but it has had less success elsewhere (e.g. in Latin America) and some regions are yet essentially untouched (e.g. tropical Africa).

Thus the Board has undoubtedly had some success in this area but the Panel thinks that the time is ripe for a more systematic approach. It was greatly encouraged in this belief by the strong support given to the idea of genetic conservation by weighty speakers and national governments at the 1979 FAO (General) Conference.

4.2.2 Meetings

The great majority of the meetings organized by the IBPGR over the years have been of a technical-professional nature and they have undoubtedly done much good in four respects, namely: (1) in promoting awareness of the needs and problems of genetic conservation (though sometimes the preaching must have been to the already converted); (2) in disseminating technical information that was not otherwise readily available; (3) in provoking useful action, such as collecting, storing, assembling descriptor lists etc.; and (4) in making fruitful personal contacts between workers who might otherwise have had little chance to meet. That the genetic resource community of the world really is becoming a community owes not a little to these meetings.

A classification of meetings may be helpful. They are of several kinds: (1) management meetings, with the Board itself meeting annually and its Executive Committee meeting at least three times a year; (2) recurrent meetings of established Advisory Committees devoted to specific crops: there are five of these which meet, on an average, every two years; collectively

there have been eleven meetings of this kind; (3) ad hoc working groups designed to assemble advice on crops not covered by the previous Committees; there have been 15 meetings of this kind; (4) ad hoc working groups devoted to specific tasks such as initiating descriptor lists; 10 such working groups met during the last three years; (5) regional meetings, which can be subdivided into meetings of scientists devoted to particular crops, preparatory workshops and full regional committee meetings; twelve such meetings were held; and (6) there were three sessions of the Advisory Committee on Information (shortly the Programme Advisory Committee, PAC) which reviewed the Board's commitment to the Boulder programme until 1978.

Collectively, these meetings have surely been very valuable, both as agents of awareness, planning, information-transmission, and collaboration among genetic conservation workers and as sources of guidance for the Board. There is no doubt that they must continue. The Panel noted, however, that all Committees tend to be self-sustaining and that these, being widely international, are expensive. Meetings should, therefore, it thinks, be held whenever possible, on the basis of perceived need rather than on routine time schedules and recommends accordingly.

4.2.3 Publications

The IBPGR has produced and distributed widely a number of publications (listed in ref. 8) which, like the meetings, are of various nature and address themselves, by and large, to professional workers in the genetic resources field. They are all of a more or less technical nature. They can be classified as follows: annual reports of which four have been produced since the initial report of 1974; descriptor lists, of which seven have been produced; and technical reports which total six; and substantial numbers of mimeographed technical reports for more restricted audiences. In addition, four technical reports have been published in collaboration with other institutions. And the IS/GR programme workers at Boulder were commissioned to produce several brochures on genetic data retrieval. Since 1978, the Secretariat has been producing, in collaboration with FAO, a quarterly Newsletter conveying current information about the GRC field as a whole, including the work of the Board; it is evidently widely appreciated.

The Panel has the impression that the Board has proceeded so far on an ad hoc basis, publishing when there was an evident need to do so, rather than on a systematic programme. The Panel thinks that the time is now ripe for a more definite attack and recommends accordingly. Publications policy is significantly linked with the idea of influence, besides having a more obvious bearing on scientific information (e.g. descriptor lists and directories) and training. So far, documentation aimed at influencing policy makers and raising public awareness has been deficient. The Panel notes the interesting example set by the Indonesian National Biological

Institute (see Appendix III) which has produced attractive public relations and educational materials.

4.2.4 Training

Training has been a significant though not large item of expenditure from 1975 onwards (Table 1). Its importance as an instrument of awareness as well as of technical competence is widely understood in the genetic resource community and the Board's activities in this respect seem to be universally appreciated. The training programme of the IBPGR has had two main aspects: initiation and/or support of short technical training courses with strong emphasis on field activities and support of the M.Sc. course (one year) at Birmingham University, U.K. Among the former, the ones initiated at Bogor, Indonesia, in 1975 by FAO/UNEP/UNESCO are the most prominent (and very successful) examples. Three subsequent ones were held (1977-79), attended by 50 trainees from Southeast Asia. Similarly, a regional training course run at New Delhi in 1979 by the Indian NBPGR in collaboration with the IBPGR (attended by 13 trainees) was evidently also much appreciated (Appendix III). Other such courses supported by the Board are listed in ref. 8.

Courses on GRC information systems have also been encouraged. Thus IBPGR gave support to some of the 41 participants attending short courses at the University of Colorado, Boulder, in 1977 and 1978. A course on Genetic Resources Documentation was held at Los Baños, Philippine Islands, in 1979, with 16 trainees from the Southeast Asian region participating.

Two training courses on seed technology for genebanks assembled 19 trainees at Edinburgh University in 1978 and 1979.

The Birmingham M.Sc. course in genetic conservation which the Board has supported for several years requires separate consideration (Appendix IV). Since 1969 it has trained 133 students, a majority from less developed countries, including seven fellowships supported by IBPGR. The course is unique and no other university offers similar training. All those whom the Panel met who had attended believed they had derived substantial benefit from doing so. Several other commentators thought the course too academic but the Panel notes that there is now (as from 1979) a seed technology component run in collaboration with the School of Agriculture, Edinburgh and that, since 1975, the IBPGR has supported a lecturer in plant breeding. Professor Hawkes will retire in 1982 but the course (very probably need not end then, even if his successor is not so deeply committed to the programme. The Panel noted that the course is unique and generally highly regarded and believes that it offers a valuable element in IBPGR training. So it recommends accordingly.

One practical point about short courses is worth making. They are expensive and it will usually be cheaper to transport a few visiting teachers a long way than a lot of students. The Secretariat, the Panel understands, is well aware of this point but it seems worth making nevertheless.

More generally, the Panel felt that there was a gap between the short training courses conducted in the regions on the one hand and an M.Sc. course in a developed country on the other. Even in those developing countries which have agricultural faculties or universities with good plant breeding courses, matters related to GRC work are frequently not, or at best sketchily, treated. The Panel thinks that, in the longer run, a wise course of action would be to strengthen this middle ground and recommends accordingly; this idea is of course once more linked to the ideas of influence and awareness.

4.3 Research and Action

4.3.1 Research

Research does not appear explicitly in the Board's Terms of Reference, (Section 3.2) but has, the Panel thinks, unavoidably and properly, figured in the programme. This is clear in the functional accounts presented in Table 3, though not in the current accounting system (Table 1). A research element was also present in the IS/GR work at Boulder; it might be put at about 10 percent of the cost of that programme.

In practice, useful investigations on seed longevity have been supported by the Board at Reading University from 1977 to 1979 and will be continued in 1980. Valuable results on storage techniques appropriate to some of the more tractable cereals and legumes have been achieved and are now being made the basis for the design of storage facilities. These are good achievements and there is no doubt that the Board must continue to support work of this general nature. It would be idle to suppose that all the problems of storing the "easy" seeds have been solved but the Panel thinks that the work should nevertheless gradually move away from them towards the forthcoming problems of genetic conservation of perennials: the use of meristems (or larger sterile shoot tips), the management of tree crops with short-lived (so-called "recalcitrant") seeds, the problems of quarantine that will have to be overcome if effective collections are to be assembled and used. There is growing general awareness of these problems and the Secretariat is certainly conscious of them.

The Panel thinks that research must have a continued place in the Board's programme and that it should be an explicit one; so it recommends accordingly. It also notes that the research element so far has been carried out in developed countries but believes that some of the problems of the future will only be effectively tackled in developing countries.

4.3.2 Collecting

A substantial part of the Board's finances are employed in collecting (Table 2). Sixty-eight missions have been supported in various regions; some of them (particularly in Africa) have been implemented through scientific institutions from outside the region concerned or through IARCs; mostly, however, grants have gone to local institutions. The IBPGR Secretariat has itself organized or helped to organize missions and has coordinated others in order to ensure harmony of purpose at national level.

A point which is emerging clearly and which Panel members have noted on several occasions during their travels, is the growing awareness in developing countries that genetic resources are a kind of wealth, coupled with an understandable unwillingness that they should be dispersed to other places without guarantee of return. This is becoming a somewhat delicate issue of which the Board is well aware and which the Secretariat treats with sensitivity. Once again, the importance of influence and awareness presents itself. Effective collecting cannot be done without local goodwill. In this connection the great value of FAO's assistance, both influential and practical, can hardly be over-emphasized; collecting missions supported by the IBPGR have benefited very greatly from it and, indeed, many would probably have been impossible without it.

As regards the Board's policy on collecting, the Panel noted that the programme has followed established priorities by crops and regions and has responded also to emergencies. This must remain the general pattern but the Panel believes that there is scope for some rebalancing of effort as between collection and conservation (Section 4.3.3) and perhaps also for enhanced attention to minor crops of local importance. It recommends accordingly.

4.3.3 Conservation and dissemination

Grants to build or improve storage facilities have gone to 11 different institutions, mostly in Latin America (including CIAT), some in Europe and Asia, and one in Africa (IITA). In all, about 15 percent of the total cost of collection and conservation has gone to this purpose. The Board's policy has been to support equipment rather than building and this, the Panel thinks, is a reasonable approach. Most projects seem to have been reasonably successful but several have run into technical difficulties of installation and maintenance (e.g. Appendix I). One can only note the need for careful initial choice and subsequent monitoring and help where necessary.

The Panel has the impression that collection and conservation have been somewhat unbalanced, the former tending to outrun the capacity to store the products efficiently. The impression is clear, though it is hard to give quantitative substance to the idea.

The Panel has noted the concern that a number of developing countries have as to the eventual place of storage of base collections (cf. Section 4.3.2). This has been particularly evident in Southwest Asia and Latin America and is a point of quite general, and probably growing, significance. Countries providing genetic resources need to be assured that they will have continued access to them in the indefinite future. The need for some secure legal framework to guarantee such access is widely, and increasingly strongly, felt. Developing awareness of the reciprocal aspects of genetic resources on a worldwide scale will no doubt mitigate the problem in time but the need for a secure international framework remains. The Panel recommends accordingly.

4.3.4 Information and documentation

By this we mean information about the entries in a collection, gathered, stored and distributed (Table 2). This is the only area in which the Panel thinks that IBPGR has gone seriously wrong in its priorities and decisions. It needs no deep discussion here because (see Section 2.1.2) the matter has been substantially assimilated into the thinking of the Executive Committee.

In essence, the Panel thinks that information/documentation is indeed essential for the effective management and utilization of a collection but that computerization and the development and use of formal DSR ^{1/} systems are secondary. The first step is surely the development of agreed descriptor systems. Only when a collection becomes substantial (thousands rather than hundreds) and the descriptor system is known to be workable, does a computer become essential. When it does, then practical ad hoc adaptation of a suitable DSR system to the local hardware (with expert consultancy if necessary) should be the rule. The TAC Review Panel was quite clear that there was no good argument for universal computing systems and the practical successes of institutes such as IRRI and ICRISAT support this view.

The achievements of the IBPGR in this area of work include the local implementation of EXIR (e.g. at Bari, Italy) and useful advisory work by the Boulder group to several institutes in Latin America (see Appendix II). Also some progress has been made with the development of descriptor lists though perhaps not as much as might have been hoped; eleven crops can be regarded as having been adequately treated and five more are in preparation. The Panel regards this (as did the Boulder Panel) as a matter of basic importance and recommends accordingly below.

^{1/} DSR = Data Storage and Retrieval.

It may be helpful here to reiterate a point made in the Boulder report (para 16-18). The word "evaluation" often causes some difficulty because it can be variously used to refer to the totality of information about an accession to a collection or only to its assessment as to utility for plant breeding or agriculture. The Panel prefers the latter usage and would refer to the basic botanical description and accession data as "characterization". In these terms, descriptors characterize rather than evaluate. Thus a collection must be characterized and the data made accessible if it is to fulfil the needs of users; but evaluation is a job for the breeders and evaluation data are not an essential component of a collection's data base. The Panel is convinced (and have found a large measure of agreement with the view) that this is a useful distinction. One might summarize it by saying that "characterization" includes both "passport" and taxonomic (minimal descriptor) information which is essentially stable and finite; by contrast, "evaluation" relates to performance data which are essentially variable, subject to interaction and are open-ended (potentially infinite).

One final point: the purpose of characterization is to identify accessions and give information on basic botanical characters to users. Over-elaborate descriptor lists are self-defeating; they should surely be as short as possible for practical purposes (i.e. "minimal" lists). But decision as to what is minimal can only be taken on a crop by crop basis.

4.4 Strategy and Support

4.4.1 The Board

The Board is composed of a Chairman and 13 members of whom at least four are from developing countries. UNEP and FAO each appoint one ex-officio, non-voting member to the Board; the Executive Secretary attends meetings but is not a member. The Board meets once a year. The Executive Committee meets three or four times a year or more, if need be. The Executive Committee comprises the Chairman and Vice-Chairman of the Board and three other elected Board members, with the participation of the FAO-designated member. At least two of the five members of the Executive Committee are from developing countries. Tenure of office of all Board members is three years, renewable once. Members of the Executive Committee are appointed on the Chairman's nomination.

In the development of its strategy, planning and decision-making procedures the Board, having no precedents to follow, had to find its own way. Essentially, it came to rely upon a strong Executive Committee which met frequently and generated most of the policy of the Board, particularly as to definition of priorities between crops and regions and as to the weight accorded to information/documentation studies. In these activities it was aided by several (latterly five) Crop Advisory Committees, by PAC (the information committee) and by ad hoc working groups. It also has the advice of such Regional Committees as exist (one at present). In discussion with the Executive Committee, the Panel learned that, in future, it was

intended that the Secretariat (which has only recently attained fully executive status) should prepare an annual forward plan and that the Executive Committee itself should increase in number from five to seven. The decision-making process has been both passive (receiving and screening requests according to established priorities) and active (by contracting-out chosen activities). In all this the Executive Committee has played a pivotal role, ranging from strategy formulation to managerial decision making.

The IBPGR has thus relied heavily upon a vigorous Executive Committee carrying diverse tasks. The Panel thinks that these tasks have become too diverse to be carried out by a single body, however vigorous. It thinks, therefore, that the time is ripe for some redistribution of responsibilities and recommends accordingly.

In considering the Board's Terms of Reference (Section 3.2) the Panel thought that, though they had served to initiate the work of the quinquennium, they had been to some extent overtaken by events and stood in need of revision in the light of experience. The Executive Committee thought that the Terms of Reference were still broadly satisfactory but perhaps needed some "sharpening". The Panel would go further than this, noting that influence and awareness are not identified, that research does not appear and that the information function is partly prejudged by reference to computing. It recommends accordingly.

4.4.2 The Secretariat

The Secretariat has grown over the years, an important move in this connection having been the assimilation of the Genetic Resources Unit of the Plant Production and Protection Division of FAO with the IBPGR Secretariat. From an initially narrow professional base, it has (as from January 1980) a staff of six professionals, three administrative assistants, four secretaries and one clerk. This staff is complemented by consultants (including a semi-permanent senior consultant for Southwest Asian affairs), and by a regional officer for Southeast Asia. The financing of the above posts is divided about equally between FAO and IBPGR. The Secretariat has an increasing workload: in 1979 it organized to a greater or lesser degree 40 meetings, passed 64 contracts and organized 12 field collecting missions; it continued to fulfil its vital role in the information, publication and training sectors; and it assembled material for administrative and planning decisions by the Board. As noted in Section 4.4.1, it is also asked to prepare a forward plan each year for the Executive Committee and the Board.

The position of the Secretariat within FAO Headquarters is a historical anomaly, but a happy one. Some early difficulties notwithstanding (and the Panel is confident that these have been fully resolved), great advantages

accrue to IBPGR from that position (Section 4.5.4). By comparison with the advantages, drawbacks inherent in having to follow FAO administrative procedures seemed, to the Panel, to be trivial, especially as FAO officers clearly made efforts to smooth out difficulties. Furthermore, some staffing problems could probably be mitigated by the Board itself by recourse to Trust Fund and fixed-term appointments.

The Panel agrees with the Executive Secretary's view that the staff as constituted is adequate for headquarters functions but that the IBPGR is deficient in permanent officers in the field (Regional Officers). It recommends accordingly.

The Panel notes that the Executive Secretary attends the Board but is not a member of it; also, that he has limited managerial authority, being required to refer comparatively minor items of expenditure to the Executive Committee or its Officers. It also notes that, though the IBPGR is not an IARC, there is an analogy between them which would, in turn, suggest an analogy between the Director of a Centre, responsible for the work of his institute, and the Executive Secretary, responsible for the work of the Board. These considerations, plus the recently increased staff of the Secretariat and the world-wide responsibilities of the Board, have led the Panel to the view that some modification of structure is desirable and it recommends accordingly.

4.5 General Observations

4.5.1 Introduction

The analysis presented so far has been based upon the Panel's structural analysis of the work of the IBPGR. The larger themes which have engaged the Board's attention, however, cut across the finer structure; the more important of them are, therefore, reviewed in this section.

4.5.2 The Genetic Resource Conservation Network

The Beltsville proposal, that a GRC network should be constructed de novo was clearly infeasible, would have been very expensive and was simply never adopted. Instead, the Board was commissioned to proceed towards the same end, but more slowly and by essentially catalytic means. This it has done and the grand objective remains the development of a functional international network.

There are three main elements in the programme: the national, the regional and the IARC (see Figure 1). Some, but unequal, progress has been made with all. National activities are developing well in some places (India, Southeast Asia generally, Brazil, Mexico for example) but yet little

or not at all elsewhere. Regional activities are even less developed, good starts having been made in Southeast Asia and the Mediterranean but matched by near total failure elsewhere. Regional centres, earlier considered as the lynch-pins of the system, seem to be running against a current of growing national interest: hence this Panel's insistence on the importance of awareness and commitment at the national level as the basic step. Increasingly, regional activities seem to be taking the form of cooperation and coordinated action; this is excellent but it implies that centres with regional responsibilities will generally be national bodies committed to regional activity. As to the IARCs, the situation is that the IBPGR has had generally good working relations with most but that their commitment to GRC work is very uneven. The IARCs are independent bodies, each having generally a strong interest in assembling the germplasm it needs for its own work but with no necessary commitment to GRC activity beyond those limits. Thus, at one extreme, CIMMYT maintains substantial working collections of cereals for its own use while, at the other, IRRRI and CIP aim at nearly complete coverage of their crops (strictly, the relevant sectors of them). In this context all the IBPGR can do is what it has done, attempt to encourage wider interest and commitment in GRC work in the various IARCs.

Thus, some progress has been made in developing the network but there is still a long way to go. The basic step remains the encouragement of interest and commitment at national and IARC level; regional activities are consequent on the above. The need for some international legal framework to secure free access by all GRC workers to all collections is becoming apparent; it is referred to elsewhere in this report and is recalled here because it will become, the Panel believes, an essential condition for effective development of the network. The same consideration applies, of course, to the choice of places of base storage. Finally, quarantine problems (already evident) are bound to become prominent in the operation of the network as time goes on, both on entry to and exit from the collections. Present quarantine arrangements are a maze of national regulations and the need for some international agreement to smooth the passage of GRC material can only increase.

4.5.3 Priorities by crops and regions

The Terms of Reference of the Board refer to crops of "major economic importance". The Board, interpreted this, inevitably and quite properly in the view of the Panel, to give greatest weight in the first quinquennium to the major cereals. Substantial progress having been made with these, the Board is now widening its scope and this, again, seems to the Panel to be appropriate. The Panel is not competent to comment in detail on the specific choices made by the Board; it can only note that they appear to be broadly reasonable and that actual, detailed decision can only be based on informed technical appraisal by experts assimilated into the Board's planning mechanism.

Main priorities having been established, the Board has been, and must continue to be, free to put significant efforts into crops, which may be minor on the world scale but can be of great local importance, on an ad hoc opportunistic basis: to meet unforeseen emergencies, to respond to local interests (especially when response would help the GRC cause as a whole), to widen its experience as a basis for future activities, and to support promising ventures which are likely to be sustained in the longer run from other sources (e.g. among industrial crops). Thus the Panel feels that modest efforts devoted to minor crops, domestic-forestry and industrial crops are well justified, should be a recognized feature of the strategy-planning process of the Board; and it recommends accordingly.

4.5.4 Relation with FAO

The great importance of, and value to IBPGR, of the relation with FAO is a recurrent theme of this report. The following advantages are evident: (1) the administrative and financial support given to the Secretariat by its presence in FAO Headquarters free of the usual charges on trust funds; (2) freedom from cash-flow problems; (3) scientific contacts within FAO Headquarters; (4) scientific contacts with FAO workers in the field and hence access to local expertise; (5) administrative support by the world-wide FAO offices; (6) the prestige of FAO and the trust reposed in it by countries as a factor which has immeasurably aided the international activities of the Board.

The disadvantages, by comparison, are trivial and the Panel is in no doubt that this valuable relation must continue, a view which, it was pleased to learn, was shared by senior FAO officers. The Panel noted that the FAO connection in future will probably turn out to be of particular importance: (1) in developing the foreseen need for some legal framework to guarantee access to working and base collections; (2) in attacking the foreseen quarantine problems on an international basis; and (3) in developing new sources of funds for GRC work. Under (3), the possibilities are various and the Board is already conscious of them.

4.5.5 Funding

Past levels of funding have been found by the Board to be adequate for the activities in hand and as much as could be wisely spent. The Panel does not feel competent to predict future funding in numerical terms but notes the following factors as relevant: (1) the decline in a very substantial commitment to information and documentation (Table 1); (2) a foreseen need for more field officers (Section 4.4.2); (3) probably greater costs of the programme as the balance of activities moves away from the cereals towards more difficult crops. A modest net increase in funding is indicated and the Panel recommends accordingly.

4.5.6 Forward Planning

There are two levels at which the Board has operated. The first level, that of priorities by crops and regions, has been systematically and well done; it is, and will continue to be, the subject of continued reappraisal in the light of progress, experience and new information (Section 4.5.3). The second level, that of priorities between the main functional areas of activity (as defined here, Table 2) seems to the Panel to have been less successfully treated. So far, the Board has proceeded by a sort of practical empiricism based on the knowledge and experience of its members. As evidenced in this report, some imbalances have ensued (as between information/documentation and the rest, between collecting and storage) and significant areas seem to have been somewhat neglected (e.g. promotion of national awareness, training and publications policies). The Panel thinks the time is ripe for a more systematic treatment of the formulation of strategy and recommends accordingly.

5. LOOKING TO THE FUTURE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this section recommendations are made in the light of the analysis presented in the preceding chapter. We assume (Section 4.3.4) that, in connection with information/documentation, the necessary major adjustment is already in hand and that only subsidiary observations are needed here. Recommendations and the arguments leading to them are set out in some detail in the following sections and summarized above in Chapter 1.

5.2 General

5.2.1 The main objective

In the light of the discussion above the Panel is in no doubt that the main objective of the IBPGR must remain, as it always has been, the development of a worldwide genetic resource conservation network devoted to the long-term needs of world agriculture. The need for genetic resource conservation becomes no less with time. Indeed the reverse is true, for genetic erosion is, generally, accelerating and there is continued need for ensuring the safety of collections and for enhancement of national co-operation. The objective is universally accepted and received renewed and powerful support from the 20th FAO Conference, 1979.

5.2.2 Continued support

The Panel records its conviction that, in the light of IBPGR's valuable achievements of the past quinquennium and the agreed importance of the overall objective, CGIAR should reaffirm its continued support of and interest in this important work.

5.2.3 FAO relations

In all its many discussions, the Panel heard no dissent from the proposition that the IBPGR has been immeasurably aided in its work by the physical placement of the Secretariat within FAO Headquarters (Sections 4.4.2 and 4.5.4). Furthermore, the Panel was delighted to learn from senior FAO officers that the Secretariat would be assured of future support. The Panel records its conviction that this arrangement should continue, to the great benefit of the work of the IBPGR, and also, it would hope, with some reciprocal gain to the FAO commitment to its objectives. The point is emphasized here because it has been suggested in the past that the Secretariat should be isolated from FAO.

5.2.4 Long-term funding

The Panel noted that present funding is adequate and that changes in programmes will tend to balance out but that some enhancement of net activities and of staff can be foreseen in the future. It therefore recommends that the Board should be free to bring forward proposals for a modest increase in expenditure during the next quinquennium and should explore, jointly with FAO, alternative or additional sources of funding.

5.3 The Board

5.3.1 General

The Panel, while recognizing the valuable overall achievement of the IBPGR, has identified what it takes to be certain weaknesses in the structure and working of the Board (Section 4.4.1). These relate to its Terms of Reference (Section 3.2), the relative roles of the Board and its Executive Committee and the formulation of strategy and programme. These issues are now to be explored.

5.3.2 Terms of reference

The Panel thought that the Terms of Reference of the IBPGR were unsatisfactory in being both vague in some particulars and over-specific in others. The Board has had to interpret them somewhat elastically in order to accommodate, for example, the research which it clearly had to support.

Since the Terms of Reference had to be written before the Board could begin to understand the nature of its task, some discrepancy was probably inevitable, and the Panel thinks that the time for revision has arrived. It recommends, therefore, that CGIAR should invite the Board, when both bodies shall have assimilated the present report, to revise its Terms of Reference and it would hope that the structural analysis of IBPGR functions used here will prove helpful in doing so. The Panel notes that this recommendation, when implemented, will inevitably also involve the Board in scrutiny (and probably also revision) of its by-laws.

