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ANALYSIS OF THE CGIAR IMPACT STUDY IN RELATION TO
TAC'S RECOMMENDATIONS ON CGIAR PRIORITIES AND FUTURE STRATEGIES

(Agenda Item 9 (a))

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Analysis of the CGIAR Impact Study
in Relation to TAC's Recommendations on
CGIAR Priorities and Future Strategies

1. Introduction

Following the discussion of the Impact Study 1/ in the CGIAR in October 1985, TAC was requested to comment on how the Study relates to its Review of CGIAR Priorities and Future Strategies 2/, because the two studies were conducted concurrently but largely independently.

The Study reviews the work of the CG System as a whole, and large sections of it are essentially factual. The views expressed are in general consistent with those presented by TAC in the Priorities Paper, but do raise some issues for discussion. There are numerous observations and minor criticisms relating to specific points that should be taken into account by individual Centers. There are also some issues which could appropriately be added to the lists of issues and questions prepared for External Program Reviews.

This paper confines itself to the broader issues. It draws on the printed summary of the Impact Study (in which the external advisory committee raises some issues of its own); the draft of the main document, dated August 31, 1985; the TAC Review of CGIAR Priorities and Future Strategies, dated August 1985; the various presentations and interventions made during the course of International Centers Week (ICW); and comments received from TAC Members. It raises some general issues on which TAC may wish either to re-consider or to re-affirm its position.

2. The Work of the Centers

2.1 Focus of Center Mandates

The philosophy, interpretation and scope of mandates are reviewed in Chapter 2 of the Impact Study. The relationship between impact and "focus" of mandate is mentioned in Chapter 4 (Section 4.3.2.) in the context of Africa where the comment is made that several scientists "held the view that IITA and ILCA ...should have their mandates reviewed and streamlined." This view was reiterated in the Priorities Paper debate during Centers Week, when several speakers

1/ International Agricultural Research Centers: Achievements and Potential, Summary and Parts I-IV, A Study Directed by Jock R. Anderson, Draft of August 31, 1985, CGIAR.

2/ AGR/TAC:IAR/85/18.

stated that "focus" had been fundamental to success, implying that a Center with a mandate for one or two commodities was likely to achieve greater impact than one with a broader mandate.

The Study Team's more cautious views are contained in the following extract from a first draft of the final chapter of the Impact Study (kindly loaned by the Study Director).

"Investors in agricultural research would be assisted in their decisions if there were clear information as to the most effective concentration of research focus. A simplistic interpretation of the CG experience is that a sharp focus, as overtly manifested in the rice and wheat research of the international Centers, has been instrumental in engendering success. It is tempting to conclude that single-commodity centers have some inherently greater chance of success. Unfortunately, the topic is more complex than this interpretation might suggest. Witness the focussed effort on maize which is as long-lived as wheat, for example, and which to date has led to little impact, notwithstanding the related considerations canvassed in Section 6.2.3. The study is less than definitive on the optimal degree of focus required for an international center to contribute to impact.

It is inconclusive because of the confounding of the issue of degree of focus with such things as the historical antecedents to research programs, the age and maturity of the centers involved, the demonstrable extent of their various impacts, and the relative ease of technological advance in different environments or, conversely, the difficulty of the mandate challenge.

The need for a critical mass of resources is clear, although the colonial African experience and that of many other parts of the world counsel that the resources required for a critical mass can be modest. Proliferation of commodity programs, per se, thus should not be an impediment to the centers making contributions. The key issue is the adequacy of research resources to match designated research goals and effective, efficient management of those resources."

Commentary: The question of focus versus diversity in formulating research strategies is one that extends well beyond the CGIAR and its research institutions. In short-term research, designed to answer specific questions, focus is often considered to be desirable, if other considerations are not overriding. With research that is less specific, however, and particularly with research which is expected to achieve results only in the long term, too sharp a focus is usually seen as unnecessarily restrictive and even dangerous because the focus might be on what eventually transpires to be a non-productive approach. Moreover, considerations other than either focus or diversity may be more important in determining the extent of success in research.