5.3.3 Executive Committee

The Panel thought that the Executive Committee, in its zeal for the work of the IBPGR, had somewhat overburdened itself by assuming heavy responsibilities for financial control and programme formulation, in addition to tasks of a more routine nature. To lighten the load on this Committee, therefore, the Panel recommends that greater managerial-financial responsibility be given to the Executive Secretary (Section 5.4) and that the function of strategy-programme formulation be given to a new committee, as recommended below (Section 5.3.4). This would enable the Executive Committee to meet more rarely (once, perhaps twice a year).

5.3.4 Strategy/Programme Committee

Up to now the Executive Committee has formulated the overall policy of the Board, on the basis of proposals brought forward, on request, by the Executive Secretary and subject to ratification by the full Board. The Panel thought that this procedure was not wholly satisfactory and had led to perceptible imbalances between components of the work: for example, over-emphasis of information-documentation and under-emphasis of influence, training and publications aspects. The Panel concluded that the Board would be helped by objective advice on strategy from a body of high scientific competence that was effectively free of the practical problems of resource allocation. It recommends, therefore, that the Board should be assisted in its strategy/programme formulation by a small advisory committee. The Panel does not make detailed recommendations but thinks that this committee probably: should meet annually, should be responsible for formulating strategy/programme proposals, should be composed of 5-7 members of whom perhaps two might be Board members, should have an independent chairman (i.e. one who was not himself a member of the Board) and should include also the Executive Secretary (by whatever name - Section 5.4). In formulating programme proposals, the Committee should address itself to the allocation of priorities both between and within the main functional headings adopted (Table 2). The Panel hopes that such a committee, as well as the Board itself, would be materially assisted in its deliberations by the functional accounting recommended below (Section 5.3.6).

5.3.5 Other committees

The Panel is aware of the universal tendency for committees to become self-sustaining and notes the difference between the five crops committees of the Board and the working groups; the former meet regularly, the latter only when there is specific reason to do so. Meetings are expensive, so economy would be served by designating all as working groups and the Panel so recommends: it believes that this would help the Board in scheduling meetings at the most favourable times for the work in hand.

With regard to the possible new advisory committee on information/documentation referred to in the Boulder report (Appendix V), the Panel thought that the earlier mission was mistaken in thinking that a need existed: it could foresee no tasks which could not as well be done by appropriate consultants or working groups. It understood, further, that the Executive Committee was thinking along the same lines. The Panel, therefore recommends that no such committee be appointed.

5.3.6 Functional accounting

The Panel found the analysis of functions given in Figures 1 and 2 and Table 2 helpful in thinking about the work of the IBPGR. As a simple extension of the idea, Table 3 gives an analysis of the 1978 accounts by a functional classification. The Panel learned that the table was not difficult to prepare and thinks that it provokes several questions about allocation of resources which simply could not be asked of the conventional accounts. The Executive Secretary shared these views and the Panel therefore commends the approach. Specifically, it recommends that, for the internal guidance of the Board and of its Strategy/Programme Committee (however entitled), budgets and accounts should be presented in some such functional form.

5.4 The Secretariat

5.4.1 General

The Panel noted (Section 4.4.2) that the Secretariat had recently grown somewhat in size, in line with its increasing budget and responsibilities. And it noted that its proposals regarding the Board (Section 5.3) had implications for the Secretariat, too. Recommendations follow.

Table 3. IBPGR Functional Accounting for 1978

(1) By functions	k\$	%	(2) By areas ^{1/}	k\$	%
Administration	372.0	21.7	Central America	36.4	3.9
Inflation	148.0	8.6	South America	156.2	16.5
Technical meetings	84.1	4.9	Med. and North Africa	189.3	20.0
Publications	15.0	0.9	Africa	97.7	10.3
Training	126.0	7.3	Southeast Asia	198.1	21.0
Research	57.4	3.3	South Asia	30.5	3.2
Collecting	360.0	21.1	Southwest Asia	232.0	24.6
Storage	112.5	6.6	Far East	4.5	0.5
Information	440.3	25.6			
	<u>1,715.3</u>	<u>100.0</u>		<u>944.7</u>	<u>100.0</u>
(3) By crops	k\$	%	(4) Administrative subdivision (including inflation)	k\$	%
Cereals	259.3	52.0	Board/Exec.Com./Chairman	74.3	19.3
Food legumes	88.3	17.7	Secretariat staff ^{2/} & travel	122.2	31.6
Tubers	31.2	6.3	Field staff and travel	142.2	37.0
Fruits	33.2	6.7	Miscellaneous (photocopying..)	18.0	4.8
Vegetables	16.1	3.2	Servicing costs	28.1	7.3
Industrial crops	13.7	2.7	(Southwest Asia project)		
Forages	57.2	11.4			
	<u>498.9</u>	<u>100.0</u>		<u>384.8</u>	<u>100.0</u>

^{1/} Includes the distribution of partial support to the Birmingham course according to provenance of students.

^{2/} Additional to FAO provision.

Notes: The figures given are for 1978 and were provided by the Executive Secretary in a trial run to test the feasibility of the proposal. Items listed under (1) are as in Table 2 and Fig. 1; items under (2) and (3) are provisional. In principle, a complex 3-way table could be constructed but would be unreadable. Note that, though the total under (1) should equal actual (or estimated) total expenditure, totals under (2) and (3) will always be less.

5.4.2 Title

The title 'Executive Secretary' was appropriate so long as the occupant of the post was simply responsible for carrying out the specific directives of the Board. The job, however, has grown greatly in size and responsibility and is now analogous to that of the Director of an Institute. The Panel, therefore, recommends that the title be changed to 'Director'.

5.4.3 Responsibilities of the Director

In the light of the preceding argument, the Panel believes that the Director should be given responsibility for programme formulation (in consultation with the proposed advisory committee) and full (including the appropriate financial) responsibility for carrying it out. He should also become a member of the Board (just as Directors of IARCs are members of their Boards). The Panel so recommends. The Panel notes in this connection that the status of the Secretariat Unit within the FAO office is likely to be affected by this and the preceding recommendations. It believes that FAO and IBPGR will need jointly to explore the administrative implications of the change proposed.

5.4.4 Staff

The Panel accepts the view that the Secretariat is adequately staffed for the immediate tasks in hand, but that there will be a developing need for (up to four more) Regional Officers as regional activities grow. There may develop a need for a Publications Officer as publications activities are enhanced. The Panel recommends that the Director should be encouraged to bring forward proposals along these lines when circumstances can be shown to justify the appointments.

5.5 Programmes

5.5.1 Introduction

On the basis of the analysis presented in Section 4, the Panel concludes that the IBPGR has been doing all the things appropriate to its basic objective but that some changes of direction and emphasis would now be desirable. Recommendations follow, under the eight functional headings adopted above.

5.5.2 Plan and promote

The Panel recommends as follows:

(1) Influence. The IBPGR should make a systematic effort to enhance its influence and promote the idea of genetic conservation at government level, especially in those areas of the world where the idea is yet weak. It should seek the help and guidance of FAO in doing so and should adopt whatever means seem appropriate: personal influence and specialized publications and seminars suggest themselves. Related matters which will also have to be explored at government level include: international acceptability of designated base storage facilities, the very probable need for some international legal framework to guarantee reciprocal access to collections in the long term, and quarantine problems (which can only become more acute as clonal crops enter the scene).

(2) Meetings. The IBPGR should support professional meetings whenever there is a clear technical reason for doing so but should exercise caution in seeing that committees do not become self-perpetuating.

(3) Publications. The IBPGR should develop a systematic publications policy aimed at influence and awareness as well as at technical information. Directories, handbooks and descriptor lists should figure in the latter category. The Director should be invited to make the case for appointing a Publications Officer when the need can be demonstrated.

(4) Training. The IBPGR should enhance its training programme along the lines already well established: by initiating/supporting local short courses whenever appropriate and by offering continued support to the Birmingham M.Sc. course. It should also deliberately encourage and assist university teachers of plant breeding courses particularly in developing countries to incorporate genetic resource conservation elements in their teaching, with a view to laying a base for more advanced studies.

5.5.3 Research and action

The Panel recommends as follows:

(1) Research. The IBPGR should continue its selective support of research but the direction should change somewhat, away from studies of the easily-stored seeds of annual crops towards the problems of perennials that are either clonal or have short lived seeds; economical maintenance of collections and disease-free transmission should be leading objectives. There should be good opportunities for initiating such work in developing countries. The forthcoming IBPGR conference (1981) could usefully be made a forum for exploration of these problems.

(2) Collecting. The IBPGR should continue to support collecting activities according to the best current advice on priorities by crops and regions but should be prepared to devote modest efforts to what seem to be, on a global scale, minor crops, when justified by emergency or policy

considerations. The Board should be prepared to reduce somewhat its collecting activities in favour of enhanced support of conservation if the Panel's judgement of the matter is sustained.

(3) Conservation. The IBPGR should enhance its support of conservation if the two activities were found to be in competition for limiting resources. As the Board itself recognizes, a balance between the two activities must be sought. It should, in general, support the Provision of equipment for buildings supplied from local resources and pay attention to subsequent working and maintenance.

(4) Information/documentation. The Board should accept the main findings of the Boulder Panel, except in regard to an advisory committee (Section 5.3.5). Specifically, it should use consultants or ad hoc working groups when it needs technical advice, avoid commitment to any specific computing equipment or systems and encourage the development of descriptor lists as the basic step in all documentation work. Further, it should adopt the distinction made in this report between "characterization" and "evaluation" and confine its documentation activities to the former.

6. TERMS OF REFERENCE AND QUESTIONS

6.1 Introduction

The Panel conducted its business in terms of its own functional analysis of the work of the Board, an analysis which it very much hopes will be useful both to the IBPGR and to the CGIAR in future. In this section it seeks to reconcile its analysis with its formal terms of reference (Section 2.2) and subsequent questions posed by TAC.

6.2 Terms of Reference

The mandate of the Board (Terms of Reference items (i) and (ii) (a)) was not thought by the Panel to be wholly satisfactory (Sections 4.4.1 and 5.3.2) and it recommends revision. On Terms of Reference item (ii) (b), the work of the Board impinges and will continue to impinge, on the genetic resource conservation work of national and international institutes in the only possible way, namely by striving to weld diverse bodies together in working networks (Section 4.5.2). This is the central practical objective before the Board; progress has been made and regional activities are starting to develop but there is a long way to go. On Terms of Reference item (ii) (c) and (d), the Panel thought that the Board's methods of formulating its strategy and the balance of major constituents of its programme were not wholly satisfactory (Sections 4.4 and 5.5) and merited some

revision, which it duly recommends. On Terms of Reference items (iii) (a), (b), (c), the Panel thought that results achieved in collection, conservation and training have been and continue to be very valuable but that changes of emphasis towards enhancement of the two latter items would be desirable (Sections 4.3 and 5.5); on information/documentation (Terms of Reference item (iii) (c), the Panel agreed with the Boulder Mission in recommending a substantial reduction in and reorientation of effort (Sections 4.3.4 and 5.5.3). The Panel assumes that Terms of Reference items (iii) (d) and (e) refer to the performance of the Secretariat in executing the wishes of the Board; it thinks it has been very satisfactory indeed. On Terms of Reference item (iv) the Panel thinks that the Board has had a valuable impact upon genetic resource conservation activities throughout the world, has itself cooperated excellently with other organizations, national and international, and has promoted cooperation among others to a degree which probably could not have been greatly exceeded in so short a period and with limited resources; this view is to be qualified by the observation that the information/documentation programme has had but a small impact in relation to its cost, as is now generally accepted. As to Terms of Reference item (v), the Panel thought that such constraints as it could identify lay largely in the area of Board-Secretariat structure (Section 4.4) and hopes that they may be alleviated by adoption of its recommendations (Sections 5.3, 5.4).

6.3 TAC Questions

A number of specific questions posed by TAC before the Panel was finally constituted are listed above in Section 2.2. Answers to them, some fairly precise, some of necessity a little vague, are offered here.

On question (i) the longer-term future for the IS/GR programme, the answer is that there is none, the report of the Boulder Mission having been substantially accepted. On priorities (question (ii) A) the Panel is not competent to comment in detail but it thinks that, in general, the early priorities were well chosen and that the list should be kept under continuous review. On (ii) B, the question of responsibility for forestry, minor crops and industrial crops, the Panel thinks that a modest commitment is well justified on grounds of emergency, local needs and general experience (Section 4.5.3).

On question (iii) concerning the effectiveness of the Board's impact on national and regional programmes, the Panel found that the former had been the more effective. Since national-regional relations must vary with time and place and must depend also upon the particular crops being handled, the Panel did not feel able to comment upon implications for long-term funding except to observe (Section 4.5.5) that a modest increase could be foreseen. On (iv), the position of the IARCs, the Panel noted that their contributions varied widely (Section 4.5.2) but thought that their long-

term commitment to GRC work was a matter for CG strategy rather than for this Panel to pronounce upon; meanwhile, the IBPGR can only try to persuade and encourage.

To the last three questions, clear answers have, the Panel thinks, been given. There will undoubtedly be a need for consideration of quarantine problems (v); there will be a need for some enhancement of staffing (especially in the field) (vi); and the present Secretariat structure is not wholly satisfactory (vii).

7. ACKNOWLEDGEMENTS

The Panel expresses its gratitude to Mr. S.A. Risopoulos, Deputy Executive Secretary, TAC, for unfailingly helpful guidance as Secretary to the Panel; its best thanks are also due to Mr. P.J. Mahler, Executive Secretary, TAC, for many useful discussions and for a very thorough report on his travels; and the Panel also expresses its thanks to Ms. Paola Dionori, for excellent secretarial help.

The Panel gained much from information provided in advance by Dr. J.T. Williams, Executive Secretary, IBPGR, and from several frank and easy discussions with him; it benefited also from its collective discussions with the Secretariat staff as a whole (Dr. J.T. Williams, Ms. E. Bennett, Dr. J.T. Esquinas-Alcazar, Dr. N.M. Anishetty, Mr. D. van Sloten, Mrs. C. Gorelli, and, in addition, Dr. K.S. Dodds, Senior Consultant, FAO). The Panel's best thanks are due to all.

The Panel also thanks members of the IBPGR Executive Committee for a productive discussion, namely: Mr. R.H. Demuth (Chairman), Dr. G. de Bakker, (Vice-Chairman), Dr. O. Brauer, Dr. A.B. Joshi, Prof. L. Kahre and Ir. W.F. Kugler.

The Panel expresses its gratitude to Dr. D.F.R. Bommer for a most informative meeting and to Dr. O. Brauer, Mr. J. Pichel and Mr. R.L. Willan for very helpful discussions.

Finally, the Panel is also very grateful indeed to all the many people, scientists and administrators, who took much time and trouble to make the preceding journeys productive of ideas and information; they are named in Appendices I-V.

8. REFERENCES

The following are the leading documents consulted in preparing the report. They all have bearing on the work of the IBPGR as a whole. For documents of local/regional concern, see Appendices I - V.

- (1) IBPGR, preliminary meeting, Rome, 1974 (AGPE:IBPGR 74/6)
- (2)-(6) IBPGR Annual Reports, 1974-78:
I (1974, AGPE:IBPGR 75/3); II (1975 (AGPE:IBPGR/75/47);
III (1976, AGPE:IBPGR 76/27); IV (1977, AGPE:IBPGR 78/8);
V (1978, AGPE:IBPGR 79/8).
- (7) IBPGR Board Meeting, VI, Feb. 1979 (AGPE:IBPGR 79/15).
- (8) IBPGR, A Review of Policies and Activities 1974-78 and of
the Prospects for the Future, 1979 (AGPE:IBPGR 78/24 Revised).
- (9)-(10) IBPGR Executive Committee, XIV, May 1979 (AGPE:IBPGR 79/28)
and Extraordinary Meeting, June 1979 (AGPE:IBPGR 79/40).
- (11) IBPGR Mid-term Report on the Programme and Budget, June 1979
(AGPE:IBPGR 79/21 Revised).
- (12) Report of the TAC Mission to the IBPGR Programme at Boulder,
Colorado, USA. April 1979 (AGD/TAC:IAR 79/18 Rev. 1).

IBPGR QUINQUENNIAL REVIEW

Report on a Visit to the Mediterranean and Southwest Asian Programmes

30 September - 9 October 1979

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Report on a Visit to the Mediterranean and Southwest Asian Programmes

30 September - 9 October 1979

1. Introduction

At the Seventeenth Meeting held in September 1977, TAC agreed that the work of the International Board for Plant Genetic Resources (IBPGR) should undergo a quinquennial review in 1979. As IBPGR's mandate is of a global nature, it was decided that three separate missions would be required to study samples of these activities. The Programme for the regional visits of the Review Panel members was approved and finalized by the 22nd TAC Meeting which decided that these visits were to be undertaken in each case by a member of the Review Panel assisted by a member of the TAC Secretariat.

The present report reflects the findings of the Mission which visited the Southwest Asia and Mediterranean Regions. Within the general framework of the terms of reference of the Review the purpose of this Mission was to assess the content, quality, impact and value of IBPGR's contribution to the plant genetic resources activities in the two regions and to identify problems and constraints for further consideration by the Review Panel. This report was considered by the IBPGR Quinquennial Review Panel, which met 3-8 December 1979 at FAO Headquarters in Rome, as an input to the preparation of the final IBPGR Quinquennial Review report. It is understood that the observations and opinions expressed here refer only to this mission and that conclusions may be modified by consideration by the Panel as a whole.

The Mission was composed of Prof. E. Åberg, Panel Member, assisted by Mr. L.H.J. Ochtman of the TAC Secretariat. Dr. K.S. Dodds, Senior Coordinator of IBPGR Southwest Asia Region, accompanied the Mission to ARARI and ICARDA.

2. The Mediterranean Programme

The main activities of the IBPGR on crop genetic resources in the Mediterranean region are based on the continuation of a programme initiated with UNEP and IBPGR funds in 1975, executed by FAO. As from 1976, the programme has been entirely funded by IBPGR.

2.1 Background

The Germplasm Laboratory Bari, Italy, started as an independent institution, sought on its own initiative cooperation with other countries in the Mediterranean region. It has a well-established gene bank, pre-

dating the IBPGR supported programme. With a few exceptions, the Bari Laboratory was engaged in most collecting missions in the Mediterranean region. The collections were made in collaboration with the other countries in the region; half of each sample collected was taken to Bari, the other half left in the country of collection. These arrangements were and still are based on personal contacts, as the Bari Laboratory is not at this time a formal coordinating body for the Mediterranean programme.

In March 1979 the first Regional Meeting of the IBPGR Mediterranean Germplasm Programme took place at FAO in Rome. Nine countries (Algeria, Cyprus, Egypt, Greece, Italy, Portugal, Spain, Tunisia and Yugoslavia) attended this meeting, which agreed (ref. 11) to recommendations relating to the definition of national coordinators and the eventual formation of a regional committee.

2.2 The Present Situation

At present the Mediterranean Germplasm Programme is being coordinated by a staff member of the Genetic Resources and Crop Ecology Unit (AGPE) of the Plant Production and Protection Division (AGP) of FAO. The Coordinator prepares, on an annual basis, in consultation with the Germplasm Laboratory Bari and the other national programmes, the regional programme of activities and a corresponding budget proposal for approval by the IBPGR. Recently, in October 1979, a preliminary agreement in principle was reached between FAO/IBPGR and the Germplasm Laboratory Bari, for the latter to assume the role of Regional Coordinator, if agreed by the joint participating nations.

The priorities for the region decided upon by IBPGR in consultation with the participating nations, are cereals, grain legumes and sugar beet. Libya and Algeria give also high priority to forage crops for semi-desert areas. Currently about 5,000 population samples of germplasm, mainly cereals and grain legumes, have been collected by regional teams supported in some instances by experienced plant collectors under short-term contracts. Thus far 17 expeditions have been made in the nine countries included in the programme.

So far only Morocco has not yet responded to invitations for cooperation from the IBPGR Secretariat or the Laboratory in Bari. Owing to the fact that IBPGR concentrated its efforts in the less developed countries of the region and is still in the process of establishing the right contacts in France, the last country does not yet actively participate in the Mediterranean Region.

The evaluation of collected germplasm is at an early stage in most countries. The Germplasm Laboratory Bari provides valuable assistance, but hopes to involve the cooperating countries even more, for example, through

evaluation of germplasm by national experimental stations involved in work with the crops concerned. At Bari itself, more than 6,000 samples of Mediterranean wheats are being evaluated. Data for processing in computer programmes are being forwarded to Bari which operates a variety of computerized systems, e.g. TAXIR, EXIR, FAMULUS and SAS.

Ample facilities for conservation are available at Bari. However participating countries feel the need for small local storage units so as to relieve Bari of other than long-term responsibility.

Financial aid and expertise has been provided by the IBPGR towards the construction of facilities for gene banks in Spain (near Madrid) and in Northern Portugal (at Braga); others are eventually planned for Libya and Greece. The first two will be responsible for grain legumes and maize, respectively. Bari is subsidized by IBPGR for collection missions outside Italy and for documentation systems.

Practical training of staff in the Mediterranean programme is possible at Bari, theoretical and higher training must take place overseas. There are resources for this through fellowships, but increased efforts are needed.

2.3 General Assessment

The programme seems to be developing fairly satisfactorily, although there is a need for greater international input through the IBPGR especially as regards the structure of the programme, as well as financial assistance and guidance in establishing facilities. At present, too much responsibility for the Regional Programme, in both coordination and operation, is carried by the Germplasm Laboratory at Bari.

The IBPGR emphasized strongly and gave valuable assistance to the two initial phases of plant genetic resources activities, i.e. exploration and collection. IBPGR still puts much emphasis on these two activities in spite of the apparent shift in certain countries towards a need for increased assistance for documentation, conservation and evaluation.

The coordination of this programme is further discussed in section 4.1.

3. The Southwest Asia Programme

The main activities of the IBPGR on crop genetic resources in Southwest Asia are based on the take over and continuation of a project started with UNDP funds and executed by FAO.

3.1 Background

Six countries participate in this programme within the project TF/REM 31 (IBPGR) entitled "Crop Genetic Resources of Southwest Asia", namely: Afghanistan, Iran, Iraq, Pakistan, Syria and Turkey. This project was preceded by two others, executed by FAO, one (ref. 2), operational from 1963 to 1973, and the other (ref. 3) operational from 1974 to 31 July 1976.

The former was not a regional project. It was concerned solely with activities in the Aegean Agricultural Research Institute (ARARI), Menemen, Izmir. The consequence was that when the second project followed in 1974, ARARI was the only centre in the six participating countries that had facilities and a cadre of trained staff to undertake crop genetic resources activities. The other five had to start from scratch and this imbalance between Turkey and the others is still very evident today. At that stage various alternatives for future work were discussed and, in the end, the IBPGR decided to make a fresh start with the redesigned project TF/REM 31 (IBPGR) cited above. It was not until 1 August 1977 that a revised work plan acceptable to the six member countries was defined and could be started. By January 1979, all six countries had signed the Plan of Operation.

The programme at ARARI in 1979 was far more advanced than the programmes in the other five countries. It was, therefore, to be supported mainly by help with its problems of documentation. In the other five countries (Afghanistan, Iran, Iraq, Syria and Pakistan), a drive to establish strong national genetic resources programmes was started.

With this aim, a Coordinator based in FAO and two technical advisers in the field were appointed in April 1977. The two advisers were placed at the Genetic Resources Division of the Seed and Plant Improvement Institute, Karaj, Iran, on the understanding that they would visit other project units when asked to do so. Both had to be withdrawn from Iran in January 1979. One of them was transferred to Iraq, to help with the establishment there of a Genetic Resource Unit. He has since visited Syria to give technical help and advice. The second expert returned to his former post at the Germplasm Laboratory, Bari, Italy. Prior to that he had spent a month in Afghanistan towards the end of 1978 to initiate work at the Genetic Resources Unit.

3.2 The Present Situation

At present, each country has a Plant Genetic Resources Unit, with its laboratory and functional seed processing equipment. Since July 1979, each unit has also had an operational medium-term cold store, though these are not always working due to variable electric power supply, or to defective compressors (as in Iran).

Taking into account differences in agricultural practices and diversity of ecological zones within the region, the following crops rate an overall high priority throughout the region: wheat, barley, chickpea, lentil, pear, apple, onion, brassicas, carrot, spinach, radish, melon and forage plants. Sub-regionally, i.e. in Afghanistan and Pakistan, rice, watermelon and cummin rate high; in Iran and Iraq dates also assume high priority.

Although collecting missions have taken place from time to time, they have not been in the field every year. Extant collections have not always been well maintained and a major task of the project has been to clean up a backlog of samples and to put them into storage.

In most participating countries, collections of vegetatively propagated crops, especially of fruits and nuts, are still in a preliminary phase, except in Turkey which has a large coordinated programme for this material.

Sponsored by various organizations, a total of 22 graduates from the six countries in the Southwest Asia programme have received formal training overseas in plant genetic resources activities, the majority at Birmingham University. When the total is corrected to include only those graduates who are currently engaged in plant genetic resources activities, it reduces to 13 as follows: Afghanistan 2, Iran 2, Iraq 2, Pakistan 1, Turkey 5, and Syria 1.

Officials of all six countries consider their cadre of trained staff far too low and are most anxious for the programme of training to continue.

A brief country-by-country account of progress made is given below.

Afghanistan

A small cold store for seed storage supplied by USAID several years ago was made operative in April 1978 and three small adjacent rooms were adapted for seed processing during the visit of the Technical Adviser in November 1978. This enabled a start to be made with the job of cleaning up and properly storing samples from earlier collections. Several collecting trips were made in 1978 and 1979, mainly for cereals and food legumes. These expeditions provided 600 samples of wheat that were grown at Daoulamen Field Station, Kabul for preliminary study and bulking in 1979.

Iran

Between March 1978, when the two Technical Advisers were in post, and January 1979 when they were withdrawn, good progress was made in the collection of material and setting up a genebank at the Seed and Plant Improvement Institute, Karaj. An IBPGR-funded cold store for medium-term seed storage was fitted out and brought into use in the small but adequate

building set aside for crop genetic resources activities. Since the experts left, it has been reported that the condensers for the cold store have broken down.

Iraq

An IBPGR-funded cold store for medium-term seed storage was completed in April 1978 and a small laboratory building for the Genetic Resources Unit is nearing completion. The Technical Adviser has participated in two collecting trips to Northern Iraq during 1979. He reports that the replacement of local wheat varieties by exotic varieties is virtually complete in the region though wild relatives of wheat and barley are still very prevalent. A good start has been made with the gene bank. Accessions so far number about 500 and consist mainly of wheat, barley, rice, broadbean and chickpea samples.

Pakistan

Except for one or two collecting expeditions in collaboration with foreign institutes, plant genetic resources activities at the Agricultural Research Centre (ARC) Islamabad have been suspended until facilities for seed processing and seed storage become available. Word has just been received that a small building housing these facilities is ready. Scientists at ARC are anxious to have an active genetic resources programme so that there is every reason to think that good use will be made of the new building.

Syria

A medium-term cold store for seed storage was completed in March 1979 but it is not possible to be optimistic about the future of the Syrian Genetic Resources Unit. Only about 300 seed samples have been collected since 1976 and these have not yet even been properly cleaned and labelled. The Unit consists of one graduate who has attended the course on plant genetic resources at Birmingham University. Another graduate has been nominated this year for training.

Turkey

A very comprehensive national genetic resources project is being undertaken by ARARI in collaboration with agricultural institutes, agricultural stations and university agricultural departments throughout the country. Eight teams, each led by a staff member of ARARI, are responsible for survey, collection, rejuvenation, multiplication and evaluation of plant material of the group of crops assigned to it. The programme embraces cereals, grain legumes, industrial crops, forage plants, vegetables, fruits, ornamentals and medicinal plants. Documentation of the collections and seed storage and distribution are done by ARARI.

3.3 General Assessment

Political events have disrupted the programme in Southwest Asia to varying degrees, especially in Afghanistan, Iran and Northern Iraq. However, there are also other problems in the region which affect cooperation and coordination. For instance, in the absence of a regional genebank the national genetic resources units have no coordinated system for storage of duplicates. There is, however, a general consensus among participating countries that if FAO could establish a seed storage facility on neutral ground, the countries would readily send material there for safe storage.

Other factors that limit progress are lack of personnel (Syria), poor facilities (Afghanistan) and, with the possible exception of Iraq, low national budgets. Routine genebank practices are not fully underway. With the exception of Pakistan, duplicate seed samples have not been sent from any of the National Units for safe storage elsewhere, though seeds are distributed world-wide from ARARI when requested for research purposes.

With regard to project TF/REM 31 (IBPGR) (ref. 10), most of IBPGR's budget contribution has been utilized as programmed. After the Consultative Meeting of the Region's participants in October 1979, IBPGR prepared a final list of equipment, on account of the participants' needs, for supply to the six national genetic resources units. Only under "Personnel" have considerable savings been made; due to events in Iran there were savings in man-months of the Genetic Resources Expert and a programmed Documentalist was not needed at all.

4. The Coordination of Regional Activities

4.1 The Mediterranean Region

The Director of the Germplasm Laboratory Bari, Italy, would be willing to coordinate genetic resources activities in the Mediterranean Region with some backstopping by the IBPGR Secretariat. With such coordination, the Mediterranean programme might confidently be expected to go ahead, especially as the countries in the region are willing to collaborate and work in close contact with Bari. Such a development would mean that, in addition to the coordination of scientific and technical activities by the Germplasm Laboratory, the Bari Genebank would become the Mediterranean Regional Genebank.

4.2 Southwest Asia Region

In the Southwest Asia Region the problem of coordination is a real one. The Mission has considered three possibilities:

- (1) A first possibility might be to make ARARI a regional centre for gene resources work in Southwest Asia. It is the best equipped national centre in Southwest Asia in terms of both personnel and equipment. However, the present working conditions and the structure of ARARI do not meet the requirements of a regional centre and its status is not such that it would be acceptable to the other nations in the region.
- (2) A second possibility would be for ICARDA to undertake regional co-ordination. However, under the terms of its mandate, the interest at this centre is confined to five crops (barley, durum wheat, lentil, broadbeans and forage crops). For ICARDA, the collection, classification and maintenance of germplasm of these five crops is an internal responsibility with working collections as the main aim. Furthermore, ICARDA is not structured for a role as co-ordinating regional centre.
- (3) Neither of the two possibilities discussed above can really replace the present form of coordination. The only solution appears to be to have a regional coordinator but to abandon, for the time being, the notion of a regional gene bank. The main duties of the coordinator would be:
 - to encourage the deposition of duplicate seed samples from the national collections for safe storage at appropriate gene banks;
 - to stimulate cooperation between national programmes as well as between national programmes and international centres in the region;
 - to foster contacts with organizations outside the region;
 - to be aware of sources for technical and financial assistance to the programmes.

The most logical procedure would be to place the proposed regional coordinator within the IBPGR Secretariat. Whether technical and financial help should be on an ad hoc basis, or through FAO-type projects, or a combination of both, is a matter for later consideration.

5. Other considerations

In addition to the foregoing, several other points merit consideration:

(i) Countries included in the programmes

Eight countries are included in the Mediterranean programme and others may perhaps wish to join later. Such a development would be welcome, and should be encouraged.

The Southwest Asia programme grew out of the initial development of ARARI as a project (1963-1973) under UNDP/FAO auspices. The other five countries (Afghanistan, Iran, Iraq, Pakistan and Syria) came to be included in the regional project (ref. 3) which followed the Special Fund project in Turkey. The IBPGR inherited this grouping and accepted it.

With the current project due to end in December 1979, it seems opportune to consider whether or not changes should be made in regional groupings and, if the project is to be extended, whether or not other countries should be invited to join the programme, for example, Jordan and North Yemen, both of which should be surveyed as soon as possible for crop genetic resources.

(ii) IBPGR's interest in and support of national programmes

It is evident that most of the countries participating in both the Mediterranean and the Southwest Asia regional programmes cannot support comprehensive genetic resources activities without considerable outside help. As basic requirements, however, countries must feel themselves to be nationally committed to the idea of genetic resource programmes and the interest and good will of indigenous scientists must be assured.

Whatever the decision about the level of outside help to national programmes, a special effort should be made to mount collecting expeditions in which national and foreign scientists participate when there is reason to think that the crop genetic resources of a particular region have not been sampled adequately. The policy of IBPGR should be to concentrate its assistance on situations where there is a perceived need and clear potential for success.

(iii) Regional Gene Resources Centres

It became evident during the Mission that the Germplasm Laboratory in Bari, Italy, is of great importance for the coordination of gene resources in the Mediterranean region. Moreover- the Laboratory is prepared formally to assume this role if so requested by the participants in the region. In the Southwest Asian region, it became clear that ARARI could, in principle, act in a similar capacity. This, however, would be politically unacceptable. A neutral site would have to be assured for any such venture.

(iv) Use of International Agricultural Research Centres

In seeking to fulfil its global mandate, the IBPGR relies upon certain of the CGIAR's International Agricultural Research Centres for assembling and maintaining major collections (for example: rice at IRRI; wheat and maize at CIMMYT, millets and sorghum at ICRISAT).

Although ICARDA feels that it cannot assume a regional coordinating role for diverse crops, it accepts an obligation to develop major collections of its mandate crops. This will surely be very valuable but the implications for IBPGR can only become clear as the ICARDA programme develops.

(v) IBPGR, National Gene Resources Centres and International Agricultural Research Centres

One has the impression that, so far, the emphasis in genetic resource conservation work has been on collection rather than upon maintenance. Despite the emphasis IBPGR has placed on crop priorities, manageable targets for collecting require to be more precisely defined in view of the difficulties most countries face in meeting the costs of maintaining the collections they already have. Moreover, in the near future, most of them may be asked to add vegetatively propagated crops to the list of crops for collection.

Thus it seems desirable that, from now on, IBPGR should pay more attention to the activities that follow collecting and to the cost of these activities, i.e. the costs of maintaining, evaluating and rejuvenating collections and of processing data. Events at ARARI illustrate the point. Financial constraints hamper follow-up activities, particularly in long-term storage (13,000 seed samples of diverse crops), in evaluation of the collections and in computerized data processing.

As mentioned above, ICARDA intends to assemble major collections of its mandate crops. It will also keep working collections of which it already has some 10,000 samples of chickpea, 20,000 samples of cereals and 5,000 samples of forage plants. IBPGR could be instrumental in helping to develop a profitable cooperation between ICARDA and the national germplasm centres in the Mediterranean and the Southwest Asia regions.

(vi) Training

The IBPGR has given valuable support for training, particularly through the M.Sc. course at Birmingham University. The need for this type of training is still evident, owing to resignations and transfer of trainees to duties other than in genetic resources.

At the same time, the need for other, often more practical, forms of training, in which technical assistants can participate, is also evident, especially now that several small national genetic resources units exist.

The IBPGR should consider how best to meet this demand, for example through a series of workshops dealing with the day-to-day operations of a gene bank, with the basic principles of cold store maintenance and with evaluation of samples in liaison with plant breeders.

(vii) Data Processing

So far as data processing is concerned, TAXIR and EXIR are being used at Bari and apparently meet requirements.

The attempt to introduce computerized data processing at ARARI has been a good deal less successful. By 1976, ARARI personnel had key punched data in readiness for TAXIR, only to find that nowadays EXIR is recommended rather than TAXIR. Consultants sent to ARARI this year to introduce EXIR failed to do so because EXIR could not be operated on the model IBM computer used by ARARI at Ege University. Thus processing of data at ARARI will be done manually until the appropriate software is acquired. Experience so far emphasizes the cost of buying time and the difficulties of access in competition with other users. In general, national institutes for genetic resources activities are in greater need of help in this field of activity than international agricultural research centres.

6. Conclusions and Recommendations

Conclusions and recommendations may be summarized as follows.

- (a) In the Mediterranean region IBPGR should continue to encourage an increased responsibility of the Germplasm Laboratory at Bari for co-ordination of activities in the region.
- (b) Inputs to achieve this must not, however, exclude such continuous contacts between IBPGR and national centres for genetic resources in the

Mediterranean region that are needed for providing (with outside help) such resources (financial and other) that otherwise may not become available to national centres.

- (c) The IBPGR should employ a consultant in the Mediterranean region with responsibility for facilitating genetic resources work in the region.
- (d) In the Southwest Asia region there are a number of problems. No national agricultural research institute has such a standing in the region that it would be accepted as a regional centre for genetic resources activities. ARARI in Turkey most nearly fulfils the requirements but it lacks the confidence of scientists in the other nations in the region. ICARDA is not structured to act as coordinating centre and cannot be given that responsibility. It could possibly host a unit for coordination, but even this is doubtful.
- (e) The only evident solution is for IBPGR to employ a regional coordinator with adequate administrative powers and with sufficient financial support.
- (f) It is clear that such a regional coordinator will meet a number of obstacles of scientific, administrative and financial character. He will also meet a number of problems caused by the political instability in the region.
- (g) A regional coordinator is most likely to be successful in his work if he is directly responsible to IBPGR.
- (h) For both the Mediterranean and the Southwest Asia regions, IBPGR should, through its regional coordinators take the initiative to establish contacts and to promote cooperation between ICARDA (and possibly other international agricultural research centres) and national research institutes and authorities.
- (i) IBPGR should give increased attention to the training of staff for gene resources work, emphasizing those activities which follow after collecting, i.e. evaluation, rejuvenation and maintenance.
- (j) Data management presents problems for national institutes engaged in genetic resources work and the IBPGR will need to be prepared to help in this connexion.

7. Itinerary and Programme

- 30 September 1979 Rome - Izmir by air
- 1 October Izmir - Discussions with Dr. K. Temiz, Director Aegean Regional Agricultural Research Institute (ARARI), and Dr. Ayla Sencer, Head of Systematic Unit ARARI
- 2 October Izmir - Discussions with Mr. K. Alpman, Head Generative Conservations & Seed Physiology ARARI, Mrs. Nedret Settari, Head Documentation Unit ARARI, Ms. Ayfer Tan, Documentation Unit ARARI and Ms. Gail A. Vonborstell, IS/GR Boulder.
- 3 October Izmir - Final discussion with Dr. K. Temiz, Director ARARI
Izmir - Beirut by air
- 4 October Beirut - Brief discussion at ICARDA Beirut Office with Dr. Mohamed Nour, Deputy Director-General, Dr. J.P. Srivastava, Leader Cereal Improvement Programme, Dr. T. Matheson, Plant Breeder Cereal Improvement Programme, Dr. Ahmed Osman, Forage Improvement Programme, Mr. J.J. Bourgeois, FAO Associate Expert Plant Genetic Resources.
Beirut - Terbol by car. Visit of ICARDA's Terbol Experiment Station for medium altitudes; accompanied by Drs. Srivastava, Matheson, Ahmed Osman and Mr. Bourgeois. Discussions with Mr. A. Alameddin, Head, Plant Breeding Department (Cereals and Legumes), Agricultural Research Institute Tel-Amara, Rayak, Mr. Mimir Sughayyar, Station Operation Engineer and Mr. Nicolas Rebeiz, Senior Technician, both of Terbol Station.
Night at Beirut
- 5 October Beirut - Further discussions at ICARDA Office with Dr. Mohamed Nour, Dr. J.P. Srivastava, Dr. T. Matheson, Dr. Ahmed Osman, and Mr. J.J. Bourgeois.
- 6 October Beirut - Final discussion at ICARDA Office with Dr. H.S. Darling, Director-General of ICARDA, Dr. Mohamed Nour, Dr. Matheson and Mr. Bourgeois.
Beirut - Rome by air
- 7 October Rome - Bari by air
- 8 October Bari - Visit to the Germplasm Laboratory, Bari. Discussions with Dr. E. Proccedu, Director, Germplasm Laboratory.
Bari - Rome by air
- 9 October Rome - Report writing.

8. Documents Consulted

- (1) The Collection, Evaluation and Conservation of Plant Genetic Resources, Report of TAC Ad Hoc Working Group held in Beltsville, U.S.A., 20-25 March 1972. TAC Secretariat PAB:IAR/72/11, 4 April 1972.
- (2) International Board for Plant Genetic Resources, First Meeting, Rome, Italy, 5-7 June 1974, IBPGR Secretariat, AGPE:IBPGR/73/6, October 1974.
- (3) Exploration and Conservation of Plant Germ Plasm in the Near East by K.S. Dodds, Review of Project Results - AG:TF/REM/5 (SWE), FAO 1977.
- (4) Programme and Budget Proposals for 1979-80, IBPGR Secretariat, AGPE:IBPGR/78/11 May 1978.
- (5) TAC Quinquennial Reviews of the International Agricultural Research Centres, "Terms of Reference" and "Guidelines for the Quinquennial Reviews", TAC Secretariat, DDD/TAC:IAR/78/11 Rev. 1, 1978.
- (6) TAC Quinquennial Review of IBPGR, Progress Report, TAC Secretariat AGD/TAC:IAR/79/9, 1979.
- (7) Report of the TAC Mission to the IBPGR Programme at Boulder, Colorado (USA), TAC Secretariat, AGD/TAC:IAR/79/18 Rev. 1, April 1979.
- (8) A Review of Policies and Activities 1974-78 and of the Prospects for the Future, IBPGR Secretariat, AGPE:IBPGR/78/24, Rev., May 1979.
- (9) Genetic Resources Proposals for ICARDA - Germplasm Maintenance & Security within ICARDA by E.M. Matheson, ICARDA - Aleppo, 3 May 1979
- (10) Project Progress Reports, TF:REM-31 (IBPGR) 1 January-30 June 1978; 1 July-31 December 1978; 1 January-30 June 1979.
- (11) Report of IBPGR Regional Meeting on the Mediterranean Germplasm Programme, IBPGR Secretariat, AGPE:IBPGR/79/20, July 1979.
- (12) IBPGR Annual report, 1974, AGPE:IBPGR/75/3, June 1975
1975, AGPE:IBPGR/75/47, April 1976
1976, AGPE:IBPGR/76/27, March 1977
1977, AGPE:IBPGR/78/8, February 1978
1978, AGPE:IBPGR/79/8, May 1979
- (13) Program of Work and Budget: 1980, ICARDA, March 1979.

9. Acknowledgements

The Mission wishes to express its gratitude to the IBPGR Secretariat and to Dr. K.S. Dodds for their valuable assistance in providing background information and in clarifying matters under discussion. The Mission also wishes to thank the Directorates of ARARI, ICARDA and the Germplasm Laboratory, Bari, for arranging informative discussions with them and their staff and for their generous hospitality.

IBPGR QUINQUENNIAL REVIEW

Report on a Visit to Latin America and North America

5 - 17 November 1979

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Report on a Visit to Latin America and North America

5 - 17 November 1979

1. Introduction

The visit to Latin America and North America was part of the three missions which were launched to study the activities promoted by the IBPGR at national and regional level before the meeting of the Review Panel in Rome in early December 1979. Each of these missions was to be conducted by a member of the Review Panel. Unfortunately, the Panel member who was designated for the visit to the Latin America and North America was unable to make the mission due to unexpected and compelling reasons. The mission was made by the two persons who were requested initially to accompany and assist the Panel member: Dr. W. Kugler, member of the IBPGR and roving consultant of the Board for Latin America on a half-time basis and Mr. P.J. Mahler, Executive Secretary, TAC.

As no Panel member participated in this mission, the report contained initially detailed information on the places visited and identified issues for further consideration by the Panel. This abbreviated version was then prepared to be appended to the Panel Report.

2. Itinerary

The itinerary of the mission was as follows:

4 November	Visit to CIP, Peru
6 "	Visit to La Molina University, Peru
7 "	Travel to Costa Rica
8-9 "	Visit to CATIE, Turrialba, Costa Rica
10 "	Travel to Mexico
11-12"	Visit to CIMMYT, Mexico
13 "	Visit to INIA <u>1/</u> , Mexico
14 "	Travel to Fort Collins, Colorado, USA (Mahler only; Dr. Kugler returns home)
15 "	Visit of NSSL <u>2/</u> , Fort Collins - Travel to Washington
16-17"	Completion of the Report

1/ INIA = Instituto Nacional de Investigaciones Agricolas

2/ NSSL = National Seed Storage Laboratory

3. Visit to CIP

The visit to CIP took place on 5 November. A full day was spent at the Headquarters of the Centre. The people met were Dr. R.L. Sawyer, Director General, Dr. R. Rowe, Deputy Director-General, Dr. O.T. Page, Director of Research, Dr. C. Ochoa in charge of collection, taxonomy and maintenance of the wild* Solanum species, Dr. Z. Huaman in charge of maintenance and data management of CIP primitive cultivar germplasm and Dr. H. Mendoza, in charge of several programmes of utilization of genetic resources of Solanum.

3.1 General

The mandate of CIP, as established in 1971, includes the collection and conservation of genetic resources of potato and its wild relatives on a worldwide basis. When IBPGR came in existence in 1974, therefore, the Board had merely to endorse a responsibility which CIP had already taken and a programme which the Centre was pursuing vigorously.

The programme has been guided by a series of Planning Conferences which have been held in 1973, 1976 and 1979. These planning conferences involve a small group of advisors (6-7) including the Executive Secretary of IBPGR and specialized scientists which are active and knowledgeable in this field of potato genetic resources. Very few specialists exist in this field and therefore the planning conferences have been attended mostly by the same group of persons or by people coming from the same institutions which are active in this field (i.e. in the USA, UK, Netherlands, FRG, and Denmark). In addition to the staff concerned in CIP, two former staff members from Latin America who now have responsibilities for potato collection in their country also participate.

The planning conferences review the status of germ plasm conservation, the progress made by CIP and others in this field and makes a series of recommendations for future activities. These recommendations are primarily addressed to CIP but also to the scientific community working in this area. In practice, these conferences serve as coordinating mechanisms between the institutions involved, in particular as regards the exploration missions in priority regions, the storage of duplicate collections and the development of a common data base.

The IBPGR found this arrangement satisfactory and considered that these planning conferences play the role of a Crop Advisory Committee. The Board has therefore accepted the view of CIP that the establishment of a Crop Advisory Committee for potato was unnecessary.

The Panel should further discuss with IBPGR the question of the composition of the group which advises CIP in this field. It should be noted

* Tuber-bearing.

however that this mechanism has been useful in avoiding duplication of work between CIP and other institutions and mobilizing resources towards the priority areas.

3.2 Exploration and Collection

The exploration and collection of primitive cultivars by CIP is now considered as almost complete. Further work is necessary in few countries such as Mexico, parts of Colombia and Chile. More than 12,000 accessions have been assembled by the staff of CIP and also by donations to CIP of duplicates of the several national collections of Latin American countries.

The collection of wild species was given high priority by the 1976 Planning Conference. Out of some 170 species known, about 50 were not in living state at that time. CIP has launched 12 expeditions and recuperated 18 of these species in living state. This type of work does not seem to attract young scientists in the region. Nevertheless an effort should be made to develop an autochthonous capacity for plant exploration in the region. For the moment the only alternative is for CIP to call on expatriates to carry out this work in cooperation with its staff.

The material collected is divided in several parts. One part is offered to the local institutions of the country. Some countries are interested to keep this material but do not have sufficient capacities for maintenance (facilities and staff). Others are not interested. The wild species are not stored at CIP but sent to Sturgeon Bay, Wisconsin for conservation. At the present stage, CIP does not wish to build up the additional greenhouses and other facilities which would be required to maintain these collections of wild species.

The collection of wild species by CIP has made considerable progress. In three years CIP has collected about one-third as much as what had been collected so far by expeditions before 1976. One of the questions to be further discussed by the Panel is whether more of this material should be maintained in the region of origin either at CIP or at other institutions in Latin America.

3.3 Maintenance, documentation and distribution of germ plasm

Most of the available collection originates from Peru (73%), Bolivia (7%), Colombia (3.8%) and Chile (7.4%). Other countries of origin are Ecuador, Argentina, Venezuela and Guatemala. Some 3,500 duplicates have been identified by morphological observations at CIP supplemented by biochemical analysis carried out in FRG (amino acids and enzymes). A computer programme is also used to identify duplicates. This collection has been thus reduced from some 12,000 to 9,000 accessions. Further elimination of duplicates should enable CIP to take a more active role in maintaining the collection of wild species.

The maintenance of these clones is very risky. Assembling the material also implies assembling the diseases which they carry. Bad weather may also harm the collection. Tubers are kept in three places at Huancayo, Peru, where the whole collection is planted each year, at La Molina in cold storage and at Bogota, Colombia in cold storage also.

True seeds are kept in Peru, Fort Collins and Sturgeon Bay, USA, and at Braunschweig, Germany.

The collection will also be transferred gradually (some 200 samples per year) to be grown in another country (Colombia).

The characterization of the accessions with standard descriptor lists is in progress. 6000 accessions were characterized with 16 descriptors, 3000 others with 9 descriptors. In addition, all accessions have information on provenance. The data have been recorded in catalogues which have been put in computer-readable form at Boulder. This data base will now be sent back to CIP with a series of programmes and a minicomputer. The computer available at times was considered too small and too expensive for the use of EXIR. Other software now developed at Boulder (GDM and REX) will be used. It will also provide a programme for identification of duplicates.

CIP has taken a number of steps to ensure a better phyto-sanitary control of its collections, in particular for those of viruses. An outbreak of the spindle tuber viroid last year has seriously limited the movement of germ plasm material. This problem has now been overcome. The increased use of tissue cultures and of botanical seeds should assist in ensuring the phyto-sanitary control of germ plasm.

It should also be noted that neither CIP nor IBPGR have formal agreements with the institutions which store duplicates of CIP collections. It seems that these institutions do not have legal obligations as regards the maintenance of this material and their distribution to users in specific regions of the world. This appears to be a general question of concern to other centres which the Panel should address.

A major obstacle to the movement of material for identification and/or storage is the fear from certain institutions in Europe to import material from CIP especially as regards wild species, which may carry diseases. CIP may require larger quarantine facilities in this respect.

3.4 Use of germ plasm in breeding programme

The germ plasm is being systematically screened for specific characters. Gene pools are then established which are used by the breeders. Most of the distribution of germ plasm by CIP to other countries takes place in this form rather than in the form of specific accessions in the germ plasm

bank. The CIP scientists argue that the individual accessions usually have a number of undesirable characters and therefore are of little interest for distribution to national programmes.

It was understood that gene pools with specific attributes (i.e. for highlands or lowlands, with certain disease resistance) are made up from the individual accessions by recurrent hybridization and selection of populations (and not of clones). CIP scientists use this method in order to maintain a broad genetic base in these pools and develop multigenic resistance to specific factors or diseases.

The material thus obtained is distributed to the CIP regional programmes which in turn distribute (after multiplication) to the national programmes. The choice of the material sent to a specific country is based on the experience which the CIP staff have of the ecological regions which it serves.

The maintenance of the genetic diversity in the genepools which are made of the individual accessions seem to be of a critical importance. The Panel may wish to address further this question as CIP plays a key role in the access which the national programmes have to the germ plasm collections of the centre.

4. Visit to the Agricultural University, La Molina, Peru

4.1 Background

Besides the visit to CIP, the purpose of the travel to Peru was to understand how the Board operates as regards its support to genetic resource conservation at national level. The University of Agriculture, La Molina, was taken as a sample of these activities as the Board had given three grants to this institution .