The time required to achieve impact was an item of debate at ICW. The statement made by one participant that "money is no substitute for time", made with particular reference to the African context, is

seldom wholly true. There are many ways in which money, to a greater or lesser extent, can substitute for time, particularly in plant breeding, where scale of operation and sophistication of techniques can contribute greatly to shortening the time required for success. Equally, there are outstanding examples of projects backed by relatively small resources achieving highly significant impact.

2.2 Range of CGIAR Commodities

The Impact Study comments on the range of activities supported by the CGIAR in several different contexts. Section 4.2.2., for example, notes that distortion may occur in national priorities because scientists are attracted to work on those commodities in which Centers are involved, even though other commodities may be more important in relation to national needs. It states:

"Now that the major food crops are better served by the present set of international Centers, including those Centers not within the sponsorship of the CGIAR, the distortions are more between food crops and other crops, especially "export" crops such as beverage crops (e.g. tea, coffee, and coca), fiber crops (e.g. cotton, jute) and other tropical tree crops (e.g. coconut, oil palm and rubber). The swing to food crops may have gone too far in some countries: for example, in Kenya and Tanzania, the proportions of research funds going to coffee, tea, sisal and pyrethrum are far below their contribution to value of output. However, most countries' export and cash crops still receive a higher proportion of the research budget than they contribute to the value of output. The very existence of the Consultative Group and most of its Centers is due to a widely held perception that, hitherto, the biases of agricultural research were towards export crops to the neglect of basic food crops."

Commentary: The original objectives of the CGIAR were stated in terms of "agricultural research", as distinct from research that is confined to food commodities. Over time, the System evolved towards concentration of its efforts on research related to food crops, as noted by the Second Review of the CGIAR (Second Review, p. 35), but this has not excluded consideration of non-food crops in the context of farming systems.

During its extensive sampling of opinions, both among donors and in the developing countries, the Study Team found no disagreement with the principle that the CGIAR System should concentrate its effort on food commodities. The consensus was that work on industrial crops should be done outside the framework of the CGIAR because of a general desire to keep the aims of the CGIAR free from the complications of national policies that have so often tended to frustrate international initiatives aimed at supporting industrial crops.

In its analysis of priorities and strategies, TAC agreed with this consensus. It also noted how the System's programs had evolved towards greater clarity and specificity. The goal statement it developed (Priorities Paper, p. 26) reflects the focus on food and the clarity and specificity of activities. TAC's analysis of priorities among commodities rests heavily on this statement. TAC's view on the

further expansion of effort on cash crops is epitomized in the following paragraph (Priorities Paper, p. 98):

"TAC has confirmed that critical food problems persist in developing country regions and that research and related activities to increase food production cannot be diminished. Not only do urgent needs persist, but opportunities for impact and returns to additional investment in research remain excellent. TAC has, therefore, recommended that the CG System maintain its focus on food crops, rather than expand its coverage to include export-cash crops, at least for the current 25-year planning horizon." (See also, pp 95 and 96.)

This view is reiterated in the final section which considers the long-term future of the CGIAR (Priorities Paper, p. 119). The contribution of cash crops to solving the interrelated problems of poverty, food production and nutrition is stressed. Noting that work on cash crops would fit easily into the CG System, the paper suggests that in the long term they could be added through a process of gradual change, as food crops become increasingly the responsibility of national programs.

2.3 Geographical Focus

In reviewing the history of contacts between IARCs and NARS from the early days, the Impact Study (Section 4.2.1.) highlights the fact that the establishment of IRRI and CIMMYT in the early 1960's broadened the scope of contacts to a much wider range of countries, than the initial program from which they grew had been able, because they were mainly bilateral arrangements. Establishment of additional Centers further widened those contacts to include nearly all developing countries, but IARCs still focus on countries in which their mandate commodities are important.