The persons met at the University were: Ing. Mario Zapata, Rector; Ing. Guillermo Parodi, Vice-Rector; Dr. Ricardo Sevilla, Head, Cooperative for Programme for Maize Improvement (PCIM); Dr. Alfonso Cerrate, Ing. Antonio Marrigue, Ing. Hugo Sanchez, staff members of PCIM.

Peru does not have a national structure nor a country-wide programme for genetic resource conservation. A national institute is now being established for agricultural research, a field which has been so far covered by the Universities of Agriculture in several provinces. Several of these universities have a long standing interest in genetic resources conservation, in particular that of La Molina, in the vicinity of Lima. Several departments of the University had already established collections for their training programmes and crop improvement research activities in the early 60s or even earlier.

The work of this University had been given international recognition, when the Panel of experts which met at Beltsville in 1972 suggested that this University should be invited to develop a regional centre for genetic resource conservation for the Andean zone. The choice of Peru for this centre had also been made taking into account the genetic diversity present for several crops in the wide range of ecological conditions of the country.

This project was not pursued further. The University however continued to maintain and expand its collections in cereals, potato and other tubers, beans, maize and vegetables. Cold chambers were established in several departments of the University for these collections.

4.2 The contribution of IBPGR to PCIM

The Board has given three successive grants to the Cooperative Programme for the Improvement of Maize: in 1977 to collect maize germ plasm in the coastal areas (\$24,777); in 1978 to improve the maize germ plasm storage facilities (\$18,792); in 1979 to collect germ plasm in the "selva" areas (\$23,100).

(i) The collection missions - The grants for collection missions were given to assist in collecting local land races which were being replaced by hybrid maize in these areas. Other areas of the Andes had been already covered by collection missions by PCIM. Collection in these two zones were considered urgent as valuable genetic material was at risk of disappearing. The grants were provided to help meeting travel expenses including rental of vehicles, labour and some collection equipment.

The project documents follow a standard format which gives specifications for the work, the personnel involved, the conditions in which the material will be stored, and the follow-up activities of evaluation.

When the visit was made to PCIM, the first collection project had been completed, while the second was going to be started in the following week. 728 samples had been collected in the coastal areas, covering about 50 land races which had been previously recognized (20 years ago).

3444 accessions had been already collected by PCIM since 1962, 2600 of which still have a germination capacity. 600 samples had also been received from NSSL Fort Collins for regeneration. These came from a collection of Peruvian maize by a Rockefeller Foundation team which included some 1000 samples, one-third of which was said to have lost their germination capacity.

All this material has been collected by the PCIM staff which have a long experience in this work and an intimate knowledge of the maize land races in Peru.

(ii) Storage facilities - PCIM was experiencing difficulties in maintaining its three cold chambers in adequate working conditions. IBPGR agreed to give a grant to improve storage conditions of the largest chamber helping PCIM to buy and install new equipment for refrigeration and for the storage of samples.

At the time of the visit, the material appeared to be very well kept. Computerized registers were maintained on provenance and main characteristics as well as data for the management of the collection (germination tests, regeneration, etc.). These data were assembled following the standard record formats of IS/GR.

A main difficulty is in the considerable amount of work involved in the regeneration of the collections and in their evaluation. These tasks will in general compete with the more urgent work of crop improvement at national level, unless genetic resource conservation and breeding are entrusted to different institutions.

The Panel may wish to address further the above questions in particular the extent to which the Board should be involved in helping national institutions to evaluate and rejuvenate their collections.

Another question which comes to mind when observing the successful impact of the IBPGR grants in Peru is how this impact could be expanded further by some multiplying effect mechanism. This could be achieved in several ways:

- (i) using the national expertise to train some people in the country or in the region for this type of work;
- (ii) using this national expertise to assist other countries in collecting their material and building up their national programmes of genetic resource conservation;
- (iii) raising the level of responsibility of a national programme and giving to it a regional role for genetic resource conservation in a certain field.

All these possibilities seem to have been examined by IBPGR. The Panel should seek clarification on the strategy of the Board in this respect and inquire on the next steps which would follow the granting of funds to individual national institution for collection and storage.

The distribution of duplicates poses also problems in several ways. PCIM has accepted (in the contract giving the grants for collection) to make duplicate available to another institution. Although PCIM has not found it possible to do it as yet, it fully agrees with this procedure. There was, however, some confusion as to the place where samples should be sent, i.e. CIMMYT which is the centre designated by IBPGR in the contract

or NSSL (USA) which has recently requested a whole duplicate of the PCIM collections. The national programmes, when sending duplicates for long-term storage, wish to be assured that they can re-obtain samples of their collection in good germination conditions.

The long-term storage institutions are also expecting in some cases the national programmes to rejuvenate part of their collections and may send samples for regeneration to the country of origin for this purpose. This represents a considerable workload on a small programme in a developing country which sometimes cannot be afforded. The Panel may wish to advise in this respect on the best course of action.

The participation of a national institution in an international programme such as that of IBPGR promotes the exchange of information on its activities and as a result other countries learn of the material available and request duplicates of this material.

There is, however, a limit to the capacity of PCIM to meet these demands and probably a stage where these requests should be directed to some kind of central germ plasm conservation facility in the region rather than to a national programme.

5. Visit to CATIE ^{1/}

Two full days were spent at CATIE, Turrialba, Costa Rica. The people met were: Dr. N. Muñoz, Director of Research; Dr. J. León, Head of the CATIE-GTZ Genetic Resource Programme; Dr. H. Goldbach, Plant Physiologist; Ing. J. Engels, Plant Geneticist.

5.1 Background

The genetic diversity of the Mexico-Central America region has long been recognized both as including the centre of origin of several crops and for the wide range of genetic resources of crops introduced in the area. The region was placed on the priority list of the experts which met at Beltsville in 1972. This group of experts also recommended that CATIE host a centre for genetic resource conservation for the region.

As a follow-up of this Beltsville meeting, TAC recommended in 1973 as a third priority (after Izmir, Turkey and Ethiopia) that this centre be

^{1/} CATIE = Centro Agronomico Tropical de Investigacion y Enseñanza is a regional independent centre established under an agreement between IICA (Instituto Inter-Americano de Ciencias Agricolas) and the Government of Costa Rica, Panama and Nicaragua and other institutions.

established at Turrialba under the auspices of IBPGR which was then being constituted. Meanwhile CATIE and FAO convened a meeting of experts on the use and maintenance of genetic resources in the Caribbean region at Turrialba in December 1973. Eighteen specialists of 11 countries attended. They reviewed the status of germ plasm collection in the region and established a plan for exploration, conservation, documentation, and plant introduction activities in the region. They also supported the recommendations which had been made before by the FAO Panel of Experts on Plant Exploration and Introduction and the TAC Working Group at Beltsville that a genetic resource centre be established at Turrialba in association with CATIE. They also stressed that the germ plasm conservation activities for maize and beans should continue in Mexico and Colombia.

GTZ, the German Agency for Technical Cooperation decided to support the establishment of two of the three centres recommended by TAC, i.e. one in Ethiopia and CATIE Turrialba. A GTZ mission was sent to CATIE to formulate a project. Meanwhile, IBPGR was established and the Board also sent a mission to CATIE in August 1975. The IBPGR mission recommended that the centre establish an Advisory Board nominated by IBPGR, but CATIE and GTZ found it difficult to implement this recommendation as both organizations had their own governing bodies.

The agreement between CATIE and GTZ was signed in December 1975 and the project started in July 1976. The framework of this bilateral arrangement also includes cooperation with the Institute for Crop Science and Seed Research of the Research Centre for Agriculture, Braunschweig - Volkenrode. The activities of this project are now entering a second phase ending in July 1981.

The relations between IBPGR and CATIE have been rather limited during the period 1976-1978. ^{1/} It is only recently that IBPGR has convened at CATIE a consultation on the genetic resources activities in Meso-America for two days in August 1979. This meeting recommended, *inter alia*, the establishment of an IBPGR Advisory Committee for the region with a secretariat provided by CATIE (see section 4.4 below).

Lastly, the Board of Trustees of CATIE have agreed to include in the organizational structure of the Centre a genetic resources unit, thus making these activities an integral part of the core programme of the Institute. This decision gives the possibility to this unit to receive funds from the core budget of the centre in addition to those of the special project with GTZ.

^{1/} Except in that some contracts were taken with IS/GR.

5.2 Priorities for genetic resources conservation in the region

Priority areas and priority crops for collection mission in the region have been reviewed and changed a number of times. The TAC working group meeting at Beltsville ^{1/} made a first list in 1972. The FAO/CATIE consultation in 1973 made a more detailed list but felt that it had not enough information to classify crops and areas by priority order.

In 1975-76, the IBPGR established its overall list of priorities from a global point of view. Several crops which were not in the earlier lists for the region were added, whereas many others were deleted.

The regional priorities were then further reviewed by an IBPGR consultation held at CATIE in August 1979. The list of priority crops prepared by this consultation included many species which were not of a global interest and therefore were not included in the overall priority list of the Board. It should be noted also that several crops such as groundnut, potato, pigeon pea and sunflower which were placed on the IBPGR list were not recognized by the regional consultation as important for the region.

This brief analysis of the changes in the priorities has been made to draw the attention of the Panel on the need to clarify the process and the criteria by which the Board has established its priorities.

5.3 CATIE as a genetic resource centre

(i) Organization and facilities

The CATIE/GTZ project is a cooperative programme in which GTZ mainly provides the funds for the scientific and technical personnel, the operating expenses, equipment, supplies and labour and CATIE mainly contributes land, building and administrative support services. The scientific and technical personnel comprise a botanist (project leader), a seed physiologist (in charge of seed collections), a plant breeder (specialized in documentation) and a horticulturist in charge of maintenance of living collections. GTZ also helped in funding the building of cold chambers and greenhouses. More than 30 hectares are used for the maintenance of living collections. In addition, other sites at different elevations are used for multiplication and rejuvenation of the collected material.

^{1/} The region considered by the Beltsville group was larger and included South American lowland, and as priority crops Phaseolus beans, cassava, cacao, rubber, tropical fruits and tropical forage legumes. It did not include Guatemala and Mexico for which beans, corn, cotton, and cucurbits were given as priority crops.

(ii) Seed conservation

CATIE has a short-term storage cold chamber at 6°C of 55 sq. m. at 40-45% of relative humidity and a long-term storage room of 110 sq. m. at minus 20°C and 10-20% relative humidity. A drying room is adjoining the latter for the preparation and handling of the samples. This long-term storage room was built with the guidance of the Mississippi University and meets the IBPGR specifications.

The collections in the stores include some 5,000 entries: phaseolus beans (about 3000 accessions), tomato (400), cucurbits (800), peppers (250) and some other 50 species.

Several other species which are maintained in living collections have "recalcitrant seeds" which lose quickly their viability, in particular cocoa, coffee, and many fruit trees and tuber crops. Some of these can be stored only for a couple of years while others lose their viability in a few days. Work has been initiated to study the best conditions for their conservation 1/. These activities appear to have been launched independently from those supported by IBPGR at the University of Reading, although CATIE has been recently requested to send material to the latter.

Most of the material is stored for short-term conditions. Samples are now prepared for long-term conservation. An original procedure has been elaborated to store an accession in the form of a series of sub-samples in sealed aluminium foil envelopes which can be retrieved individually for distribution, germination tests or rejuvenation without disturbing the other sub-samples.

(iii) Living collections

Most of species on which the project works have to be maintained in living collections either because their seeds cannot be stored or because their production of seeds is erratic or inexistent. The main collections which have been established since many years at CATIE are those of coffee (1400 entries) and cocoa (300 entries). In addition, there are some 220 entries of fruit trees and 180 entries of the "pejibaye" palm. 2/

1/ For some of these species, there is no knowledge available of the optimum conditions of storage or germination and even in some cases whether seeds can be stored or germinated at all.

2/ Bactris gasipaes.

In addition to the above tree species, several roots and tuber crops and vegetables which have to be vegetatively propagated are kept in living collections. Among these cassava (120 entries), several yams, cocoyams and taros (some 50 accessions), chayotes ^{1/} (100 accessions) and many others. A total of some 330 species of economic value are present in these living collections. In some cases, the material which is maintained in these living collections is unique in that it is not known to exist in other collections or in natural conditions. Several of these are maintained as a single plant of a single species and do not represent the variability. In this respect, the collections also serve as a botanical garden for the many students, research workers and other visitors which come to CATIE.

(iv) Exploration missions

These are conducted by the project staff and also by two local collectors, one in Guatemala and one in Colombia. These collection missions have been carried out in South Mexico and in several countries of Central America. In addition, the project staff has been associated with collection expeditions in Brazil and Peru.

(v) Introduction and exchange of material

In addition to the material brought recently by the exploration missions, CATIE used to receive material since many years from a number of sources and exchange material with other countries. Coffee and cocoa are the most important among the crops which are subject to this distribution of material.

Quarantine does not seem to be a major limitation to the introduction of material in CATIE's collection and the quarantine facilities established at CATIE have been used only in a limited number of doubtful cases. In the case of coffee, a USDA quarantine station is used as an intermediary before entering material from Asia and Africa.

CATIE considers that keeping material for possible introduction of new crops which are not grown in certain countries is as important as supplying new germplasm accessions for the improvement of crops which are already grown in the region. It has established close cooperation with botanic gardens and germplasm storage facilities in the region and in other continents for this double purpose.

^{1/} Sechium edule, an important vegetable in Latin America and Africa which is grown commercially for export to Europe and North America. Chayote is the third vegetable in importance in Brazil.

(vi) Documentation

An elaborated system of punched cards which can be processed manually has been developed by the project to record data on the material, which is collected, stored, maintained and distributed. Lists of descriptors have been established for peppers, cucurbits, cocoa, and cassava. These descriptor lists were prepared in consultation with specialists of these crops and using available literature. It does not seem that IBPGR has been directly involved in this work although some contacts have been made with the Secretariat and contacts were established with IS/GR. The cooperation with IS/GR however served mostly to adapt the GDM programme to the microcomputer used by CATIE. CATIE has found this contribution very useful since its limited computer capacity did not permit the use of EXIR. The data on the large collections are being transferred from the index cards to computer storage. For many crops, however, the limited number of accessions does not warrant the use of the computer and index cards which can be processed manually are preferred.

(vii) Training

Four-month graduate courses are organized in the field of genetic resources and seed technology. The project also provides opportunities for in-service training for few students and for thesis work of some others. CATIE has also organized a ten-day seminar with participants of six countries in genetic resource conservation and documentation.

5.4 Prospects for future cooperation between IBPGR and CATIE

The IBPGR consultation on genetic resource activities in Meso America which was held at CATIE in August 1979 may be a new starting point for IBPGR/CATIE cooperation. The outcome of this consultation as regards priorities in the region has been reported on in section 5.2 above. The consultation also made a number of recommendations to IBPGR for future activities. Although it is not clear for the moment whether the Board will implement these recommendations it is felt that the Review Panel should be informed of several of these since they may have considerable importance in discussing the future strategies and plans of the Board in the region and elsewhere.

(i) The proposed Regional Advisory Committee

The consultation considered that a regional committee with government representatives was impractical at this stage and recommended that an IBPGR advisory committee be established for the future programmes in the region. The members (six in total with a fixed number of seats for each sub-region and alternates) would be selected by IBPGR and should meet every other year. The committee may establish specialized working groups as necessary. The Secretariat of the Committee would be provided by CATIE. This Committee

should establish priorities and programmes for the consideration of IBPGR regarding genetic resource activities in the region.

The Panel may wish to discuss further the role of such advisory committees (one is already established for the South East Asian programme and its composition is fully representative). The respective roles of the Secretariat staff, of the Committee and, in this case, of CATIE, as Secretariat of the proposed Committee, should be clarified, in particular as regards the formulation and implementation of the programme and the channelling of funds. Another question is the role which such Committee may play as regards the national activities whereas its members are not nominated by the countries concerned but by the Board itself. It should also be noted that the geographical scope of this committee go beyond the field of jurisdiction of CATIE. ^{1/} The limited participation of the countries of the region in this consultation also raises doubts about the strength of these recommendations.

(ii) Proposed IBPGR/CATIE cooperative activities as recommended by the IBPGR regional consultation

The consultation held in August 1979 made a series of general recommendations on the needs of the countries of the region as regards exploration, storage, documentation and training. It is not clear as yet whether IBPGR will take action on these recommendations and how nor whether CATIE will be involved in their implementation. A comprehensive programme proposal which would translate these recommendations into specific action is lacking for the moment.

(iii) General remarks

The Centre has developed very good facilities for genetic resources conservation. These are still modest but are very well conceived and well run. These facilities and the staff are sufficient for the present programme. The size of the operation has not been expanded so far, knowing that CATIE may have to absorb this programme on its core budget. It will not suffice if the centre is taking a wider role as suggested below.

The major limitation to the expansion of the activities of the Centre is the available staff. Money is available for training and the problem is for the programme to meet concurrently the requirement for further collection, and maintenance of the material with those for training more staff. Some steps are taken in this direction. These could possibly be expanded and accelerated.

^{1/} CATIE however has cooperative activities with several countries outside Central America.

The main reasons for the further development of the activities of the Centre are (a) genetic erosion is accelerating and involves many species; (b) the type of material on which CATIE works is difficult to collect, increase and to maintain; (c) the countries of the region need the co-operation of CATIE in their own programmes of genetic resources conservation (training, consultancies, collecting missions, storage facilities); (d) it is important that CATIE acts as a regional centre for major food crops of the region, having duplicates of the seed collections of the IARCs; (e) CATIE could expand its cooperation with countries in characterizing, evaluating, rejuvenating and multiplying its material. Otherwise the material collected risks to be lost or not to be used; (f) the project may serve as a model to demonstrate how a genetic resource centre can be organized and managed in a developing country. Other countries of the region or from elsewhere could be invited to send people who could study this model and learn from CATIE's experience on establishing this type of activities (building, collection maintenance, documentation, etc.).

A major obstacle in a wider use of the material collected is the difficulty to prepare and distribute samples of those species which do not set seeds or whose seed viability is very limited. It seems logical, therefore, that CATIE now tries to expand its capacities to provide vegetatively propagated material to other countries and have its own meristem culture facilities for vegetative propagation.

The cooperation with IBPGR is increasing but it is still leading to scattered activities. It is clear also that as long as GTZ is ready to support CATIE there is no reason for the centre to seek additional funds to IBPGR (which it can obtain from GTZ). It is not clear, however, that GTZ would support a wider expansion.

Should this expansion take place it will put more managerial and administrative burden on the programme and its present small team, (especially as far as the relations of the Centres with the national programmes are concerned if CATIE accepts to administer IBPGR funds for activities in specific countries). It seems therefore that an expansion of the staff should not only cover specialists but also some staff for the management and administration of larger-scale operations.

Such expansion, if accepted in principle, would of course require a plan for systematic collection, characterization of material, rejuvenation, multiplication in cooperation with countries and for exchange of material and information on a larger scale. If the countries of the region would be ready to take long-term commitments in this field and agree to CATIE playing a leading regional role and if CATIE would accept this wider role, then it could be the task of IBPGR in the next five years to assist in the planning and funding of a wider programme. IBPGR should also see to it that the IARCs concerned cooperate with CATIE in this respect. The development of CATIE as suggested above would, if implemented, probably require a more organized linkage between the Secretariat of the Board or the Board and the Centre.

6. Visit to CIMMYT

Discussions with the Directorate and the staff of CIMMYT ^{1/} were held on 12 November.

6.1 Genetic resources conservation and use in the Wheat Programme

CIMMYT has modest facilities for the conservation of wheat germplasm. It essentially maintains miscellaneous working collections for the purpose of its breeding programme. CIMMYT depends mostly on Beltsville USA and on the national programmes with which it cooperates as sources of germplasm material. The Beltsville collections have been grown twice at CIMMYT and the wheat programme staff has chosen within these collections the material which had a potential interest for their activities. Similarly, when the staff visit national nurseries during their travel abroad, and they find material which they do not have and could be useful, they request that a duplicate be sent to Mexico. As a result the collections are fragmentary in appearance but serve specific needs of the international breeding programme.

The material which comes from these national collections generally has a poor agronomic type and much of it cannot be used directly in the breeding programmes. One breeding unit at CIMMYT works on the transfer of desirable characteristics found in these new entries into lines with good agronomic type. The new material is screened for these characteristics and then crossed and back-crossed several times with lines of good agronomic type (earliness, stiff and short straw, day length insensitive, etc.). When the desirable characteristics have been transferred and fixed, the source may or may not be discarded.

The work on intergeneric crosses involves mostly wheat x barley and wheat with Agropyron, Aegilos and Elymus. CIMMYT has recently recruited a cytologist to assist the breeders in this programme. The wild wheat relatives used come from US collections and not from the recent explorations missions carried out in the Middle East. The early types of wheat are not used at this stage in this programme. These activities are expected to be expanded and CIMMYT hopes in this way to renew the interest of advanced

^{1/} Dr. R. Havener, Director-General; Dr. K. Finlay, Deputy Director-General; Dr. S. Anderson, Director of the Wheat Programme; Ing. Ricardo Rodriguez in charge of wheat germplasm development; Ing. Maximino Alcalá, wheat international nurseries and germplasm conservation; Drs. Peter Goertz and Alejandro Ortega, maize advanced unit; Drs. Shivaji Pandey, Hugo, Zorilla, Dietmar Dehne, Maize Backup Unit; Dr. Elmer C. Johnson, Maize Special Projects, Dr. N.L. Dhawan, Maize International Nurseries.

research institutions in developed countries in this type of work. CIMMYT considers that the use of wide crosses can often be more effective in introducing certain new desirable characters in the wheat and barley germplasm than searching for these characters in local races of wheat or barley. This is, however, only one of the approaches followed by CIMMYT in a very complex programme of crop improvement.

The process of introducing new desirable characters in the material with good agronomic type necessarily involves a "narrowing down" of the genetic variability available in the sources where these characters are found. A wider diversity is introduced however when the gene pools so obtained are crossed with other material of multiple origins as part of the worldwide breeding process which CIMMYT operates and distributes through its international nurseries. Advanced material which is generated by the national programmes enters these international nurseries along with material developed by the CIMMYT breeders. CIMMYT keeps in its cold storage facilities (at 0°C and 40-45% relative humidity) small samples of each of the lines which enter these international nurseries. In this way CIMMYT has in store a considerable diversity of advanced germplasm material of wheat, barley and triticale which originate not only from the CIMMYT programme but also from the many countries with which the Centre cooperates. CIMMYT also keeps duplicates of parents and segregating material sent to national programmes while these programmes proceed with the further steps in selection. The national programmes have then the possibility to obtain from CIMMYT samples of the duplicates for these lines which prove to be of interest to them. The information on these lines is available in the reports which CIMMYT publishes each year on the result of these nurseries. There is a continuing flow of requests to CIMMYT for duplicates of these samples.

6.2 Cooperation of CIMMYT with IBPGR as regards wheat germplasm

CIMMYT has very limited facilities for germplasm storage of wheat, barley and triticale. For these reasons, CIMMYT has not been requested by IBPGR to take a worldwide responsibility for long-term storage for these crops; long-term storage facilities at VIR, USSR, NSSL, USA and Bari, Italy have been designated by IBPGR for this purpose. CIMMYT, however, cooperates with IBPGR in the framework of its Wheat Advisory Committee which the Centre has accepted to co-sponsor since 1978. The worldwide experience of CIMMYT scientists was found particularly useful in the Wheat Advisory Committee when deciding on priorities for collecting missions and also when elaborating the list of descriptors.

It should be noted that CIMMYT has recently agreed to store the main germplasm "land marks" in the development and improvement of triticale.

CIMMYT does not participate in the cooperative pilot project which IBPGR is launching to evaluate some 200 accessions at different sites and

test the validity of the established system of descriptors but has offered and is prepared to collaborate if this is desired. The value of this type of activity for the centre is not clear and it seems that the role of IBPGR in evaluation of material requires further discussion. "Characterization" seems a better word than "evaluation" to describe these activities of the Board.

CIMMYT is going to enlarge its facilities for wheat germplasm handling and storage. This expansion is meant to serve the increasing needs of its programme. These facilities will also be used to receive on a selective basis material collected by the IBPGR missions. CIMMYT is also reinforcing its links with NBPGR/USA and will continue to use their collections as a major source of germplasm. It looks also for increasing activities of the Board in cataloguing other existing collections and to facilitate the access of CIMMYT to the material contained in these collections.

6.3 Conservation and use of genetic resources in the Maize Programme

Before the establishment of CIMMYT, Mexico had made in 1943 a bilateral agreement with the Rockefeller Foundation for a cooperative programme including the collection and evaluation of maize germplasm. The material collected at that time was described in a publication on Mexican maize land races. The collections were eventually handed over to the Mexico Maize Programme and then duplicated and stored at CIMMYT. These included mostly material from Mexico and also more accessions from other Latin American countries.

A larger collection programme was also mounted in Latin America with the help of the US National Academy of Sciences in 1966. Some 4,000 accessions were stored at four banks in Brazil, Colombia, Mexico and Iowa University. This material was also sent to Fort Collins. As its viability was insufficient NSSL sent the material back for regeneration in the countries of origin.

At present CIMMYT has some 13,000 entries in its maize germplasm collection. 200 of these are hybrids and varieties and the rest are land races. 5500 accessions originated from South America (3000 from Brazil, 600 from Peru, 4000 from Mexico, 2500 from Central America, 30 from the US, and others from other places including some from Asia). CIMMYT also has 78 entries of teosinte.