Commentary: The small size of the CGIAR System requires that it be highly selective as regards its research targets, selecting commodities which have global importance and concentrate on the regions where the greatest impact on agricultural production and productivity can be achieved (Priority Paper, Section 2.6.).

The indicators used by TAC in its review of priorities, were chosen on the grounds that they would help in assessing the global importance of a commodity, the potential for its improvement through research, and the efficiency of the CG System to undertake the research.

3. Relations of NARS with Centers

3.1 National Priorities vis-a-vis Centers' Priorities

Comments by respondents in countries which host a Center typically reflect frustration with the IARCs' focus on world or regional responsibilities rather than on the range of problems most pressing to the host country (Impact Study, Section 4.2.4.). TAC agrees with the Impact Study statement that it is surely inevitable that there would be differences of opinion between NARS and IARCs, given the requirement of the host country national program to cover a broad range of location-specific agricultural research issues, and the Centers' international responsibilities.

Commentary: The Impact Study, however, also states that an increase in the total spending by the Centers on field crop research was found to be associated with increased spending on both research and extension by national programs. Investment in research by the Centers appears to have a greater enhancing effect on national spending than other forms of aid. Moreover, all the Centers have committed substantial resources to assisting in the development of national research institutions, both in direct and indirect ways (Impact Study, Section 10.9). Nevertheless, it is commonly agreed that host countries in general are the greatest beneficiaries of the research program of the hosted IARC.

TAC has considered the System's role and functions in the global context with particular reference to division of labour and mode of collaboration, as follows (Priority Paper, Section 3.3.4.):

- growing acceptance by all components of the global system of an integrated set of common objectives grouped around a central long-term goal.
- increase in collaboration among all partners in the global system in pursuit of this common goal.
- move towards a more rational division of labour in the global system, guided by the comparative advantage of each of the components.

TAC considers that the move towards coherence and partnership implies a shift in the functions of the IARCs and the NARS. As national systems increasingly take the lead role in the technology generation process, the CG System will increase its linkages to basic science and assume an expanded service function to the NARS. At the same time, however, the IARCs will have to be selective in responding to the broad range of demands from national systems by concentrating on those functions for which they have a clear comparative advantage, taking into account that countries with weak research systems will still need considerable support in adaptive research until their capacities are built up.

3.2 Centers' Relationships with Universities and Other Specialized Institutes

In numerous countries a significant and increasing amount of research takes place outside the formal public sector agency, which is usually within the Ministry of Agriculture. Universities, private firms, private research agencies and producer bodies may all have a role, and effective collaboration with a country can depend on a Center's establishing a number of links. In some countries, the lack of contact IARCs have had with universities and institutes outside the agricultural ministry is seen as a weakness of their link with those countries (Impact Study, Section 4.2.7.).

Commentary: TAC considers that national agricultural research systems of the developing countries are in the best position to determine their research needs and priorities. They also have the

capacity to develop, evaluate and adapt production technologies to specific ecologies and farming conditions since they can conduct experiments in those environments.

The private sector and universities have been playing an increasingly important role in agricultural research and technology development in developing countries in recent years, and will undoubtedly continue to do so. So far, their activities have been largely concentrated on adaptive research, but the trend is clearly towards greater involvement in strategic and basic research. TAC is of the opinion that specialized institutions, which include universities and research facilities in both developed and developing countries, have the unique capacity to conduct basic research. As a consequence, TAC considers that for future gains in sustainable agricultural productivity, strong linkages will have to be formed among these various research levels and actors in the technology generation process.

TAC is convinced that the increasing capacity of developing countries to conduct applied and adaptive research will be crucial to meeting future needs. As the NARS assume increased responsibility for research in these areas, the IARCs will concentrate more on strategic research. They will have to be supported in basic research by the specialized institutions in both the public and the private sectors (Priority Paper, Section 2.6.).

4. Implications for Future CGIAR Activities

4.1 Gaps in Coverage

Gaps in commodity coverage are discussed in Impact Study Section 4.3.2., which notes that most of the major food crops of importance to developing countries are now encompassed by the System's work. Vegetables are identified as a somewhat neglected field of research in many parts of the world, while the recommendations of the Priority Paper to strengthen international research on starchy bananas and sweet potatoes are noted. The Section continues:

"Notwithstanding the continued investment of many national programs in research on export crops, the main perceived gaps brought to the attention of the study concern commodities beyond major food crops including industrial crops or export crops; fibers such as cotton, jute and kenaf, oil crops such as coconut and oil palm, and beverage crops such as tea, coffee and cocoa and pharmaceutical crops. The production of these commodities has traditionally been an important source of foreign exchange for many countries. Typically, their research and development infrastructures have declined in the post-colonial era and in many tropical countries there are now perceived to be serious imbalances in the research infrastructure supporting such crops vis-a-vis those of more immediate interest to the CGIAR Centers. Of course, any suggestions for expanding the commodity scope of the CGIAR must be considered against a backdrop of limited budgetary support and the already long list of commodities and farming systems under study."

Reflecting national views on the work of the CGIAR, the Study Team also draws attention to the relative lack of work on animals and trees in farming systems research, the limited scope of concerns for postharvest operations, and the lack of attention to gardening systems.

The Study Team's views on gaps (Impact Study, Section 4.3.4.) stress the importance of tree crops as a means of enhancing ecological stability, productivity and incomes in fragile ecosystems. More generally, the gaps in research on cash crops are perceived as particularly significant in view of the comparative advantage for their production, that many countries once enjoyed in comparison with their production of some food crops.

Research on living aquatic resources, i.e. aquaculture, is seen as an important gap, while soil and water management are identified as other areas where research could usefully be strengthened. Finally, the Study Team notes certain areas of policy research, e.g. agricultural credit and labour markets need more attention.

Commentary: TAC's assessment of program and commodity priorities is close to that of the Impact Study. At the program level, the Committee recommends that relative increases in support should be directed to natural resource management and conservation, to post-harvest conversion and utilization, and to policy research.

In addressing natural resource management and conservation, TAC recognizes that selected work on trees, soil, and water is essential, especially in the context of whole farm systems. It also recognizes that there should be greater integration of livestock and crop production systems. The strengthening of this area of research TAC sees as being accomplished through a combination of strengthening of these areas of research, by including the appropriate experience on the research teams, and by closer cooperation with other specialized institutions outside the System (Priorities Paper, Sections 3.3.2., 4.2.1.[c] [d] [e]).

With respect to commodities, TAC recommends broadening the range to include tropical vegetables, coconut and aquaculture, but recognizes that such expansion would require additional funding (Priorities Paper, Section 4.3.6.). By consolidation of current activities TAC also recommends relative increases to currently supported annual oil seed crops and starchy banana (Priorities Paper, Sections 4.3.3., 4.3.4.).

TAC, by recommending support to tropical vegetables, coconut, aquaculture, annual oil seeds, and starchy banana, is recommending increased support to cash crops which are also food crops.

4.2 Increasing the Benefits to the Poor

The Impact Study shows that research has sought modern varieties helpful to the poor by using more labour and supplying cheap food energy. Nevertheless, most of Africa is without modern varieties and is poorer than in 1970, while the incidence and severity of poverty in Southern Asia are little changed despite modern varieties. The Study

Team considers that diagnosis of means to alleviate poverty in these situations increasingly needs to start from the total context of typical poor households (Section 8.7.). Further, the Study Team indicates that preschool children and pregnant and lactating women require particular research attention because of their relative vulnerability (Section 8.6.2.).

Commentary: TAC also identified similar areas of concern, and as a result recommends increasing substantially the relative allocation to research on some of the commodities which make up the bulk of subsistence farmers' production, especially those in rainfed areas which are seasonally dry or semi-arid. These commodities also make up a substantial proportion of the calories consumed by both urban and rural low-income people.