5800 entries have been rejuvenated. Material was sent to Fort Collins for long-term storage (7629 accessions). In addition, 200 land race composites and 700 groups have been made by bulking material of similar origin.

The maintenance of the germplasm of an open pollinated crop such as maize requires a considerable amount of work to regenerate and/or maintain the variability within one accession. The simpler procedure which is now followed involves 256 plants per accession and bulk pollination instead of plant-to-plant pollination. 350 entries are so regenerated every year. 3000 entries are more than 10 years old and will be regenerated in the next 10 years. Cooperators may be invited to help in this work and also in increasing seeds.

The evaluation process is associated with the procedure by which new accessions are entering the back-up tools. The procedure consists in growing an accession for observation at three locations at different elevations and then to compare them with the pools at two locations, before deciding on whether to include the accession in a given pool.

Another approach in introducing new germplasm in the maize improvement programme is the wide crosses which are being made by CIMMYT since 1975. These include crosses between maize and its wild relatives (teosinte) and between maize and sorghum. This programme is now being expanded as a means to introduce new variability in the germplasm material which CIMMYT uses in its breeding programme.

The material is stored in sealed cans in a cold chamber at 0°C and 40-45% relative humidity. Computerized registers have been established with the help of IS/GR Boulder for the management of the collections. CIMMYT also has a register which contains some information on the characteristics of the accessions. This catalogue is incomplete and search for specific accessions has to be done manually. Plans had been made for IS/GR to help CIMMYT in computerizing this catalogue with the GDN system. This is not likely to be achieved now that IBPGR is reducing its support to IS/GR. Nevertheless, CIMMYT may contemplate to undertake this work which is said to require a few months only.

6.4 Relationships of the maize programme with IBPGR

In 1975, CIMMYT "has agreed to assume primary responsibility for maize germplasm" 1/ and to co-sponsor the Maize Advisory Committee. There does not seem to be a clear agreement on the implications for CIMMYT of this responsibility as regards the collection of additional maize germplasm. IBPGR has not designated CIMMYT as depository for the main base collections. 2/ CIMMYT does not have adequate facilities for long-term storage which meets the IBPGR specifications. CIMMYT is in principle interested in keeping

1/ IBPGR Annual Report 1975.

2/ NSSL USA; NIAS Japan and VIR USSR have been designated.

collections of all the tropical and subtropical germplasm but wants to remain selective in storing essentially the material which is of interest to its programme (chiefly that coming from Latin America and within Latin America the germplasm which it considers valuable for its programme).

As to the Maize Advisory Committee, CIMMYT has made important contributions to it in the elaboration of descriptors and in the selection of the priority areas for collecting missions.

IBPGR does not systematically consult CIMMYT on the maize collecting missions undertaken in Latin America. As the Advisory Committee meets every two years, the Secretariat of IBPGR consult the Chairman of the Committee on the requests for collection expeditions which are submitted in the interval.

There seems to be no formal agreement between CIMMYT and IBPGR by which CIMMYT agrees to receive duplicates of the material collected by the IBPGR missions, although the IBPGR project document specifies in certain cases that duplicates are to be sent to CIMMYT (when the Centre is interested in receiving this material).

CIMMYT would welcome the cooperation of IBPGR in solving special problems such as the methods for sampling the material during the collecting missions and the use of composites for storage instead of individual accessions. CIMMYT also stresses the urgency of collection missions in the Amazon region (these are now initiated by IBPGR) and in Asia.

7. Visit to INIA Mexico

The main institution in charge of genetic resources in Mexico is the National Institute for Agricultural Research (INIA). The Institute has established in 1977 a special unit for genetic resources. The visit was made to the Directorate of INIA and to the Genetic Resources Unit. ^{1/} The unit has now taken the overall responsibilities for collections which were long established in many experimental stations of INIA. The activities of genetic resources in Mexico started in the early 40s and have covered a large number of provinces where some crops had their origin in Mexico and others where crops were introduced and developed a considerable diversity. The main collections are those of beans (6000 accessions), maize (8000

^{1/} The people met were Dr. E. Alvarez Luna, Director-General INIA; Dr. J. Moncada de la Fuente, Deputy Director for operations; and Dr. F. Cardenas Ramos, General Coordinator for the Genetic Resources Unit.

accessions), wheat and potatoes (undetermined number), sorghum (3000 accessions) and soya bean (1500 accessions). INIA also has collections in rice, cassava, lentils, barley and many vegetables and fruit trees.

Since 1977, INIA has accelerated its exploration missions. These are conducted by the national personnel specialized in specific crops and in agricultural botany in general. Some of these missions are conducted jointly with personnel from other institutions such as CATIE, USDA, CIAT. A comprehensive programme has been launched to rejuvenate the collections, evaluate the material with the established descriptors and maintain the collections of various types as working collections and living collections. Storage facilities at 0-5°C are available at Chapingo, Ciudad de Obregon, Sonora and Rio Bravo. For working collections, two other similar storage facilities are planned. In addition INIA is planning the establishment of a major central facility for long-term storage for which the support of IBPGR will be requested.

The support of IBPGR has also been requested for a collecting mission for Capsicum sp.

INIA has access to a major computer facility with which the use of the EXIR programme has been tried. More recently INIA has been in contact with IS/GR and has now a micro computer on loan into which the data on maize and beans are being entered using the GDN system. A staff member of IS/GR has helped to install the micro computer and establish the programmes which are now run by INIA personnel.

Although the germplasm unit of INIA has a core of experienced personnel (10 professionals), 1/ it feels the need for training more staff with the help of IBPGR, CATIE and some of the IARCs. INIA has established active relationships with a large number of genetic resource institutions in the region and elsewhere and is keen to play an important role in further regional cooperation in this field.

8. Visit to the National Seed Storage Laboratory (NSSL),
Fort Collins, Co., USA

A short visit ^{2/} was made to NSSL which is one of the repositories which has agreed with IBPGR to store major base collections. NSSL has

1/ Breeders in the experimental stations also contribute to the work of evaluation and rejuvenation of the material.

2/ People met during the visit were Dr. L.N. Bass, Director; Mr. D. Clark, Botanist (Data Management); Dr. E. Roos, Plant Physiologist (research); Dr. P. Stanwood, Agronomist (Germination, cryogenic storage).

specifically agreed to accept responsibility for storing base collections of rice (Mediterranean forms, temperate, South American and intermediate types from the USA; wheat - i.e. the US collection and a duplicate of Bari collections; maize - new world material; cultivated and wild sorghum; cultivated and wild pearl millet). 1/

Facilities at Fort Collins include a series of cold chambers with temperature controlled between -5° and -20°C; a laboratory for preparation of samples for storage and germination tests and a laboratory for research on seed physiology and cytogenetics of the material under cold storage conditions. Equipment for storage of liquid nitrogen and for data processing is also available.

The NSSL is the federal institution established under USDA/SEA for long-term seed storage. A policy statement establishes the rules under which this laboratory operates within US and in the relations with other countries.

There is no detailed formal agreement between NSSL and IBPGR. An exchange of letters between IBPGR and the Administrator for Science and Education has indicated the readiness of NSSL to store the material collected under the auspices of IBPGR and that of the IARC. Material may be received by NSSL as base collection for long-term storage or for temporary storage for collections which are in jeopardy until conditions permit safe storage in the country of origin.

For the time being NSSL plays the role of a warehouse for duplicates of material which are stored at CIMMYT, IRRI, CIAT. Botanical seeds of potato from CIP will eventually also be stored at NSSL. At the present stage, the parcels received from these centres and from Bari have been placed directly in the cold store. NSSL is in the process of reorganizing its collections and its catalogues. The parcels may eventually be opened and the material undergo the routine process for storage in aluminum bags after germination test, cleaning and drying.

Material has also been received from several collecting missions mounted by IBPGR, for example from Nepal and East Africa. In addition USDA has recently requested several countries to send duplicates of their collections to NSSL.

1/ The Laboratory does not have a special register for this material and it was not possible during the short time of the visit to obtain detailed list of collections sent by IARCs and IBPGR.

The information on the material received from the IARCs and other sources as indicated above has not been recorded in the overall data management system operated by NSSL. The Laboratory will need additional shelf space to store this material and for the moment the information on this material is kept in the filing cabinets of the Laboratory.

Several data systems have been used in succession by the Laboratory. The Laboratory did not use EXIR as it was considered too cumbersome and expensive. The Laboratory concentrates at present on the data system for the management of the collections. It is also using this new system as a pilot project for two crops (Phaseolus vulgaris and Cyanopsis tetragonoloba).

NSSL plans to have basically two data systems: one for the management of the collection and another which would have a capacity for interactive processes with the users and may be accessible by the research stations throughout the US.

NSSL keeps in touch with the staff of LISA which has grown from staff formerly at Boulder but there are no cooperative projects between NSSL and LISA at this stage.

The policy of the Laboratory as regards material of foreign origin is the same as that of local provenance: any request for samples of accessions available in the collections will be referred to the institution which has originally provided duplicates to NSSL. For example, a request for samples of the maize collections sent by CIMMYT to NSSL would be referred to CIMMYT. Only in case the originator may not be able to provide the sample, NSSL would consider other arrangements.

The material which is sent from abroad goes first through the Germ Plasm Quarantine Centre at Beltsville for phytosanitary control. The material is not grown at this stage but the seeds are inspected and the phytosanitary certificates of the originator are checked. The material is then sent to NSSL for storage. If a sample of this material is requested for use in the USA, it will have to go through the Plant Introduction Station in the US for disease control prior to its release.

The cooperative arrangements between IBPGR and NSSL are still in an initial phase. The detailed responsibilities and the procedures have been clarified but do not seem to have been spelt out in a written agreement.

The Laboratory is in a stage of reorganization of its collections and of the related information. Although there are definite signs of goodwill and readiness to cooperate with IBPGR, it will take some time before the Laboratory undertake to store additional material in conditions similar to those of its own collections. For the time being, the Laboratory essentially

acts as a warehouse facility for the material which is provided through the IARCs and IBPGR.

As this cooperation further develops, it will be essential for the NSSL to have from IBPGR a more precise information and advance notice on the collection missions which are requested to send material to the Laboratory. The specifications for the samples to be sent to NSSL (in particular the minimum number of seeds) will also have to be determined. A meeting of the curators of the international and national collections with NSSL may help to develop a better understanding of their respective responsibilities and of the procedures for their cooperation, in particular as regards the regeneration of the collections and the distribution of material.

9. Main observations and issues for the consideration of the Panel

There is a considerable amount of ongoing activities in Latin America in the field of genetic resources conservation. Some of these were initiated several decades ago, others more recently. The Board has since 1976 promoted these activities through regional meetings and grants to national institutions and IARCs. (Some 25 grants for about half a million US dollars):

(i) The most tangible results of these grants are the collection of additional material (mostly maize, forages, Phaseolus beans, Solanum species, Andean grains and tubers, and groundnuts) and the improvement of storage conditions, organization of collection and documentation at several national and international centres.

(ii) The cooperation of national and international institutions has been increased through several meetings convened or sponsored by IBPGR (for maize germplasm in the Southern Cone, for various species in Meso-America).

(iii) Several national programmes and international centres appreciate the help of IBPGR (i.e. through IS/GR) in establishing computerized data systems for the management of their collections and also, in a few cases, for storing detailed information on the material collected and evaluated with established descriptors.

Several other initiatives have been taken concurrently without the direct support of the Board. The most important are the establishment of the CATIE/GTZ programme in Turrialba which could probably serve as a model and a training ground for the national programmes which plan to establish modest but effective facilities for germplasm conservation; the establishment of GENARGEN in Brazil (which was not visited by the mission) and of the Genetic Resource Unit of INIA in Mexico. These two national institutions have both central facilities and actual or proposed storage and evaluation programmes in their regional experimental stations.

The interventions of the Board in the region took into account these parallel activities and tried to complement and capitalize on the past and ongoing work. For these reasons, the activities of the Board may at first sight appear scattered, somewhat unrelated, and opportunistic. In fact, the Board tried to take advantage of the expertise and interest shown in different institutions to get as much collection work under way as possible, and to cope with emergencies, in particular as regards the deterioration of the material already collected. As a result, most of the institutions visited do not have a clear understanding of their long-term commitments vis-à-vis the Board.

The Panel may wish to discuss with the representatives of the Board whether the time has now come to develop regional mechanisms and cooperative programmes which would give more cohesion to its activities in the region and so enhance the impact of the grants which have been distributed so far. The priorities in terms of crops and subregions could be reviewed at this opportunity, taking into account those of the countries concerned. It would be also important to examine whether the geographical distribution of the activities of the Board and of the material collected actually correspond to these priorities and whether some imbalance should be corrected. Similarly, it seems necessary to examine in more depth the implications of the growing quantities of material collected in terms of storage, maintenance, cataloguing, rejuvenation, duplicates for long-term conservation, use in breeding programmes, etc.

All the institutions visited showed a growing concern for the additional workload which their cooperation with the Board is creating. It seems therefore essential that the Board assist these institutions in sharing this workload and in clarifying their respective roles and responsibilities, in particular those for storage (short-term and long-term), rejuvenation and evaluation.

Most of the institutions visited consider that the lack of trained personnel in the countries of the region is a major obstacle to the development of their activities and would wish the Board to be more active in this field. The need for a clear political commitment at the government level appears to be an essential first step in establishing a national focal point-institution for genetic resources conservation and for regional cooperation.

An important aspect of the maintenance of the genetic diversity is related to the methods and procedures by which the collections are used to make gene pools (back-up pools) for the international crop improvement programmes. It would seem important that the Panel discuss with the Board the role which it could play in this respect in cooperation with the IARCs.

Several institutions visited have suggested that the Board should be more active in promoting basic research on several problems which have a bearing on genetic resources conservation. These include the methods of conservation and exchange of vegetatively propagated material and of the recalcitrant seeds; the methods of rejuvenation of collections in particular for open pollinated crops; the taxonomy of some of important crops (e.g. Phaseolus); the cytogenetic changes of the material under storage; long-term storage in liquid nitrogen. The methods of collecting samples during the exploration missions should also be examined. Biochemical methods to identify gaps and duplicates in the existing collections should also be promoted.

The establishment of an international code of conduct or international convention for the collection, movement and custody of germplasm between countries has also been suggested.

All the above suggestions, if supported by the Panel, would probably lead to an increasing demand on the financial resources of the Board. The Board has so far used essentially its "core" resources for its programme. The Panel may wish to discuss with the representatives of the Board the possibility of using extra-core resources, i.e. special projects as commonly used by the IARCs.

The Secretariat has established a standard format for the contracts between the Board and other institutions. This format has been well conceived to make sure that the activities financed by the Board meet certain specifications. It would seem essential that in addition the Board spell out the methods and the criteria used for deciding the allocation of its resources to specific institutions. The respective roles of the Secretariat, of the Crop Advisory Committees, of any regional committee which may be created and of the IARC concerned (when applicable) should be clarified in this respect.

The above observations should be examined in the context of the generally very positive impression which has been gained throughout the mission, of the important and useful role played by the Board in the region.

10. Acknowledgements

The kind cooperation and hospitality of the persons met during the visits at CIP, PCIM, CATIE, CIMMYT, INIA and NSSL 1/ are gratefully acknowledged. Thanks are due also to the IBPGR Secretariat for the preparation of the mission and the background documentation provided.

1/ The list of the persons met is given in the sections of the report related to each of these institutions.

11. Documents Consulted

1. Summary of major activities of IBPGR in Latin America
(past, present and future)
Annex I - Training for Latin America
Annex II - IBPGR funded projects in Latin America
2. Programa Cooperativo de Investigaciones en Maiz,
Universidad Nacional Agraria La Molina, Lima, Peru
3. Programa de Recursos Genéticos CATIE-GTZ
4. IBPGR: Informe de la Consulta en Actividades sobre
los Recursos Genéticos en Mesoamerica
5. Informacion general sobre la Unidad de Recursos Genéticos
del INIA de Mexico
6. Extract from CIMMYT Review 1978
7. Extract from the CIP Annual Report 1977/78 and the TAC
Quinquennial Review Mission to CIP
8. Plant Genetic Resources: Conservation and Use National
Plant Genetic Resources Board (USA)

APPENDIX III

IBPGR QUINQUENNIAL REVIEW

Report on A Visit to Asia

8 October - 22 October 1979

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Visit to Asia - 8 October to 22 October 1979

1. Itinerary

The mission to Asia was composed of Prof. N.W. Simmonds, Panel Chairman and Mr. S.A. Risopoulos, Deputy Executive Secretary, TAC.

- 8 October - Left Edinburgh and Rome, respectively, and travelled overnight
- 9 October - Arrived Delhi early morning
- 10 October - At Delhi
- 11 October - Travelled Delhi - Hyderabad
- 12-13 October - At Hyderabad
- 14 October - Travelled Hyderabad - Bombay - Jakarta, arriving in the evening
- 15 October - At Jakarta, to Bogor
- 16 October - At Bogor, returned to Jakarta
- 17 October - Travelled Jakarta to Manila in the morning, to Los Baños in the afternoon
- 18 October - At Los Baños
- 19 October - Travelled via Cebu to Davao, arriving early afternoon
- 20 October - Returned to Manila in the morning and travelled on to Bangkok in the afternoon
- 21 October - At Bangkok in the morning, left for Europe in the afternoon
- 22 October - Arrived Edinburgh and Rome, respectively.

2. Introduction

We travelled (8-22 October 1979) through India, Indonesia, the Philippine Islands and Thailand. Contacts with local scientists from whom we sought advice had been well prepared by the TAC-IBPGR Secretariats. From each person or group we met we tried to elicit a general discussion of and views upon the working of the IBPGR, its usefulness in the past and possible priorities for the future. The purpose of this report is formally to record the main facts relating to our visits and to indicate the tenor of our discussions. No attempt is made to draw general conclusions about Board policy; these must be reserved for the collective report of the Panel. Nor do we attempt to describe the many interesting but essentially subsidiary discussions we had on plant breeding and other agricultural matters, useful though these were in filling in the background against which the IBPGR must operate.

3. Observations

3.1 India - New Delhi

We had several long talks with Dr. K.L. Mehra, Director of the National Bureau for Plant Genetic Resources (NBPGR). In company with Dr. Mehra, we also had the

privilege of talks with Dr. M.S. Swaminathan, Secretary to the Government of India, Ministry of Agriculture, and long eminent in the affairs of the CGIAR/TAC; with Dr. H.K. Jain, Director of the Indian Agricultural Research Institute; and with Dr. C. Kempanna, Deputy Director-General, Indian Council of Agricultural Research (ICAR).

The NBPGR was established in 1976 out of its predecessor (the Division of Plant Introduction) within the Indian Agricultural Research Institute (IARI); it is now autonomous and it is expected that the complement of scientific staff will rise to about 150 under the Sixth Plan. Serious interest in genetic conservation in India goes back some thirty years, so the total effort and commitment is very substantial. The NBPGR will ultimately provide a centralized collection-introduction-storage-distribution system for all crops on an all-India basis. It maintains seven stations and a network of contacts with the 24 agricultural universities and the numerous crop research programmes of the IARI. It is seen as, basically, a service to crops research and is soon to be paralleled by similar bodies with responsibilities for animals, fish and trees.

Of the many valuable points we picked up from these interesting discussions, the following seem the most important. First, there was no doubt of the value of the IBPGR and of the importance of its work, at all levels from the practical to the political. It was suggested that it might perhaps seek more consciously to inform and influence politicians, by way of brochures and selective seminars, using the good offices of FAO, a body that had enormous prestige as well as deep commitment to the idea of genetic conservation. Most discussions tended to view the IBPGR-NBPGR linkage as the natural one, placing less emphasis on regional organizations and the IARCs. The formation of a regional committee had been regarded as premature at the 1978 Workshop (ref. 1), but we understood that views might now be changing on this matter. As to the IARCs, the value of their work both in breeding and genetic conservation was not at all in doubt but we had the impression that relations with national bodies had not always been as good as they might have been. It seems that the Centres would do well to be as selfeffacing as possible in order to minimize damage to national susceptibilities. We learned later that Centres are indeed now very conscious of this and of the necessity of local development of their products through national agencies.

Two (related) points about the Board itself arose at one of our discussions. It was suggested that the Board was a diverse and rather distant body, with insufficient professional expertise and local knowledge to cover adequately the complex decision that it had to make. More expertise (on the Board itself or by way of special

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consultancy), plus formal regional representation were suggested as remedies.

At a more practical level, the value of training courses, and the desirability of the IBPGR providing help to local initiative in this connection, was repeatedly emphasized (a recurrent theme of later discussions). Dr. Mehra showed us the interesting book he and his colleagues had compiled for what had clearly been a very successful recent IBPGR/NBPCR course at Delhi (ref. 2). Other technical points of interest included the observation that the IBPGR will soon have to move away from seed-crops into the much more difficult area of clonal crops. This will generate new demands for supporting research and will draw attention to the problems of quarantine; what will the Board be able to do to minimize the difficulties of international movement of clonal materials?

Finally, it seemed to be pretty generally agreed that computing-documentation aspects of genetic research work had been too heavily emphasized in the early years of the work of the IBPGR.

3.2 India - Hyderabad

At Hyderabad we had the pleasure of several talks with Dr. M.H. Mengesha (Head of Genetic Resources Unit, ICRISAT) and also of productive discussions with: Dr. J.S. Kanwar (Deputy-Director, ICRISAT), Dr. P. Williams and Dr. R.W. Gibbons (ICRISAT); and with three Directors of All-India Coordinated Crop Improvement Programmes, Rajendranagar, namely: Dr. R. Seetharaman (rice), Dr. R.V. Vidyabushanan (sorghum) and Dr. Vikram Singh (oilseeds).

Once again, no-one doubted the value or importance of the IBPGR, especially as an instrument of awareness and influence at governmental level. The relationships between the AICCIPs and the appropriate IARCs (rice with IRRI, sorghum and groundnuts with ICRISAT) were obviously good and there was clearly an excellent flow of materials, ideas and people in both directions. Similarly, the Sorghum and Millets Committee (ref. 3-5) and the Legume Panel (ref. 6), promoted by IBPGR and centred at ICRISAT, were thought to be valuable agencies for information flow (though a tendency to press the Centre into genetic resource activities beyond the boundaries of its mandate crops was noted).

More generally, we wondered whether, when a major crop was fairly well collected and the mandated subject of a Centre, then the interest of the Board in that crop should decline. True, the Board would probably still need to promote information flow and might well support further collecting on a strictly limited ad hoc basis but the need for major involvement would have gone. In this situation, the crucial need for good working relations between Centres and national agencies deserves emphasis.

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Finally, we discussed extensively the connection between conservation and exploitation. All agreed that these were distinct functions which had, nevertheless, to be closely integrated. Neither breeding nor conservation should dominate the other. As to evaluation, it was felt that the extent to which this could be done in the collection itself was very limited; generally, breeders would have to do their own evaluations and data bases would be functionally separate.

3.3 Indonesia - Bogor

At Bogor we had the pleasure of several talks with Dr. Setijati Sastrapradja (Director, National Biological Institute, LIPI) and with her colleague, Dr. M.A. Rifai, both members of the Indonesian National Committee. Dr. Setijati is also a member (lately Chairman) of the IBPGR Regional Committee (ref. 9 et seq) and has long been distinguished for her contributions to the work of the Board. We were, unfortunately, unable to meet the National Committee collectively, as had been planned, but were able to talk with two members in their offices: Dr. B.H. Siwi (National Agricultural Research Centre) and Dr. I.G.M. Tantra (Forestry Institute). We also met Dr. R.J. Deswert (Industrial Crops, a colleague of Dr. A. Mamid who is also a member of the National Committee).

We got many valuable points. The importance of the Board as an agent for influencing governments and for promoting awareness at all levels by judicious training programmes and publicity was repeatedly emphasized. It appeared that the Indonesian Government is already highly aware and, besides supporting substantial efforts on specific crops, is developing important legislation for the protection both of extensive forest reserves and also of designated field collections of tree crops. The latter is a particularly interesting idea because it would give the maintenance of perennial collections the force of law.

In view of the importance of perennial (often clonal) crops in Indonesian agriculture, it is not surprising that a good deal of thought had been given to the related problems of clonal maintenance, of non-storable ("recalcitrant") seeds and of quarantine. We all recognized that these are questions with which the IBPGR will soon have to grapple, as the major annual crops progressively come under control.

As at Hyderabad, we found that the rice breeders had good working relations with IRRI and that excellent progress in collecting, conservation, exchange and exploitation was being made; Dr. Siwi showed us his new storage facility, soon to be commissioned.

Again, as elsewhere, we found that the view prevailed that conservation and exploitation should be distinct but complementary activities. Workers in charge of collection and plant breeders have large areas of common interest but distinct

responsibilities. Similarly, Dr. Sastrapradja's distinction between botanical evaluation within the collection and agronomic evaluation somewhere else, with separate objectives and data bases, parallels the distinction also made in Hyderabad and elsewhere. On documentation, the trend of opinion was clear: that this activity (especially the computer aspects) had been overemphasized in the past. The use of computers should be secondary to the acquisition of well-founded data and might often be long (even indefinitely) delayed, depending on local circumstances.