TAC considers concerns related to nutrition of high priority and recommends a relative increase to the program approach dealing with human nutrition linkages in which low-income people are the beneficiaries, particularly infants, children and lactating women, as well as the landless rural and urban poor (Priorities Paper, Section 4.2.5.).

While TAC agrees with the Study Team that diagnosis of means to alleviate poverty needs to start from the context of typical poor households, TAC considers that this highly location-specific micro-level research should be increasingly taken over by national programs. CG System scientists should continue to backstop and advise NARS scientists, and to work on refining methodologies, training and catalyzing international concern (Priorities Paper, Section 4.2.2.[e]).

4.3 Targeting of Agricultural Research

The Study Team confirmed that:

- Most of the poorest people of the world live in vast areas of unreliable rainfed rice, or of semi-arid crops, and most of these areas remain in traditional varieties. Extra targeted research is surely needed (Impact Study, Section 8.3.3.).
- The area of edaphoclimatic targeting (Impact Study, Section 15) is an important input in the development of resource management recommendations. For the most part only maps of mega environments have been prepared, generally in terms of temperature and rainfall regions. Low-yielding sites with different kinds of limitations need environmental characterization to provide essential information to explain crop performance. Further work is therefore needed to identify rapid and effective methods of characterizing and mapping recommendation domains or homogeneous crop regions at low cost. A small proportion of the work will have to be done by highly trained specialists. The environmental limits of research findings are generally not sharply defined, because few, if any, near-boundary cases can usually be tested.

- The Centers and national programs cannot respond specifically to all the needs of farmers in their diverse and complex environments. Therefore, the Centers have concentrated on improving components of farming systems expected to be applicable in a wide range of conditions. This has led to the concept of wide adaptability in breeding new varieties, but as many of the most difficult problems are not alleviated by the use of these wide-adapted varieties, the Impact Study underlines that it is local specificity which is now needed (Impact Study, Section 8).

Commentary: TAC agrees that there is a need for extra targetting in research especially with respect to rainfed agriculture. As TAC indicates (Priorities Paper, Section 2.3.2.), there will be growing reliance on rainfed areas for increased crop production both through intensification, and expansion of agriculture into more difficult and marginal environments which require more location-specific technologies appropriate for complex cropping systems and diverse fragile environments. TAC considers (Priorities Paper, Section 2.6.) that the broad and rapid diffusion of technologies of wide adaptability will be less common than in the past. It has therefore called for more concerted effort on agricultural research among all global partners - specialized research institutions, IARCs, regional and national systems, bilateral and multilateral development agencies and research interests in the private sector.

In this connection, TAC (Priorities Paper, Section 4.2.1.[b]) also stresses the importance of agroecological characterization through full utilization of data available from satellites and other sources.

In addition, TAC stresses that technological development leading to a sustainable increase in agricultural productivity requires viable supporting facilities, such as national research institutions, credit and extension services, infra-structure, input-output markets, and transportation. Improved technologies can increase food production only when farmers are aware of the technologies and know how to use them; when the required inputs (seeds, fertilizer, herbicides, etc.) are available at reasonable prices; when markets are accessible; and when there are remunerative prices for farmers' products. Admittedly, TAC may not have dealt with some of these issues in depth, since, with the exception of national research systems, they are largely beyond the domain of CGIAR efforts. They lie more appropriately within the realm of responsibilities of the international and national development agencies (Priority Paper, Section 2.5.1.).

4.4 Germplasm Exploration, Collection, Conservation and Evaluation

The Impact Study is generally positive about the achievements of the CGIAR in the field of germplasm conservation and the elements (exploration, collection, conservation and evaluation) of which it is comprised. It stresses a major achievement of the System in contributing to increased awareness that genetic variation of cultivated crops and related wild species is an important natural resource.

A large amount of genetic diversity of the major crops has now been collected. However, the record of most of the Centers comes under some criticism. While the Study notes that changes are occurring, it points out deficiencies in several Centers with respect to activities and facilities. In others it points to geographic gaps in species representation, to the lack of wild forms or to collection and evaluation proceeding too slowly (Impact Study, Section 12).

Commentary: TAC gives great importance to germplasm conservation and related activities and recognizes, that despite their achievements, the Centers still have much to accomplish in the high priority fields of characterization and documentation of germplasm collections. TAC also recommends that pathbreaking research on improving the effectiveness of long-term storage of germplasm, particularly in relation to recalcitrant seeds and cryo-preservation of vegetatively propagated crops, be promoted. Overall TAC recommends a significant relative increase to germplasm bank activities while moderate increases should go to promoting research and supporting NARS (Priorities Paper, Section 4.2.1(a)).

4.5 Crop Protection

The Impact Study found that a rather large number of criticisms have been directed at the Centers. Those important ones which the Study Team took seriously are summarized below:

- Weed control research, particularly important in main arid areas, seems to receive few resources. Rats, birds and other vertebrate pests are rather neglected by the Centers (Impact Study, Section 8.3.4.).
- There is no consistent formulation of goals or objectives vis-a-vis plant protection work in the Centers (Impact Study, Section 13.2.1.).
- Center plant breeders have mainly followed the strategy of resistance breeding used at IRRI and while quite successful, germplasm improvement may be less appropriate for a few crops. These crops would therefore need different strategies (Impact Study Section 13.2.2.).
- More research is needed on the evaluation of pesticides and pesticide safety. The Study Team considers such research an appropriate activity for Centers as a complement to national programs (Impact Study, Section 13.3.4.).

Commentary: TAC considers adequate control of weeds is fundamental to crop productivity in all tropical environments. Because herbicides are expensive, the System's approach is to examine their use as an aid to timely weed control, particularly during periods of labour shortage. Weed control is a serious problem on a range of crops in Africa, North Africa/Near East and the Indian Sub-continent, and TAC considers that considerably greater efforts are required. The same applies to control of rats, birds and other vertebrate pests (Priorities Paper, Section 4.2.2.[c]).

TAC is of the opinion that an integrated approach to the management of pests and diseases will continue to be a major component of the System's approach to improved crop productivity and will comprise such aspects as varietal resistance, identification and monitoring of pest and disease organisms, efficient use of chemicals and biological control. Increasingly, work will involve collaboration in the development of more suitable chemicals and control techniques (implying the use of biotechnologies as these evolve) which can be incorporated into integrated methods of management (Section 4.2.2.[c]).

4.6 Role of Strategic/Basic Research in the CG System

Throughout the study, there are references to the importance of IARCs collaborating more closely with universities and advanced institutions in both developing and developed countries. These references have been summarized in the Foreword and in the concluding section of the printed summary of the Impact Study by drawing attention to the need for Centers to take advantage of the new advances in biotechnology and knowledge generation. The need to establish linkages with advanced institutions and for staff members to be trained in the new techniques is stressed. It predicts that the tools of biotechnology will greatly increase the potential gains from investment in research and urges that the Centers take the earliest possible advantage of the new technologies.

Likewise, during the debate on the TAC Priorities Paper, at least one speaker spoke in similar vein, drawing attention to the risk of the CG System becoming obsolete, warning against complacency, and urging TAC to take note that currently the World is on the brink of a major revolution in agriculture and that developing countries would get involved in biotechnology with or without support from the CG System.

Commentary: Views among scientists and journalists generally on the possible contributions of biotechnology to future agricultural production range from the outrageously presumptuous to the unnecessarily contemptuous. TAC has to help the CG System to steer a realistic course through this morass of conflicting viewpoints in order that the CGIAR may invest its funds effectively and economically.