3.4 Philippine Islands

We first visited IRRI and had the benefit of an introductory discussion of the work of the Institute with Dr. M.D. Pathak (Deputy-Director, in charge of the Genetic Evaluation Unit, GEU) followed by a talk with Dr. T.T. Chang on the work of the GEU in relation to genetic conservation. In company with Dr. R.V. Valmayor (Deputy-Director, Philippine Council for Agricultural Research and Resources, PCARR) we visited Dr. R. Lantican and his colleagues of the newly formed Institute of Plant Breeding, recently developed out of the long-established University Department. The Institute is acquiring new buildings on the Los Baños site and we walked round them; the buildings are in an advanced stage of construction and include a medium-term seed storage facility. Dr. Valmayor kindly accompanied us to Davao where we saw, in company with Mr. F. Lomuljo, the first stage of development of the base collection of bananas growing well on a very attractive site. Collection in the Philippines proceeds and the problems of introducing clones from other countries in South East Asia, and further afield, will soon have to be faced. At Davao we also saw something of the work of the Philippine Coconut Authority, by courtesy of the Manager, R.C. Blancaver.

Notable points at IRRI included the following: the insistence on a "low profile" whereby good varieties emerging from the GEU programme are named by the breeders/selectors in the countries concerned; the close collaboration between GEU workers at IRRI and breeders in other countries, along with the intensive biannual courses run for visitors; the close integration in the GEU programme of genetic resource conservation work in the rice collection proper with breeding programmes but the clear separation of functional responsibility for conservation and breeding (with separate data bases); we noted also the huge scale of the collection (ca. 60,000 entries and still growing) coupled with superb storage facilities (nearly complete) and locally-developed computerization.

In our more general discussions about the functions of the IBPGR, several of the, by-now, familiar points again emerged: the importance of promoting awareness at all

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levels by propaganda, publications and training; the importance of perceived national interest as an essential basis for effective regional organizations; the need to develop agreed descriptor systems as the basis sine qua non of documentation; the feeling that computerization per se had been somewhat over-supported in the past and that, when required, it should grow out of local needs with ad hoc adaptation to the local computing resources; and, yet again, the perception of technical and quarantine problems to come when clones and tree crops are tackled seriously.

3.5 Bangkok

Our stay here was short and we met only Dr. R.B. Sing, IBPGR Officer for S.E. Asia. Short as it was, we had several hours of intense discussion of great interest. Although he had only been in post for a few months, Dr. Singh had clearly started to become acquainted with his "parish" and had thought deeply and effectively about the functions of the IBPGR and his own responsibilities (ref. 17). Our talk ranged systematically over the whole field. Rather than try to summarize conclusions specifically, we shall only say that we found a high level of agreement between Dr. Singh's observations and our own views (which were, by then, beginning to crystallize into, we hope, a more coherent form than they had taken earlier). We took this to be an encouraging sign but note, cautiously, that the Review Panel as a whole has yet to meet. At all events, Dr. Singh's perceptions of the IBPGR as a whole and of the situation in South East Asia will be of substantial value.

4. IBPGR achievements in the area

4.1 Preliminaries

South East Asia has shown, among the different regions of the world with significant crop diversity, unusual perception of the importance of genetic resource conservation. This was evidenced by the holding in March 1975 at Bogor of a Symposium on S.E. Asian plant genetic resources (ref. 8). It was the result of close collaboration between Dr. Setijati Sastrapradja (who was later to become a prominent member of the IBPGR and a driving force behind IBPGR regional germplasm conservation and coordination efforts), FAO and regional institutions such as the Regional Centre for Tropical Biology of the S.E. Asia Ministers of Education Organization. Among the recommendations made was one addressed to the newly created IBPGR for the convening of a regional working group which would prepare a regional cooperative plan for genetic conservation. This was agreed to by the IBPGR and effected in December 1976 in Manila under the co-sponsorship of the Philippine Government (ref. 9). The working group provided a current statement of the genetic

resources work in the five participating countries (Indonesia, Malaysia, Papua New Guinea, Philippines and Thailand), and of the programme of regional and international organizations which had a bearing on genetic resources conservation in S.E. Asia. During the discussions, points of agreement were reached which laid the foundation for a regional cooperative programme. An organizational framework and plan of action were provided, with targets for exploration and collection, priorities for crops and agreed sites for collection. This plan was approved by the IBPGR and agreed to by the five Governments. The latter agreed to nominate spokesmen to serve on an IBPGR Regional Committee.

4.2 The IBPGR Regional Committee for S.E. Asia

The first meeting was held in Bogor, Indonesia in July 1978, and a second one in Sanur, Indonesia in July 1979 (ref. 11 and 12). During such meetings, participating countries relate the progress made in genetic conservation, review the regional crop priorities, define procedures for moving accessions into base and working collections, identify training needs and relevant training programmes, consider and define IBPGR regional budget allocations to national and regional programmes. There is therefore an excellent interaction between IBPGR governments and national and regional activities, a linkage reinforced by the appointment of an IBPGR regional officer, Dr. R.B. Sing, located in the FAO Regional Office in Bangkok.

4.3 Regional Activity in South Asia

In this region, the coordinating role of IBPGR was slower to develop than in S.E. Asia. An IBPGR Working Group met in May 1978 in Delhi (ref. 1) under the co-sponsorship of IBPGR and the Indian National Bureau of Plant Genetic Resources. Representatives from India, Bhutan, Nepal and Sri Lanka identified national priorities for the collection of genetic material and formulated recommendations as regards collection, storage, information, training and liaison. Since the meeting Bangladesh has agreed to cooperate. At this stage no committee has been formulated but countries have been asked to nominate liaison officers.

4.4 Crop Advisory Committees

There are two centred in this region, one in IRRI (rice) and one in ICRISAT (sorghum and millets). The Rice Advisory Committee met in 1976, 1977 and 1978 (ref. 14, 15 and 16). A good record is kept of who sends what and to whom and agreements have been reached as regards storage descriptors and an action plan for collecting. The Sorghum and Millets Advisory Committee met in 1976, 1978 and 1979 (ref. 3, 4 and 5) and has identified the priority species and areas for collecting as well as advising on base storage. An explanatory Panel on legumes has also been held at ICRISAT (ref. 6)

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4.5 Grants made by IBPGR

The material assistance given by IBPGR went in S.E. Asia to the collection of tropical fruits (Indonesia, Thailand, Philippines), tuber crops (Indonesia), grain legumes (Thailand), rice (through IRRI), banana (Malaysia, Thailand, Indonesia), coconut (Indonesia), vegetables (Thailand). A base regional storage facilities is being assisted in the Philippines and additional small units funded for Indonesia and Thailand. In S. Asia, grants were given for the collection of cereals (India, Nepal), rice (through IRRI) and grain legumes (Bangladesh).

4.6 Training

The major feature of training in S.E. Asia were the regional courses on plant genetic resources exploration techniques at Bogor in 1977, 1978 and 1979, which were attended by a total of 50 trainees from the region. These IBPGR courses followed an FAO/UNEP/UNESCO course in 1975 at Bogor. This was complemented by a first regional training course on genetic resources documentation which was held in the Philippines in 1979 in which 16 trainees participated. In S. Asia, the first regional training course on plant exploration and collecting techniques was held in India in 1979 (ref. 2); it assembled 13 trainees. Seven trainees from either S. or S.E. Asia attended the two IBPGR courses at Edinburgh University on seed technology for gene banks which were held in 1978 and 1979. Seven trainees attended the two FAO/IBPGR courses on genetic resources information system which were held in Colorado University at Boulder. From 1975 to 1979, 26 students from S. or S.E. Asia followed the M.Sc. International Training Course in Conservation and Utilization of Plant Genetic Resources at Birmingham University, U.K. Three of these were supported by IBPGR. Others received grants from various sources, mostly from the British Government.

5. Summary

5.1 The main value of this journey lay in the opportunity it gave to fill out the impressions gained from reading the preliminary documentation and to get some feel for the views of the practitioners and users of the products of genetic conservation. In general, we found that the work of the Board has been and is highly appreciated in the area; it has made good (though uneven) progress in stimulating interest, awareness, training and practical collecting/conservation activities.

5.2 The leading conclusions from the viewpoint of IBPGR strategy seem to be the following: (a) the importance of promoting awareness and interest at all levels from the governmental/political to the worker in the field; seminars, publications and training all have parts to play; (b) the basic nature of national commitment to the idea of genetic conservation, without which regional/international organization is unlikely to be fully effective - (a) is clearly a prerequisite for (b).

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5.3 At a more practical level the following points emerged: (a) the value of diverse technical training, adapted to personal needs, and ranging from prolonged courses at post-graduate level to short, intensive courses with much local emphasis, whether national or regional; (b) the technical problems of collection, maintenance and exchange of perennial crops, including clones and trees (often with short-lived seeds); the problems will be manifold, the solutions not easy; (c) the need for good descriptor lists internationally agreed and used; computerization, as and when necessary, should arise ad hoc from locally perceived needs; and (d) the essentially distinct character of conservation and exploitation; these are complementary activities implying distinct responsibility but close integration and collaboration.

5.4 The above points represent, fairly we believe, a consensus of opinions we received on our tour from colleagues in India and South East Asia; the Review Panel is not, of course, committed to agreement with them and will, in due course, form its own opinions. But we think it unlikely that the Panel will dissent substantially from them.

6. Acknowledgement

We acknowledge, with gratitude, the very generous way in which colleagues named in this report gave of their time and wisdom in helping us with our study. And we thank them also for many personal courtesies. Our best thanks are also due to FAO Offices in Delhi and Djakarta for help with practical arrangements.

7. References to Documentation

The following documents pertain specifically to our travels; papers relating to the IBPGR generally are listed in the collective report.

- Delhi
- (1) Report of IBPGR Workshop on South Asian Plant Genetic Resources, New Delhi, 1978 (AGPE:IBPGR/78/17), with subsequent brief report on progress)
 - (2) South Asian Training Course on Plant Exploration and Collection, New Delhi, 1979, ed. Mehra and Arora
- Hyderabad
- (3) Advisory Committee on Sorghums and Millets, I, 1976 (AGPE:IBPGR/76/17)
 - (4) Advisory Committee on Sorghums and Millets, II, 1978 (AGPE:IBPGR/78/1)

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(5) Advisory Committee on Sorghums and Millets, III, 1979

(6) Panel on Collection of Legume Germplasm, 1978

(7) ICRISAT, General Information, 1979

South East Asia (General) (8) South East Asian Plant Genetic Resources, Bogor, 1975, ed. Williams, Lamoureux and Soetjipto

(9) A Cooperative Regional Programme in Southeast Asia: a proposed organizational framework and plan of action, Los Baños, 1976 (AGPE:IBPGR/76/37, 1977)

(10) Proceedings, Southeast Asian Workshop on Plant Genetic Resources PCARR/IPBGR, Philippines, 1977)

(11) Regional Committee for Southeast Asia, I, Bogor, 1978 (AGPE:IBPGR/78/20)

(12) Regional Committee for Southeast Asia, II, Sanur, 1979 (AGPE:IBPGR/79/39)

Indonesia (13) Pamphlets on the activities of the National Biological Institute (LIPI), the National Germplasms Committee and the Southeast Asian Regional Committee

Los Baños (14) Proceedings of the Workshop on Genetic Conservation of Rice, IRRI, 1977 (pub. 1978)

(15) Advisory Committee on Rice, I, IRRI, 1976 (AGPE:IBPGR/76/9)

(16) Advisory Committee on Rice, II, Beltsville, 1978 (AGPE:IBPGR/79/19)

Thailand (17) Terms of Reference for Dr. R.B. Singh (IBPGR note, no ref. no.) and Dr. Singh's observations on a list of questions addressed to him.

IBPGR QUINQUENNIAL REVIEW

Visit to Department of Plant Biology, Birmingham University

22 - 23 November 1979

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Visit to Department of Plant Biology,
Birmingham University, 22-23 November 1979 ^{1/}

1. Introduction

The purpose of the visit was to learn something, at first hand, of the MSc course in Conservation and Utilization of Plant Genetic Resources run by Prof. J.G. Hawkes. The course has been supported by the IBPGR for some years and the need to know something of its structure and working had become clear during the preliminary work of the IBPGR Quinquennial Review Panel. With TAC approval, therefore, and the kind agreement of Prof. Hawkes, I visited Birmingham on 22-23 November 1979, travelling down overnight from Edinburgh on November 21 and returning late in the evening of the 23rd.

2. Historical

The course was started in 1969-70 in response to Prof. J.G. Hawkes' perception of a wide international need. The present year (1979-80) is therefore the eleventh. To date, 133 students, from 38 different countries, have been accommodated. A majority (86) were from less developed countries and, of the remaining 47, 41 were from the U.K. The intake hastended to rise over the years and, judging by the flow of applications, there has been no decline of international interest, indeed rather the reverse.

From the start, teaching was mostly by the staff of the Department, but with important contributions by the Genetics Department and a few visiting teachers. Since 1975 the course has had substantial support from IBPGR, which permitted the addition of a lecturer in plant breeding to the teaching staff, a technician and miscellaneous minor expenditures. Though basically a "taught MSc", there has always been a substantial project/thesis element.

Of the first ten years' products (100 graduates) enquiry showed that about one third were directly involved in genetic resource work, nearly a half were in related activities (teaching etc.) and about a quarter had left the field or could not be traced.

The course, it should be noted, is unique. A few proposals that similar courses were to be set up elsewhere all apparently came to naught.

^{1/} by Prof. N.W. Simmonds

3. Present Structure

3.1 Contents

The component courses are as follows:

1. Introduction; 2. Cultivated plants; 3. Economic plants; 4. Taxonomic methods; 5. Population genetics; 6. Variation in plants; 7. Agricultural systems; 8. Agro-ecology; 9. Plant Pathology; 10. Biological statistics; 11. Data processing; 12. Documentation; 13. Plant Exploration; 14. Conservation; 15. Utilization; 16. Plant Breeding; 17. Forest genetic resources.

The total is about 200 lectures plus practical classes and excursions, plus visiting speakers. Items 5 and 10 in the list above are given by the Genetics Department, item 11 by a Computing Department lecturer and item 7 by a visitor from London. The rest are given by Prof. Hawkes and his departmental colleagues.

This work occupies the three terms from October to June. From July to September the students do their projects and write reports. A great deal of work goes into the preparation and supervision of projects, which all have a substantial experimental content but must be capable of yielding useful results in two or three months, July-September. A few projects are done at labs away from Birmingham (e.g. agricultural research institutes) and these have gone well; but one attempt to locate projects in an overseas lab did not work well.

Of the excursions, one deserves special mention. In 1979, the class, with IBPGR support, visited Edinburgh for a week of intensive tuition in Seed Technology at the Edinburgh School of Agriculture. This fitted in well, between the completion of thesis work and the oral exams at the end of September. By all accounts, the visit was very successful and Prof. Hawkes hopes that it can be repeated.

3.2 Students

As noted above, a substantial majority of students are from less developed countries (14/18 in the current year) and there is no evident fall in demand for places. The 18 now in training are about as many as the staff and resources can sustain.

3.3 Resources

The Department has modern, well-equipped laboratories and clearly benefits, from the point of view of post-graduate teaching, both from the proximity of other strong science departments (Genetics is in the same building) and from the

geographical location of the University (Birmingham is near the centre of England). The experimental ground (Winterbourne) is only about a kilometre away, with plots, gardens, glasshouses and modern laboratories to accommodate, among others, the MSc class.

3.4 Funds

Most of the cost of running the course is met by University funds (which contain, of course, a notional element derived from the fees paid by MSc students). The IBPGR grant (48 k\$ this year) supports a lecturer in plant breeding, on a year-to-year basis, a technician and sundry minor expenditures.

The great majority of students are supported by grants from governments, international bodies (FAO, IBPGR) and foundations; very few come privately.

3.5 Observations

The course has sometimes been criticized as being "overacademic", a criticism of which the Birmingham staff are well aware. An earlier weakness in the plant breeding/exploitation aspects of GRC work was largely remedied by the appointment, with IBPGR support, of a lecturer in the subject (para. 3.4). A continuing weakness in the area of field exploration/collecting work is recognized by all but is far harder to correct: Birmingham is just not a suitable place for practical experience of this nature. However this aspect is very well covered by local short courses within the tropics, so these and the MSc course are effectively complementary. Thus the MSc has its limitations on the more practical side but these can be repaired elsewhere; and if it be agreed that there is need for fundamental training then this MSc certainly supplies it, as no other course in the world does. Indeed it is probably more accurate to describe it as fundamental than as academic. However, the fact of a basically botanical rather than agricultural orientation remains.

4. Short courses

From a beginning in 1978/79, the same department has offered several short courses in genetic conservation, of duration 5, 10 and 13 weeks.

The titles are: Crop plant diversity,
Genetic exploration and conservation,
Documentation and information,
Management and Evaluation and Utilization.

Each contains lectures, practicals and project work. They are designed to introduce more mature workers (already of MSc or PhD or equivalent status) to genetic resource conservation work (especially those workers who cannot be away for long). Space limits numbers of admissions to about two people per course. The project is still experimental and it is too early to assess its usefulness.

./...

5. The future

Prof. Hawkes will retire in 1982 but foresees a need for the MSc course for some years after that date - judging by the yet-upward trend of applications for admission. He hopes that the IBPGR will commit itself to support (in principle and subject to funds, of course) for the next quinquennium. This would secure the course for two years after Prof. Hawkes' departure and would give the new professor time to decide whether he wished it to continue or not. It has to be recognized that the interest and encouragement of the new professor would be essential, even if he himself were not active in running the course.

6. Other matters

6.1 Talks with Prof. Hawkes

I had several useful talks with Prof. Hawkes about GRC work in general; these, in view of his long experience and activity in the field were valuable. There is no call to expound his views here but the main points will emerge in the forthcoming Panel discussions.

6.2 Talks with colleagues

Apart from discussions of matters relating specifically to the MSc teaching, I also had useful talks about scientific matters. From Dr. Henshaw and his colleagues I learned that meristem technology, at least for herbaceous plants, is in a more advanced state than I had appreciated; but that there are yet many unresolved problems in handling the meristems of woody plants. The Panel will wish to be aware of this and also of the very high levels of technique and understanding of this subject resident in this laboratory.

7. Conclusions

I had the impression of a good, though perhaps somewhat too academic (or fundamental?) MSc course run by a vigorous and enthusiastic staff, two at least, of considerable international standing. It is clear that a substantial number of very useful GRC workers from less developed countries have been trained there in the past decade, and that the flow of applicants continues. It will be for the Panel to consider, in the light of its discussion of training in general, whether it should recommend that IBPGR support be continued. Considerations that will have to be taken into account include the relative importance attached to long and short courses, rising costs and the imminence of Prof. Hawkes' retirement.

8. Acknowledgements

I am very grateful to Prof. Hawkes and his colleagues for receiving me kindly and giving up much time for discussion. Among colleagues were: Drs. G. Henshaw (tissue and meristem cultures), P. Mumford (plant breeding), D. Wilkins (ecology and adaptation), B. Ford Lloyd (numerical taxonomy, documentation), R. Lester (taxonomy, chemical methods), and D. Astley (potato systematics).

IBPGR QUINQUENNIAL REVIEW

Report of the TAC Mission to the IBPGR Programme
at Boulder, Colorado, USA

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CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

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8 June 1979

Dear Dr. Cummings,

... I have pleasure in sending herewith the report of the TAC mission on the IBPGR Information Programme at the University of Colorado, Boulder, USA. It has been a personal privilege for me to have been given by TAC the leadership of this mission and to work with such distinguished colleagues as Professors N. Simmonds and J. Warren.

As you know, the preliminary conclusions of the mission were presented to you and to Mr. R. Demuth, Chairman of IBPGR, at the end of our visit to the USA and the Panel benefitted from your and Mr. Demuth's observations.

The draft report was then considered by the Executive Committee of IBPGR at its May 1979 meeting. I was pleased to learn from Dr. T. Williams, Executive Secretary of IBPGR, that the Executive Committee had agreed with the basic thrust of the report. Through Dr. Williams, I received also from the Committee a series of comments and suggestions on the draft report. These have been taken into account as much as possible in finalizing the report while maintaining the integrity of the collective analysis and conclusions made by the Mission Panel.

I wish to thank you again and the members of TAC for the confidence placed in me for the conduct of this mission. I would also like to thank the Panel members for their hard work and the staff of the IBPGR Secretariat and the IS/GR Programme at Boulder for the cooperation extended to us during the mission.

Yours sincerely,

E. Åberg
Chairman
TAC Mission Panel on
IBPGR Information Programme

Dr. Ralph W. Cummings
Chairman
Technical Advisory Committee to the
Consultative Group on International
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812 Rosemont Avenue
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REPORT OF THE TAC MISSION TO
THE IBPGR PROGRAMME AT BOULDER, COLORADO (USA)

I. SUMMARY

1. The IBPGR programme, in addressing the information needs of an international genetic resources network, has been confronted with a difficult and demanding task. Considerable effort has been expended and substantial experience has been acquired.
2. Progress has been made in the development of descriptor lists and the storage of germplasm data in an exchangeable format. A computer package for managing germplasm data, EXIR, has been developed and distributed. A technical assistance effort using micro-computers has been initiated. These undertakings appear to have had relatively high costs.
3. Major recommendations of the Panel include:
 - (i) Assignment of the highest priority to the development of directories of centres, personnel, contents of collections and areas of activity for both germplasm related efforts and computing skills related to computing applications in agriculture.
 - (ii) Assignment of equally high priority to the pursuit of minimum descriptor lists.
 - (iii) Adoption of a policy that will avoid investments in the development of computing products or the sponsorship of such products.
 - (iv) Adoption of a policy that will limit the role of IBPGR in computing to that of arranging ad hoc advice upon request. This policy should be implemented in a manner that provides for maximum diversity in the sources of skill employed and should conserve access to the experienced personnel that have recently shifted from IS/GR to a separate USDA programme.
 - (v) Formation of an advisory committee which reports to the Executive Secretary and includes a wide range of computing background, germplasm experience and general experience in computing needs of agricultural research. This committee will advise on persons available for advisory help in computing and assist the Secretariat in reviewing the performance of advisors.
 - (vi) Adoption of revised organizational structure that places responsibility and authority for programme formulation, implementation and budgetary control with the Secretariat.

(vii) Treatment of technical assistance projects to national governments as special projects or bilateral agreements except in carefully defined and limited conditions.

4. The Panel suggests that immediate attention be given to:

- (i) Providing current EXIR users with the help needed to continue use of that package for a clearly defined period of time.
- (ii) Ensuring that EXIR is no longer to be distributed if other alternatives can be located which are more cost effective.
- (iii) Clarification of the responsibilities that IBPGR will take for the continued maintenance of the micro-computer hardware and software now being distributed in the technical assistance programme.
- (iv) The formation of an advisory committee which will assist the Secretariat in identifying sources of advice (see above (v)).
- (v) The formation of a widely knowledgeable and ad hoc working group to assist the Secretariat in preparing a directory of computing skills and products and to set up a scheme for periodically updating that directory.

II. INTRODUCTION

5. When reviewing the proposed programme of work and budget of IBPGR for 1979, TAC at its 19th meeting in June 1978 raised questions as to the purpose and financial support of the contractual arrangement which IBPGR had concluded with the University of Colorado in the field of information on plant genetic resources. The Committee decided to refer these questions to the forthcoming quinquennial review of the IBPGR which was, at that time, scheduled for the first half of 1979. Meanwhile an internal review of the IBPGR programme at Boulder, Colorado, was carried out in October 1978. This review recommended that the orientation of the programme be changed by stopping software development and concentrating on helping several designated centres to put their genetic resources information into machine readable form. These recommendations were endorsed by the Board at its Sixth Meeting in February 1979.

6. The quinquennial review was subsequently postponed to the second half of 1979. The Committee, however, recommended that the questions raised on the information programme of IBPGR should be addressed as soon as possible and this should be done before the Committee had the opportunity to examine the IBPGR proposals for its programme of work and budget for 1980. The Secretariat of TAC was therefore requested to mount a mission of three consultants to visit the IBPGR information programme at Boulder, Colorado and report to the TAC at its 22nd meeting.

7. The terms of reference of the mission were established as follows.

(i) To gain an understanding of the past and present objectives, strategies, priorities and programmes of the IBPGR in meeting the needs for improved information, documentation and communication on plant genetic resources at international level. In this context, to analyze the scope, organization and management of past and present activities supported by the Board at the University of Colorado, Boulder.

(ii) To assess the usefulness of the results obtained through the IBPGR-supported activities at Boulder in the light of the needs, in particular:

(a) to identify achievements and constraints relating to the adoption and use of EXIR by different categories of users in developed and developing countries; and

(b) to review the technical help provided to other institutions.

(iii) To advise TAC on the rationale for a continued CGIAR support to the Boulder programme, on its future direction, management and guidance, on the nature and level of support required for its component activities and on possible alternatives to the present arrangements.

8. In addition to the above terms of reference, the Team was assisted in its work by a list of questions which had been identified by reference to the documentation made available (Annex II). The list of questions (Annex I) was largely based upon a review of TAC and CGIAR discussions as recorded in the reports of their meetings and on an analysis by the TAC Secretariat of the documentation provided. As indicated in the list presented in Annex II, this documentation was considerable. It concerned mostly, however, the past and present activities of the Board in the field of genetic resources information and provided limited information on the future plans of work beyond 1979 in this field. In fact, a report on the proposed 1980 programme of work and budget was only being prepared when the mission visited Boulder.

9. At the request of the Panel, the Chairman of the Advisory Committee ^{1/} provided a note giving his personal views on future prospects regarding this programme. Like the overall document on the future plans of the Board, however, this note essentially outlined the future perspective of the activities and their organization and, understandably, could not provide sufficient information to the Panel on the future work plans and resource allocations proposed for the programme in 1980 and beyond.

10. The Mission Panel was composed of Prof. E. Åberg (plant taxonomist and agronomist) Swedish University of Agricultural Sciences, Uppsala, Sweden (Chairman), with Prof. N.W. Simmonds (plant geneticist), University of Edinburgh, UK and Prof. J.A. Warren (agricultural applications of statistics and computing specialist), University of New Hampshire, USA, as Panel members. Mr. P.J. Mahler, Executive Secretary of TAC, acted as secretary of the Panel. Mr. J. Griffith, Senior Programme Officer, World Bank, participated as an observer on behalf of the CGIAR Secretariat.

11. The mission was carried out from 4 to 9 April. The Panel first assembled in Washington on 4 April and met with Mr. F. Williams, Assistant Director, Research, U.S. Department of State, Dr. Q. Jones, Coordinator for Plant Germplasm, Science and Education Administration/Agricultural Research, USDA, Mr. D.M. Daugherty, Assistant Chief, International Programs

^{1/} IBPGR Advisory Committee on the Genetic Resources Communication, Information and Documentation System.

Staff, Science and Education Administration, USDA, and members of the CGIAR and TAC Secretariats. The Panel also met with Dr. G.N. Hersh, Director of the Laboratory for Information Science in Agriculture (LISA), Fort Collins, who was formerly associated with the information programme at Boulder. The Team then visited the Information Science/Genetic Resources Programme (IS/GR) at Boulder, Colorado, for two days where it had extensive discussions with the Director of the IS/GR programme (Prof. C. McMillan), the Chairman of the IBPGR Advisory Committee for the programme (Prof. A.H. Bunting) and with the Executive Secretary of the Board (Dr. J.T. Williams). The Team also met briefly with two former chief scientists of the programme, Drs. K. Rawal and J. Hanley, now staff members of LISA. The Team returned to Washington on 7 April, drafted its report and on the 9th presented its conclusions first to the Chairman of TAC, Dr. R.W. Cummings, and then to the Chairman of IBPGR, Mr. R. Demuth.

12. The Panel was helpfully received both at the FAO Offices in Washington and by the Group at Boulder. It wishes to record its thanks to both for the good working arrangements made and for helpful responses to requests for information.

III. GENERAL CONSIDERATIONS AND THE ROLE OF
IBPGR IN GENETIC RESOURCES INFORMATION

1. General Considerations

13. The need for genetic conservation has now been thoroughly accepted for about 10 years. It emerged from the realization, largely stimulated by FAO, that genetic resources were precious, that they were declining rapidly, that they were essentially non-renewable and that they were of profound long-term practical value. The practical conclusion was that, since the decline could clearly not be halted in situ, there was an evident necessity to conserve large collections of crop plants in perpetuity. The need is not long-term; it is immediate and infinite and it applies to all crops; none can be considered exempt. So much is now generally accepted.

14. The ultimate object is practical: to conserve variability in usable form for the benefit of plant breeding and therefore (the Panel reasonably assumes) for the ultimate benefit of mankind. This, too, is generally accepted. The procedures appropriate to the acquisition, maintenance, distribution and utilization of plant collections stem from the biological natures of individual crops; they are, as might be expected, exceedingly diverse; wheat, coconuts, bananas and potatoes pose quite different practical problems which require diverse solutions. The information component of genetic resource work is, however, virtually independent of crop biology and the technology of maintenance. Thus the problems of, for example, definition of descriptors, are often considerable but they are of the same general nature whatever the crop and it matters little whether one is considering wheat or bananas. The Panel therefore ignored biological complication and addressed itself solely to the information aspect.

15. That there is a basic need for some information about all the entries in a collection is not in doubt. The questions of what information and how much are explored below. The Panel wishes simply to note that the common idea that information management and computerization are virtually synonymous is wrong. The information about a small collection can well be handled by the purely mechanical methods traditional in the past. Large bodies of data, however, and large collections, are far better handled by computer. Declining costs of equipment will no doubt ensure that computers, already well established in the field, become ever more widely used for this purpose. This report is therefore basically concerned with computer-based methods; but one does well to recall that they are not yet universally adopted.

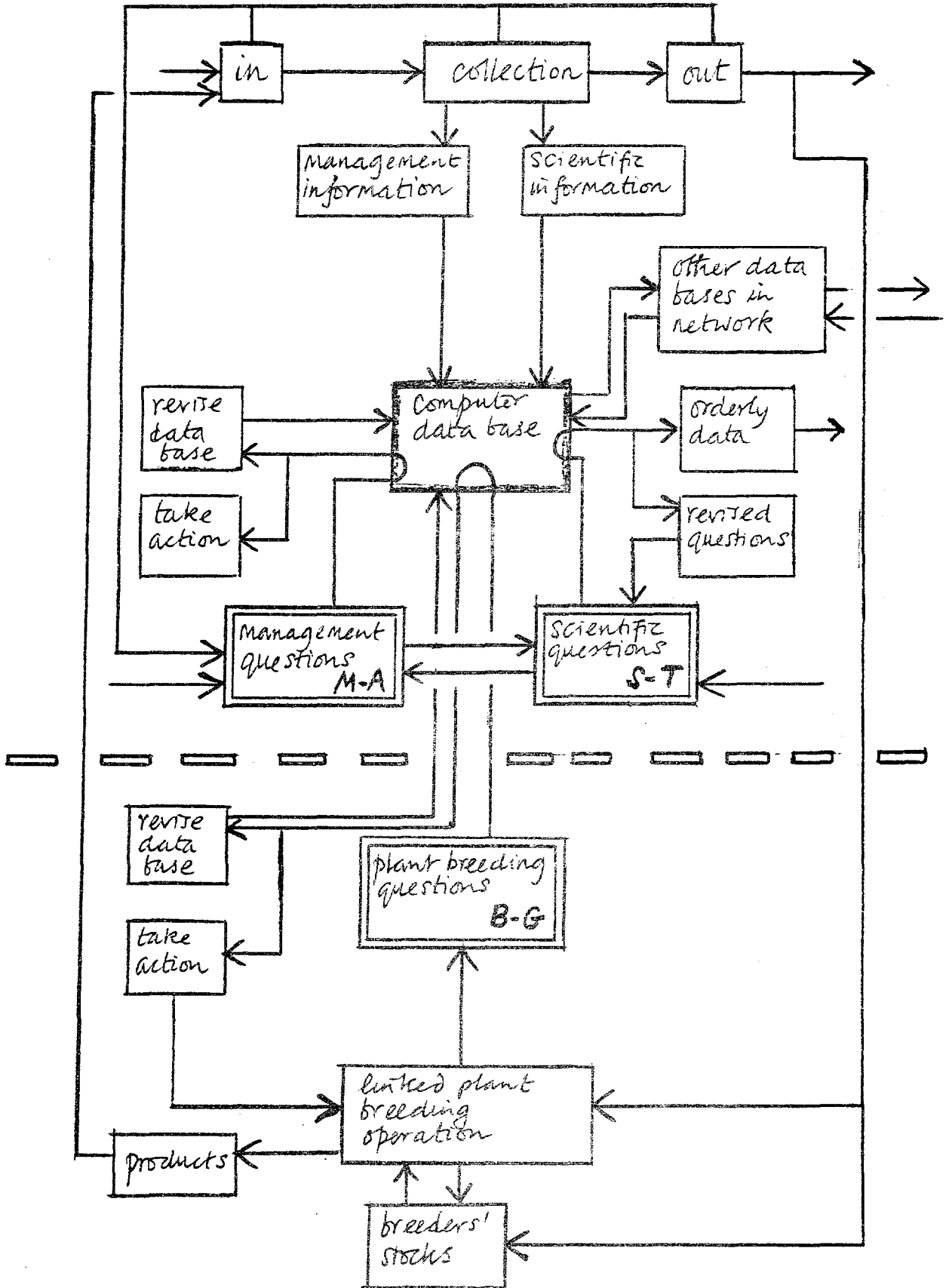
2. Kinds and Uses of Information

16. In the diagram (Fig. 1) are distinguished three kinds of information: management-administrative (M-A), scientific-taxonomic (S-T), and breeding-genetic (B-G). The first (M-A) will contain the primary data (accession number, collector, date, site, altitude, soil, etc.) and secondary maintenance data (viability, stocks in hand, regeneration, etc.). The second (S-T) will contain descriptive material contributed by the collector and taxonomic data assembled subsequent to entry into the collection. The characters recorded will be often of the yes-no, present-absent kind and will be characterized by few states, high heritability and low interaction with environmental factors; that is, they will have relatively stable expression. The third category (B-G) will only emerge from extensive evaluation studies by breeders. The characters recorded are occasionally of the simple, discrete kind (e.g. major-gene disease resistance) but are, much more often, examples of continuous, polygenic variation showing low heritability and large environmental interactions (e.g. yield, quality features, field resistance to disease).

17. The relative importance and manageability of the three kinds of data deserve comment. The first two kinds (M-A and S-T) are, in principle, relatively easily adapted to the computer. In practice, agreement as to definition of descriptors and states is not always easily attained and some variable materials (outbred or mixed populations) present problems but partial or imperfect solutions are always feasible. The basic requirement is the agreed list of descriptors (to which IBPGR has long, and certainly correctly, attached so much importance). Given appropriate machinery and software, allied to competent physical management of the collection, basic data can easily be transmitted between collections, individual lines can be at least fairly closely identified, the management of stocks can be facilitated and information can be made available to researchers. Apart from outright errors (which do happen, however), information is unambiguous, stable, easily stored and easily transmitted. It is otherwise with the third category (B-G): continuous, widely-varying characters are harder and more costly to handle by computer; the data themselves are mostly applicable to one time and one place - while they may be of some (limited) value to workers elsewhere.

18. The Panel thinks that a rather important point flows from the distinction just made. Information categories M-A and S-T are inherent in the collection itself and are jointly sufficient for its efficient operation. Any collection that provided good data of these kinds would be doing what was basically required of it. The category B-G is, in a sense, adventitious. The demand for it arises from the facts that: (a) the ultimate object of any collection is to facilitate plant breeding and (b) major collections ('base collections' in the commonly adopted

Fig. 1 - THE THREE POSSIBLE REQUIREMENTS OF A DATA BASE



EXPLANATORY NOTE ON THE DIAGRAM PRESENTED IN FIGURE 1

The information base in genetic resource work. Three kinds of data/questions are apparent (see text): M-A (management - administrative), S-T (scientific - taxonomic), B-G (breeding - genetic). Note interactions between M-A and S-T. As argued in the text, the B-G component (below the dashed line) could be incorporated in the same data base but is, in practice, separable; from the viewpoint of collection management, M-A and S-T alone are essential (and linked).

nomenclature) are often, as matters of convenience and practical common sense, closely associated with active breeding programmes. The evaluations which are the substance of B-G type data are produced by plant breeders for plant breeding purposes and for this they are essential. However, they are not essential to the efficient management of a collection and, as was noted above, pose operational and biological problems the solution of which might actually impede the work of the collection per se. In short, plant breeders will surely need to develop their own data bases for their own purposes; to associate them with collection data-bases is unnecessary and could actually be inimical to genetic resource work by generating avoidable complexity and diverting limiting resources. The simpler an information system, the more robust and the cheaper it is and the further the funds go; the basic needs of even a large collection are not too complex and should not, the Panel thinks, be confounded with the distinct (though clearly not unrelated) needs of plant breeding.

3. The Roles of IBPGR

19. Before IBPGR was established, there was no systematic collecting on a world-wide basis of all crops; the need had not been generally perceived. There were a few great national collections (the USSR, the USA) and a scatter of individual crop collections, nearly always associated with breeding programmes. There was much genetic erosion because the collections were often not very highly regarded and indeed several important ones were totally lost. The IBPGR has sought, following the basic FAO initiative (middle 1960s) to promote the conservation of genetic resources of major crops on an all-time, world-wide basis. To do this, it has generated priority lists by crops and regions, has encouraged appropriate local initiatives to collect and assemble and has promoted understanding and development of ideas on data/information management and flow.

20. The mandate of the IBPGR is wide. Very briefly paraphrased, it is to promote, on an international scale, the conservation, diffusion and utilization of any and all plant materials which are of major economic importance, either globally or regionally. The information component of its remit is covered in paragraphs 9 and 10 of its terms of reference, as follows:

"9. To promote the dissemination of information and material among centres and institutions, and to encourage, within existing resources and possibilities, the establishment of inventories of collections.

10. To make appropriate recommendations with respect to computerized information, storage and retrieval system, taking into account their suitability for an effective international

genetic resources network, and their compatibility with existing systems already in operation at some regional and national centres."

21. The IBPGR (surely correctly) recognized that there were two fundamental requirements of any information system that should effectively serve the world-wide needs of plant breeding in any one crop: (1) an orderly, agreed system of annotation and description; and (2) efficient methods of storage, retrieval and transmission of intelligible data. To promote (1) it has generated a series of committees/working groups on specific crops charged i.a. to produce descriptor lists (both minimal and amplified). This task is not difficult; it has been well begun but many crops are yet untouched and the Board plans greater pressure in this important area. The information categories covered are, of course, M-A and S-T in our nomenclature (see para. 17 above). The storage-retrieval aspect (2) is the principal subject matter of this report and is covered elsewhere. The Panel notes here that any data system is only as good as the inputs and recalls the sometimes overlooked garbage-in-garbage-out principle. An excellent data system cannot compensate for ill-chosen descriptors or poor physical management of the collection.

22. To place the information aspect of the Board's work in some sort of a time-perspective, the Panel recalls that the Board itself has remarked that it will not have an indefinite existence. Its job will have been done when a substantial fraction of the variability in each of a substantial fraction of the major world's crops is safely conserved in well-managed collections. This will not be soon. The basic information requirements will be met (in the form of accepted descriptor lists and appropriate computer systems) long before this point is reached. The Panel recalls here its opinion (para 18) that plant breeding data (B-G) need not and, indeed, in the early phases at least, should not, enter the information system.

4. Institutional Arrangements

23. Three kinds of institutional arrangements for the conservation of collections are apparent: the national, the regional and the crop-specific. National collections (for example the Russian and American ones) typically cover many kinds of crops, as also do regional ones (for example the European Gene Banks). Crop-specific collections are characteristically devoted to crops for which there is local breeding responsibility (for example rice at IRRI, sorghum at ICRISAT). It is unlikely (having regard to ecological amplitude and diseases) that any major crop could be kept effectively at one place so, in practice, collections are widely dispersed as sub-collections, the totality representing the crop as a whole. Duplication between collections is desirable as an insurance against

various local hazards. The notion of the single, gigantic, all-inclusive collection in one place is neither realistic nor biologically sensible. From the information point of view, the total data bank for a crop must also be dispersed and therefore provided with an appropriate referral system to aid searchers. So much is generally accepted and the IBPGR has worked within the general framework of dispersed sub-collections joined by freely-flowing materials and data.

24. From the information point of view, the relevance of the IBPGR's information objectives (para 20) to the practical situation will be apparent: agreed descriptors and efficient communications are essential if the system is to work. In the longer run, one expects to see a strong flow of materials and information between widely spread workers, a productive network stimulated, in part, by the catalytic activity of the Board. Workers in some crops (for example sugar cane, barley) are already in remarkably close touch with each other internationally; this must tend to facilitate, to provide a basis for, the adoption of standard descriptors and methods. Contrarywise, the Board's promotion of those last must have beneficial effects beyond the immediate objectives. These invisible colleges are, crop-by-crop, a potent stimulus to information flow.

IV. ORGANIZATION AND MANAGEMENT OF IBPGR ACTIVITIES
IN THE FIELD OF GENETIC RESOURCES INFORMATION

1. The Programme

25. The major part of the programme of IBPGR in the field of genetic resources information was and still is implemented by means of contracts with the University of Colorado, at Boulder.

26. During the first years and until 1976, the executing agency for these contracts was the Taximetrics Laboratory and the University of Colorado at Boulder. This laboratory has launched a programme for the development of a Genetic Resources Communication, Information and Documentation System (GR/CIDS), which was funded from a number of sources including IBPGR, FAO, the University of Colorado, and USDA. Within this programme, the work of the Taximetrics Laboratory in support of IBPGR was determined through joint discussions and negotiations between the Laboratory and the Board, leading to yearly contracts with specifications of the work plan, operations, and budgets.

27. In 1976-77, the GR/CIDS programme of the University of Colorado was transferred from the Taximetrics Laboratory to the College of Business Administration and was officially placed under the Division of Information Sciences Research. The procedures of cooperation with IBPGR however remained basically the same. The programme, renamed Information Sciences/ Genetic Resources (IS/GR), included both activities funded by IBPGR and others, either international or national in scope, public or private, financed from various sources including FAO, the IARCs, USDA, IBM, other US corporations, and the University of Colorado.

28. Late in 1978, a further change occurred with the departure of a large part of the staff of IS/GR to the College of Agricultural Sciences at Fort Collins, Colorado, to establish a new Laboratory for Information Science in Agriculture (LISA). An IBPGR mission 1/ was sent to Boulder at that time for an internal review of the programme. The recommendations of the internal review (i.e. to stop software development and concentrate on technical assistance) were subsequently endorsed by the Board in February 1979. The IS/GR programme then became almost exclusively confined to activities supported by IBPGR funds along with computer time provided by the University.

1/ Participants in the mission were Mr. R. Demuth, Prof. A.H. Bunting and Dr. T. Williams. Reference to the report is made in Annex II, page 2.

2. The Advisory Committee

29. After the inception of this programme, the IBPGR realized that the expertise available in its membership and in its secretariat was not sufficient to provide for the guidance and control of the highly specialized activities carried out at Boulder on its behalf. At its third meeting (in February 1976) the Board formally established an Advisory Committee on the Genetic Resources Communication Information and Documentation System, with the following terms of reference 1/:

"The Advisory Committee will be responsible to the International Board for Plant Genetic Resources (IBPGR) and will report periodically to the IBPGR, recommending whatever actions the Committee believes to be necessary or desirable in connection with Communication, Information and Documentation System (GR/CIDS) for the assembly, storage and retrieval of information on plant genetic resources which is being developed by the Taximetrics Laboratory of the University of Colorado at Boulder, Colorado, USA. Specifically, the Committee will:

- (1) Evaluate the technical quality of the System for the purposes of classification of and exchange of information on crop germplasm resources.
- (2) Evaluate the specific priorities and targets of the GR/CIDS programme in the light of the goals and objectives of the IBPGR.
- (3) Evaluate the plans and resources of the Taximetrics Laboratory as against the objectives of the GR/CIDS project, and advise on the time period and manpower and financial resources likely to be required to achieve those objectives.
- (4) Consider the present and future computer software and hardware requirements of the System and advise on (a) whether these appear reasonable in relation to the objectives of the IBPGR programme and the staff and computing facilities likely to be available to prospective users of the System, and (b) whether there are practicable means by which the operational requirements of the System might be simplified.

1/ The Panel was informed that the Committee as now constituted will be dissolved and established on a different basis both in terms of membership and disciplines covered and in terms of scope, its responsibilities being possibly expanded and covering other aspects of the future information programme of IBPGR.

(5) Advise on the long-term aspects of genetic resources data management, including whether there is need for a central point in the international network to monitor and assist in both computer-related work and use of the gathered data, and if there is believed to be such a need on how it can most effectively be met.

(6) Advise on any other matters with regard to the System or the GR/CIDS programme (a) which the Advisory Committee believes to be important with respect to the effectiveness of the System, and to the duration and amount of financial support by the IBPGR for the GR/CIDS programme, or (b) on which the advice of the Committee is specifically requested by either the Director of the Taximetrics Laboratory of the University of Colorado, the IBPGR or the Technical Advisory Committee of the Consultative Group on International Agricultural Research.

Appointment of the Committee will be for an initial period of three years. During this period, the Committee will meet at least once a year, and more often if it believes that additional meetings are necessary. Unless the Committee otherwise decides, meetings will be held at the Taximetrics Laboratory of the University of Colorado, Boulder, Colorado, and copies of all Committee reports to the IBPGR will be made available to the Director of that Laboratory."

30. The members appointed by the Board to the Advisory Committee were:

Dr. L.M. Branscomb, Vice-President and Chief Scientist,
IBM Corporation, Armonk, New York, USA

Dr. A.H. Bunting, Professor of Agricultural Development
Overseas, University of Reading, England, UK (a member
of IBPGR and of its Executive Committee) (Chairman)

Dr. K.W. Finlay, Deputy Director General, Centro
Internacional de Mejoramiento de Maiz y Trigo (CIMMYT)
Mexico

Mr. J.L. Fyfe, formerly Deputy Director, Scottish Plant
Breeding Station, Pentlandsfield, Roslin, Midlothian,
Scotland, UK

Dr. W. Salhuana, Director, Centro Estadístico Procesamiento
de Datos, Universidad Nacional Agraria, La Molina, Lima,
Peru.

31. The meetings of the Committee were also attended by the Director of the programme and, as observers, the Chairman of the IBPGR and representatives of the Secretariat and other interested parties as required (e.g. USDA).

32. The Committee met every year. Its main task was to consider the progress reports and draft work plans and budget proposals for the programme and to transmit these documents to the Board with its observations and recommendations. In practice, the Committee, through its Chairman who visited the programme several times a year, played a growing role not only in the formulation of the programme and in its overall direction but in the coordination both with other activities of the Board and with other activities of the programme which were not funded by the Board.

3. The Crop Advisory Committees

33. The work of the information programme on specific crops had to be guided by specialists in the related field of conservation and utilization of genetic resources of these crops. This guidance was provided by the Crop Advisory Committees of the Board for five major crops and by specialized working groups. These committees which advised the Board mainly on the priorities for genetic resources collections and exploration, were also requested to assist in the development of the related information programmes, in particular the definition of common sets of descriptors for the standardization of the genetic resources information on particular crops. For this purpose, staff of the Boulder programme were associated with the work of the Crop Advisory Committees.

4. Observations on the Management of the Programme

34. Until recently the work of Boulder programme for IBPGR was part of a broader range of activities carried out under the auspices of the University of Colorado. The coordination of activities was ensured by joint meetings of the Advisory Committee of the Board for the CIDS (now IS/GR) programme with yet another advisory committee, this one appointed by Colorado University in 1977.

35. Until the end of 1978, the role of the IBPGR Secretariat in connection with this programme was to assist in the preparation and signature of the contracts and in the disbursement of funds on behalf of the Board. The Secretariat also played an active role in working out the practical arrangements needed for participation of the Boulder programme in other activities of the Board.

36. The major decisions which were taken as a result of the successive changes in the organization of these activities by the University of Colorado were based on the findings of several missions of the Chairmen of the Board and of the Advisory Committee.

37. More recently, a post of information programme officer was established in the Secretariat with the intention of strengthening the capabilities of the Board in this area.

38. As regards the resources made available by IBPGR to the programme, these consisted of funds for salaries, travel, computer services and equipment. Until the transfer of some of the IS/GR activities to LISA, Fort Collins, the staff and the programme activities were in part paid by IBPGR and partly from other sources. Table 1 gives the staffing patterns in 1977 and 1979.

39. Having reviewed the organization and management of the programme, the Panel wishes to make the following observations:

(i) Since its inception and until the late summer of 1978, the IBPGR-funded activities at Boulder were part of a broader programme with multiple objectives and sources of funding (international, national, public and private). Although this situation was in line with the catalytic role which the IBPGR wishes to play, it proved difficult for the Board to control the use of its resources. The Advisory Committee, through its Chairman, subsequently assumed growing responsibilities which went beyond its advisory role to the Board in formulating, guiding and reporting on the programme.

(ii) The Advisory Committee recommended to the IBPGR adoption of funding procedures for Boulder in which the IBPGR Secretariat is in a position of 'provider of funds' under an agreement that calls for funding at regular intervals. This process of funding is largely independent from that of monitoring the results of the programme. There is no control over the disposition of these funds by the Secretariat.

(iii) The accounting procedures at Boulder, after many promises for improvement, have undergone little change over the past two years. Under this present system, it is difficult to state that all the funds provided by the IBPGR are being spent in the manner intended.

(iv) Programme formulation and review lack forward planning. The team received differing viewpoints as to the future Boulder programme and it is clear that the programme for 1979 and 1980 is highly fluid at this time. The Boulder budget has been significantly reduced in scope (from some \$500,000 to \$300,000). The rationale for continued funding of the programme had not yet clearly emerged.

(v) The Panel was given to understand by the Director of the Programme that the Board gave permission for IS/GR to expand its mandate

beyond germplasm data management requirements. It was to look at such other items as trials analysis, farming systems modelling, operations research, and administrative data processing needs of centres; this seems a very wide mandate indeed, especially at a time when its budget has been cut by 40%.

(vi) The Panel believes that this situation could be greatly improved by removing the functions of programme formulation, budgetary review and control from the Advisory Committee and placing them into the hands of the IBPGR Secretariat.

(vii) The newly proposed Advisory Committee would have a wider mandate than previously accepted: this new body is to advise all IBPGR activities related to management of germ plasm information. In the opinion of the Panel, any newly constituted advisory committee in this area should be very carefully constructed to draw upon a wide diversity of backgrounds and should report to the Secretariat. It should not include representatives of computer vendors nor should it be used as source of consultants for advisory services provided through the Secretariat.

V. PROGRESS REVIEW OF THE IBPGR PROGRAMME AT BOULDER

1. Major Undertakings

40. Major undertakings of the Boulder group include:

- (i) Data Banks and Descriptor Lists - the Boulder Group has been involved in the assembly of a number of data banks and the assembly of descriptor tests.
- (ii) EXIR - A collection of programmes (software packages) for storing and managing genetic data. A seed storage management programme will be considered part of this collection.
- (iii) A Micro-Computer Based System - A low cost computer system that includes programmes for storing germplasm data and performing some searches and statistical analyses.
- (iv) Training and Promotion - Conduct of courses, provision of technical assistance, visits with potential collaborators, etc.

2. Comments on Assessing Costs and Benefits

41. Over the period from 1975 until 1978 around \$1.5 million was invested in the IBPGR programme at Boulder. It is difficult to form even an approximate picture of what has been accomplished. When this question was raised with principals involved in the project, answers cited two classes of benefits:

Tangible products such as the EXIR programme, data put into retrievable form, etc.; and

Intangibles such as stimulation of efforts for managing information, knowledge of the problems of information management, personal contacts with persons interested in germplasm, etc.

42. When costs and benefits for the Boulder programme are considered, it is relevant to observe:

- Many intangible benefits tend to be associated with people.
- Experience resides in people, personal contacts, etc.
- At least 3/4 of the professionals formerly associated with the Boulder project have become separated from that project since October 1978 (see Table 1).
- No provision has been made for IBPGR to benefit from the experience of those who have left.

Table 1.

Composition of the IS/GR Staff

1977

Claude McMillan, Director
Jay E. April, Director
Gilbert N. Hersh, Director
Kanti Rawal, Chief Scientist
Jim Hanley, Chief Computer Scientist

Systems Investigation and Development

Don Watt, Head
John Gertsch
Jerry Kaltenhauser, C.U. Computing Center
Jeff Scott
Allan Shafton
Margaret Snyder
Steve Snyder, located at CIMMYT
Zhahai Stewart
Jim Warner, C.U. Computing Center
Joe Wingerd

Data Services

Lou Vincent, Head
William Boyd
John Thompson
Gail Von Borstell

Education and Training

Greg McArthur, Head
June Arnold
Rafael Zarate

Support Services

Arden Switzer, Head
Sandy Beach
Karen Nein, Publications
Marcia Rinck

1979

Claude McMillan, Director
Lou Vincent, Director of Operations
Arden Switzer, Coordinator of Personnel, Budgets & Accounting and Purchasing
Allan Shafton, Systems Analyst
Greg McArthur, Biologist, Analyst and Education & Training Manager
Zhahai Stewart, Programmer
Wilfredo Salhuana, Chief Scientist
Richard Crosby, Graduate Student
Edward Lyell, Consultant
Gail von Borstell, Data Coordinator
Wira Babiak, Data Coordinator

43. The general impression given to this Panel has been that the bulk of the benefits to be credited to the Boulder programme are made up of intangibles. Unless measures are taken to continue access to the personnel located at Ft. Collins, little benefit can be credited to the Boulder programme for intangibles.

44. This risk of losing intangible benefits is particularly troublesome because tangible benefits are limited and a total cost of \$1.5 million has to be assigned somewhere. If intangible benefits have been great, then much of the benefit of the programme is currently in danger of being lost. If intangible benefits were not great, then the cost:tangible benefit ratio appears to be poor.

45. The Panel would have preferred to have worked with actual costs for the tangible products resulting from this project. The Panel has not been able to identify such costs in the material that has been available to it. It recommends that such costs be obtained. In the material that follows the Panel's comments on costs are based on analyses that have produced consistent conclusions over a variety of assumptions.

3. Assessment of Tangible Products

3.1 Data Banks and Descriptor Lists

46. Annex V lists 18 EXIR users and 2 descriptor lists that have been developed in association with the Boulder programme. In the absence of cost information, the Panel declines to comment on whether or not this should be regarded as a reasonable return on investment. When cost information is available, allowance should be made for the tendency for start-up efforts to incur higher costs than activities that have become routine.

3.2 EXIR

47. The principals concerned with both the Boulder project and the USDA's Ft. Collins project agree that EXIR now has no special advantages. However, when this project started there was a need for software development. The project did provide some features that otherwise were not easy to obtain at that time. Problems associated with the adoption and use of EXIR have been abundantly identified by members of the Boulder team. They range from technical constraints related to memory size required, compiler language, etc. to design features such as provision for arithmetic operations, file merger, etc. EXIR is a programme that has some good features that can be made available on a limited range of computers. In most, if not all cases, where a computer can support EXIR it can also support other packages that provide the same or more functions than EXIR. Adoption of EXIR by new sites should be further limited by the current policy of the Boulder group that it will not maintain EXIR.

48. In 1976, the Boulder Group listed 18 installations as EXIR users. They now list 17 installations as active users. Six of the "currently active" users were also listed in 1976.

49. Consideration of EXIR should take into account two types of cost that must be of concern to IBPGR:

(i) Maintenance. If IBPGR wishes to be regarded as a credible source of help for scientists wishing to manage germplasm collections, it should not abandon those users who trusted the Boulder group and installed EXIR. If maintenance of EXIR is to be discontinued, it should be preceded by at least one year's notice and with vigorous efforts to locate and install an equivalent retrieval package.

In addressing the problem of maintaining EXIR it should be kept in mind that the personnel who developed EXIR are in the Ft. Collins group. This source of maintenance should be used if possible. It is estimated that at least one skilled programmer (salary level around \$18,000 per year) will be needed to maintain EXIR.

(ii) New User Cost. Even though the principals connected with the Boulder programme state that EXIR is now not promoted and even though it was announced by the Advisory Board in 1977 that EXIR would only be supplied to organizations having skilled programmers, that group still seems to be actively promoting adoption of EXIR (Work Plan 1979) and sometimes commits to supplying EXIR without checking on programming capability. There are now 7 requests pending for EXIR. Filling those requests will add to IBPGR's obligations for maintenance. They may even carry extra costs. In some cases there may be alternatives that are as good or better than EXIR that are neglected because of EXIR promotion. IBPGR's representatives may well lose even more credibility in such cases.

50. EXIR does not appear to be cost effective. Packages having all of the capability of EXIR plus a full range of statistical routines can be acquired for much less. Several CG institutes appear to have obtained the capabilities of EXIR at costs well below its estimated cost per installation.

3.3 Micro-Computer Based System

51. This system consists of both a computer and a software collection. It appears to be able to handle germplasm data entry and most retrieval operations needed for germplasm collections of small size. It is in an early developmental stage in terms of software, documentation, and knowledge of reliability and problems.

52. This kind of system could be valuable for introducing computing in situations where data storage and retrieval would otherwise be impossible.

However, it should be observed that the micro-computers now in use could be perceived as a solution to general computing needs in situations where larger and somewhat more expensive machines would be more suitable.

53. It should be recognized that an involvement of IBPGR in the distribution of micro-based systems carries with it the potential liability for costs associated with continued maintenance of hardware and software.

54. It is too early to assign benefits to this project. This project is unlikely to provide a general solution because of national differences in customs, support services, etc. but a micro-based approach could be helpful in many cases.

3.4 General Observations

55. The most common reaction to the costs and benefits for the tangible products of the Boulder group seems to be that rather limited gains have been made at a high cost. Over and over this group has reported new, often very sensible, undertakings followed by nothing tangible. Projects seemed to have been identified for action and then apparently forgotten. New enthusiasms seem to have consistently taken precedence over completing older undertakings.

4. Sponsorship of Hardware and Software; Payment of Development Costs

56. The micro-based system is an interesting project and it may merit considerable additional investment. It should not be financed by IBPGR just as further development and distribution of EXIR should not be promoted by IBPGR. IBPGR should not be in a position of sponsoring hardware or software because:

(i) It is an organization pooling skills involving germplasm and is not a natural depository of computing knowledge and experience. It is not in a good position to supervise or evaluate computer projects.

(ii) IBPGR should be in a position that favors the objective assessment of options when a client is considering computing alternatives. That is less likely to occur when the success of an IBPGR development project is weighed in terms of frequency of adoption. It is less likely to occur when those providing advice are much less familiar with alternatives than with materials they have developed or are sponsoring. Even though the current official position on EXIR is that it is nothing special and not worth the cost of maintenance support, shipment of EXIR to IITA and ORD ^{1/} -Korea is pending. Both institutes have the same equipment as ICRISAT which has its own system operational. It is not clear that EXIR is operational for the computers of those institutes.

^{1/} ORD = Office of Rural Development.

(iii) IBPGR has to be in a position of trust with its clients or prospective clients. That position is put in jeopardy by sponsorship of products that will not always be the best available. It is also put in jeopardy by failing to provide maintenance for products promoted by IBPGR.

5. Computing - A Wider Context

57. The Panel met with four of the persons who are (or were) actively involved in promoting the development of the germplasm information network. Each stated the same message, a message that most of us had already heard from CG centres and other sources. The following emerged:

(i) Management of germplasm information is a low priority item for most, if not all, centres that belong in the CGIAR system. When computing activities for an agricultural organization are considered, germplasm data management is an infrequent activity that has to be reconciled with many, many other activities. It is not just germplasm that is endangered. Research results are just as perishable and sometimes much more urgent.

(ii) Promotion of germplasm data management without regard to other computing needs is ill-advised and sometimes could be expensive. There are times when doing so makes it less likely that an organization will be disposed to cooperate with IBPGR programmes.

(iii) Satisfying the computing requirements of a germplasm network is more likely to occur if IBPGR is perceived as supporting a balanced approach to the computing needs of its potential clients than if IBPGR is perceived as promoting over-emphasis on germplasm data management. As it is now being pursued, the current micro-based technical assistance effort could be an unbalanced promotion of germplasm needs.

VI. FUTURE NEEDS AND DEVELOPMENTS

1. General

58. In the light of conclusions reached in preceding paragraphs, the Panel identified three key areas for IBPGR activities, namely:

- (a) The assembly of catalogues of collections and of genetic resources workers; this work has already begun but should be accelerated.
- (b) The development of agreed descriptor lists, crop by crop, and their translation into computable form; this work, too, has begun but it, too, should be accelerated.
- (c) The promotion of a basically new attitude to computing founded on the substitution of a dispersed system of ad hoc arrangements for highly specific purposes for the present heavy commitment to a single centre on a long-term basis.

59. Items (a) and (b) in the preceding paragraph call for no elaboration. They are fundamental to the development of any information system and serious computing work in any crop is impossible until they shall have been satisfied. The Panel noted that progress has been made in both but that there is yet a very long way to go.

60. Item (c) in paragraph 1.1 proposes a radical change in current arrangements. It is founded on the beliefs that, despite some useful achievements in the development of EXIR, the process was not cost-effective (page 15) and that commitment to a single source of computing expertise is risky and inefficient. The Panel noted that computing skill is widely dispersed through the world and that specific questions could usually be matched by specific expertise. The Panel therefore concluded that the Board would do well to adopt the following principles:

- (a) identify specific, limited problems;
- (b) identify appropriate consultants by way of institutional mechanisms discussed later herein;
- (c) negotiate or help others to negotiate agreements (usually of a relatively short-term nature) to attack those problems;
- (d) avoid long-term commitments to any specific consultants, systems or hardware.

61. The Panel thought that items (a)-(c) should improve cost-effectiveness of the whole and that item (d), as an act of policy, was important in guaranteeing and being seen to guarantee the Board's objectivity.

62. Specifically, the Panel suggests:

- (1) The immediate formation of an ad hoc committee to assist the Executive Secretary in producing a directory of persons and products that might be useful in meeting computing needs for germ plasm information. This group should be drawn from a variety of sources representing as much variation in computing backgrounds as practicable. It should have a definite target date for completing its task and should recognize that it is being asked to provide a first approximation rather than a polished product. This temporary committee should also develop plans for periodic updating of this directory by the Secretariat.
- (2) The formation of an advisory committee that will report to the Executive Secretary and will assist in the process of identifying and monitoring sources of advisory help in computing. This committee should emphasize diversity of backgrounds and include some persons who are well informed on germ plasm information problems, and some who are knowledgeable about general computing needs in agricultural organizations. Members of this committee will not serve as computing advisors, but will advise the Executive Secretary on persons suitable for this work and later assist in assessing the performance of advisors.
- (3) Neither the ad hoc committee nor the advisory committee should contain representatives of computer manufacturers, software houses, or other vendors of computing products. Appointments suggestive of conflicts in interest should be carefully avoided.

2. Contents of the Core Programme

63. After deliberation, the Panel agreed that the following activities should be maintained in the core programme of IBPGR in the field of genetic resources information:

- (a) the development of agreed minimum descriptor lists and their translation into computable form;
- (b) the promotion of machine-readability of genetic resource information;
- (c) the provision of maintenance services to existing users of EXIR;
- (d) small ad hoc software developments.^{1/}

^{1/} Although the Board agreed in February 1979 that no major software development should continue, the development of the micro-computer based system still involves some software development.

64. The Panel also recommended that the following activities should be added to or strengthened within the core programme:

- (a) the assembly of directories of existing collections, institutions and research workers involved in genetic resource conservation;
- (b) the provision of advisory services of short duration to institutions engaged in the development of genetic resource information systems in developing countries and the promotion of longer-term arrangements for advisory services and technical assistance;
- (c) regional consultations on the development and use of genetic resource information systems for specific crops;
- (d) training in matters relevant to the core programme.

65. The Panel considered that certain ongoing activities should not be included in the core programme of IBPGR. These are the following:

- (a) technical assistance to national genetic resource information programmes;
- (b) the sponsorship and supply of specific hardware and software;
- (c) any substantial development activities of new software for genetic resource information systems;
- (d) any software development concerned with the processing of data that is not directly a part of genetic resource work (e.g. plant breeding, statistics, operational research, management and accounting).

66. The exclusion of the above activities from the core programme of the IBPGR as recommended above should not be interpreted as negating the very useful catalytic role which the Board should play by means of special projects and promotion of technical assistance by other institutions.

VII. CONCLUSIONS AND RECOMMENDATIONS

67. Before presenting its conclusions and recommendations, the Panel notes that a number of difficulties were experienced in the accomplishment of the mission. A thorough assessment of the impact of the IBPGR programme at Boulder would have required a series of consultations with international and national genetic resources centres. This did not prove feasible and will have to be made as part of the broader evaluation of the impact of IBPGR when the quinquennial review is carried out. More time would have been necessary also for discussions with members of the Board, of the Advisory Committee and also of TAC and CGIAR in order to understand fully their attitude vis-à-vis the programme under review. Finally, the Panel could not examine the future plans of IBPGR for this programme beyond 1979 as these were being prepared at the time of the review.

68. The Panel therefore recommends that its conclusions and recommendations should be considered essentially as an input in a wider process of review of IBPGR activities.

69. The Panel stresses that the establishment of an international system of information, documentation and communication on plant genetic resources is an essential complement to the international efforts of the Board in ensuring the collection and conservation of plant genetic resources. These conservation and collection efforts would have little value if the collections were not adequately documented and if this information were not readily accessible by the users, first, for monitoring the collection and conservation process, and, second, to facilitate the distribution and use of material on request. Another justification for the work of the IBPGR in this field is the major catalytic role which the development of an international information system is likely to play indirectly in inducing a better organization and management of the existing collections and in identifying gaps which in turn will call for further exploration and conservation work. For these reasons, the Panel recommends that IBPGR continue to devote a substantial portion of its resources to the field of information. This however calls for significant changes in the present programme as indicated below.

70. The Panel recognizes the many difficulties and obstacles faced in the development of an international information system on plant genetic resources. This is an enormous task. Progress has been slow and TAC/CGIAR should not expect spectacular results or a completion of this work in the next couple of years. It may well take 15-20 years to establish genetic resources collections for major crops and the associated international programme of information, documentation and communication. Any assessment of the results of the programme should take into account the magnitude of the task and the problems involved.

71. The leading result of the Boulder programme is an increased awareness and an improved understanding of the needs and problems. This programme should be seen as a pilot experiment in which different concepts, approaches and techniques were successively tried and which provided valuable experience for all concerned.

72. Nevertheless a number of results have been achieved already. This includes: (a) the development of the EXIR system, a system which is a collection of programmes for storing and managing genetic data; (b) the development of personnel having expertise in this field. This expertise has now spread not only to other places in United States but also through the training and cooperative programmes promoted at Boulder to a number of developing and developed countries. (c) In cooperation with the Crop Advisory Committees, the development of common sets of descriptors for cataloguing the collections of several crops. Although there is still a long way to go before a wide-scale adoption and use of these descriptors, they constitute an essential step in that direction. (d) Stimulation of the cataloguing of the material contained in certain collections. A significant result, which is not entirely attributable to IBPGR but to which IBPGR has contributed significantly, is the development of a programme of systematic cataloguing of one of the largest sets of genetic resources collections of the world, that of the United States. The programme has also assisted several IARCs in their work in this field, and accelerated recently its technical assistance to several national collections in developing countries, in Latin America in particular.

73. The problems now before the IBPGR relate essentially to the scope and priorities of its future work and to its organization and management: (a) the Board is confronted with a situation where a series of IARCs and national programmes in developed countries are already well advanced in the development of their genetic information systems for specific crops but usually with different software and hardware. It is very unlikely that these advanced programmes will now change their information systems to any significant extent. This may not be necessary, however, as they are or may be made sufficiently compatible for the purpose of communication of information and exchange of genetic material.

(b) Most of the national collections in developing countries have yet to be catalogued and documented. This offers considerable opportunities for developing internationally compatible information systems but requires also a considerable amount of specialized advisory services, personnel training and equipment for a long period.

(c) Most of the centres, national or international, wish to develop data systems and install hardware which would not exclusively deal with genetic conservation aspects but also serve their needs for data processing in the field of plant breeding and other areas of agricultural research. Germplasm considerations should not be expected to dominate their choices.

74. IBPGR cannot attend to all these problems and should take note of the diversity of requirements by national and international institutions, in developed and developing countries, both in the narrow field of genetic resources information and in the adjacent fields of agricultural research. IBPGR should enhance consultation among users and invite their active participation in planning and priority-setting.

75. The Panel does not propose to define a structure and set priorities for the future programme since it had not the opportunity to review other related aspects of the IBPGR programme. Nevertheless some relevant points should be indicated:

(a) Although efforts to develop individual data bases in a standardized manner should continue, the primary requirement is the assembly of directories of existing collections, crop by crop. This task which is truly international in character should be part of the core programme of IBPGR and should be carried out centrally by its Secretariat with the help of the appropriate Crop Advisory Committees and working groups.

(b) Of equal priority is the continuation (through the core programme) of the development of minimum descriptor lists. This long-term task is also truly international in character and should be promoted by the IBPGR and its Advisory Committees.

(c) The Board should provide ad hoc advisory services to address the needs of organizations wishing to manage and exchange germplasm data. This should be done on a world-wide basis and make use of as broad a range of skills and backgrounds as possible. Ordinarily the funding of these activities will be by special project or bilateral arrangements except as needed for short-term (up to 4 weeks) assessments of needs and resources.

(d) The Board should not promote a world-wide adoption of any particular software or hardware but rather sponsor and sometimes support with its core resources, quite limited initiatives aiming at facilitating the compatibility of existing and future software and hardware systems so as to provide for international communication between these systems.

76. The Panel recommends that, when considering the above observations on the future information programme of IBPGR, the Board assesses the organizational and managerial implications of these changes. In particular, it seems essential that a new organizational structure provides the Secretariat with a clear responsibility and authority for programme formulation, implementation and budgetary control. All aspects of the programme will have to be considered in this context, but the Panel wishes to stress the need for giving greater responsibility to the Secretariat in formulating programme and budget proposals and in implementing the programme with any necessary technical guidance which the Secretariat may call upon for the purpose. The Board should also develop a mechanism for scrutiny of

programme proposals and of progress reports similar to those adopted by programme committees of the IARCs. In addition, the Secretariat should establish an expert group to advise on information-computing matters.

77. The Panel sincerely hopes that these recommendations will assist the Board in its efforts to promote international information exchange and communication on genetic resources; this profoundly important role should, the Panel believes, receive the full support of the CGIAR. The Panel further recommends that IBPGR with the help of the above recommendations, should formulate a detailed plan of work and budget for the next two years; these should be examined by TAC in the light of views expressed in this report. TAC may then wish to refer such questions as may arise to the Quinquennial Review Panel.

List of Questions

1. Is there a broad agreement among the main potential users and beneficiaries of the programme on the general principles of cooperation and on common concepts and approaches regarding the establishment of an international information system on plant genetic resources?
2. To what extent and how were the diverse users concerned (IARCs, national programmes in developing and developed countries ...) consulted before and during the implementation of the programme? If necessary, what would be the mechanism to improve these consultations?
3. What is the structure contemplated for the international information network? How does this structure relate to that of the IBPGR, its crop advisory committees, working groups, its regional programmes and the global network of genetic resources centres, to the CGIAR system, to the national programmes and regional (EUCARPIA) and international (FAO) institutions?
4. What are the past and present roles of the different parties concerned* in the forward planning, formulation of the programme, decision-making, implementation and accountability?
5. What were the nature of, and the reasons for, the successive changes in the programme? How these changes relate to the mandate of IBPGR?
6. What is the degree of universality and versatility of the system developed by IS/GR as regards the different crops concerned, the number and type of characteristics to be handled, the compatibility with other existing systems, its use with different types of computers? Why is the system being adopted (or adapted) by some institutions and not by others? What are the main obstacles and constraints on the adoption and use of the system by the IARCs, by national programmes in developing countries, by national programmes in developed countries? What is being done by the programme to overcome these obstacles and constraints?
7. To what extent the lists of descriptors prepared for different crops are internationally accepted and provide for reliability and consistency in the description of the material and the information exchange? If necessary what should be the mechanisms to improve them?

* IBPGR (its Board, its Executive Committee, its Advisory Committee, its Secretariat), FAO, the University of Colorado, donors, users, etc.

8. How was the balance maintained between international and national interests in the programme; between different functions of the programme (system development, data base development, system implementation, research, technical assistance and training); between different uses of the system?

9. What are the criteria and procedures used in identifying the institutions which cooperate with the programme and/or receive technical assistance from it? What are the principles and factors considered in allocating resources of the programme to cooperative activities with specific international and national centres?

10. Among the functions of the programme, what are those which correspond to continuing international requirements and those which are more limited in scope and duration? What are the priorities among these requirements? How should computing requirements of genetic resources information programmes be related to the other computing needs of agricultural research? To what extent (and why) should these needs be covered by IBPGR or by other sources of funding within the CGIAR or outside?

11. What was the rationale for the location of the programme at Boulder? Is this location still valid in the light of the changes brought to the programmes?

12. Are the present programme and resource allocation by the IBPGR reflecting the priorities? How would the programme and the budget be expected to develop over time? Would this affect the relationship and the distribution of responsibilities established between the Board, its Executive Committee, its Advisory Committee, the Secretariat, the University of Colorado, the IARCs and the institutions involved in the funding of the programme?

List of Background Documents for the Mission

1. IBPGR documents

(i) General

A Review of Policy and Activities 1974-78 and of the Prospects for the Future (AGPE:IBPGR/78/24 - Fifth Draft)

A World Plan for Crop Genetic Resources Exploration 1980-1985 (AGPE/IBPGR/79/1)

The Documentation of Plant Genetic Resources - A Background Paper by D.J. Rogers (AGPE:MISC/4)

Work Plans for Genetic Resources Communication, Information and Documentation Systems (GR/CIDS) (AGPE:IBPGR/74/4C)

Extracts from the Minutes of the IBPGR Executive Committee Meeting and IBPGR Plenary meeting.

(ii) Progress Reports

Report dated 28 March 1975 (AGPE:IBPGR/75/19)

GR/CIDS Project Report to IBPGR and FAO (AGPE:IBPGR/75/35)

GR/CIDS 1975 Progress Report to IBPGR and FAO (AGPE:IBPGR/75/42)

IS/GR Annual Report 1976

(iii) Short Training Courses in Genetic Resources Information Systems

Report on the 1977 IS/GR Short Course (18 July to 26 August 1977)

Report on the 1978 GRIS Short Course (5 June to 14 July 1978)

(iv) Contracts

FAO Contract for 1975 (IBPGR funded)

FAO Contract for 1976 (IBPGR and FAO funded)

FAO Contract for 1977 (IBPGR funded)

IBPGR Letter of Agreement in support of programme in 1978 (IBPGR funded)

IBPGR Letter of Agreement in support of programme in 1979 (IBPGR funded; note some amendments are proposed to the Work Plan)

(v) The Current Work Plan 1978-79

IS/GR Last Quarter Report (Part I) and Work Plan for 1979 (Part II)

(vi) IBPGR Advisory Committee on the Genetic Resources Communication,
Information and Documentation System (GR/CIDS)

Terms of Reference (AGPE:IBPGR/75/43)

Report of First Meeting (AGPE:IBPGR/76/7)

Report of Second Meeting (AGPE:IBPGR/77/6)

Report of Third Meeting (AGPE:IBPGR/77/36)

Report on visit to Boulder and Fort Collins, Colorado, 12-19 October 1978
by R.H. Demuth, J.T. Williams and A.H. Bunting (AGPE:IBPGR/78/38)

(vii) Descriptors

Descriptors for Wheat and Aegilops (AGPE:IBPGR/77/20)

Descriptors for the Cultivated Potato by Z. Huaman, J.T. Williams,
W. Salhuana and L. Vincent (AGPE:IBPGR/77/32)

2. TAC Documents

Extracts from the minutes of the TAC Meetings no. 1, 2, 3, 4, 5, 6, 8,
9, 10, 13, 14, 16, 18, 19. TAC Secretariat, FAO, Rome

3. Others

- IS/GR Annual Report 1977. University of Colorado, Boulder, U.S.A., 1978.
- GDM - A computer based germ plasm management system. IS/GR University of Colorado, Boulder, March 1979
- Plant Genetic Resources Conservation and Use. National Plant Genetic Resources Board - USDA, March 1979
- IBPGR Advisory Committee on Information Management - Prospect for the Future - a personal view by A.H. Bunting. April 6, 1979