TAC's views on the System's long-term evolution towards more strategic research are outlined in Priorities Paper Section 3.3.6. The Committee uses the words "upstream/downstream" to indicate a continuum from basic to adaptive research as outlined in Priorities Paper Section 2.6. It decided against using the word "biotechnology" because of confusion in many circles over the real meaning of the term.

Originally "biotechnology" was the term coined by the media for the techniques related to manipulation of chromosomes and especially in the removal or addition of pieces of DNA. By extension, the term has come to be applied to a wide range of standard biological practices already in use. TAC has preferred to name the disciplines that are likely to provide answers (genetics, biochemistry, cytology, molecular biology, etc.) rather than the tools (biotechnologies) used by the disciplines (DNA probes, monoclonal antibodies, tissue culture, protoplast fusion, etc.).

Recent biotechnological developments have wide application to problems associated with both crop and livestock productivity. In its recommendations for work on commodity productivity, TAC has been highly selective, recognizing that the field is enormous and that there must be concentration of effort. It sees opportunities for the use of these developments in resistance breeding, biological nitrogen fixation, and biochemistry and physiology of pest and disease organisms.

Several of the Centers have already responded to the need to equip themselves to exploit new techniques in molecular and cell biology (such as ILRAD, IRRI, CIP, IITA and CIAT). In this work they are cooperating with various advanced institutions throughout the world.

5. Development of Strategies for the Future

5.1 Rationalization of Center Mandates

The Impact Study report states in Section 2.3. that there was little conscious care taken to ensure consistency in the charters or constitutions that established the early Centers. It notes that the mandates of the later Centers have been more tightly drawn. Both TAC and the Centers management have come to recognize two types of mandates: the formal and the operational. A number of Centers have formal mandates that are much broader than their operational mandates and do in fact overlap those of other Centers. Examples include CIMMYT and ICARDA; and CIAT, IITA, and CIP. However, it is claimed that none of the mandates has proved an impediment. Concern was also expressed that other Centers with programs in Africa have not been effective in their collaboration with national research systems.

Commentary: This is a point where there is disagreement between TAC and the Impact Study. TAC does not see a reason to change its position. The need to define the interrelationships of Centers working in the same region has been stressed by TAC on several occasions. TAC is convinced of the need to rationalize the distribution of mandates among Centers (Priorities Paper, Section 5.3), but sees this as an evolutionary process to be accomplished gradually in consultation with Center Boards and managements. Furthermore, the mandates of individual Centers are continually monitored by TAC through External Program Reviews, and adjustments recommended as circumstances change. TAC has also endorsed the concept of global (as distinct from regional) commodity mandates (Priorities Paper, Section 3.3.3.).

5.2 Decentralization of Center Research

Center Research Strategies

Among the criticisms levied against the Centers was that "programs have a tendency to be over-centralized". The dangers of over-centralization are illustrated in the Impact Study mainly in reference to strategies in plant breeding (Impact Study, Section 6.4.3). One possible consequence of centralization is that parents may be chosen and selections made under conditions that are not typical of the environments for which the material is intended. "If the object is to breed varieties for small-scale farmers employing low inputs, a procedure of selection under high input conditions on experiment

stations is likely to be self-defeating." The Study also makes the point that there is a limit to the number of characters (especially resistance to pests and diseases) that can be coped with at one place, with the consequent need for decentralization at an early stage in the breeding process.

Greater decentralization also has implications for the concept of the "International Center", as well as for the network approach. Some speakers during the debate at Centers Week appeared to interpret TAC's endorsement of the Center concept as representing its lack of support for decentralized approaches to international research.

Commentary: Comments on breeding strategies, similar to those made in the Impact Study, have been made in several reports of External Program Reviews of individual Centers. For example, in the recent review of IITA, which was accepted by the CGIAR, the need for greater de-centralization was stressed, not only for the breeding programs, but for other activities as well.

It is widely recognized that ultimately, decentralization will be achieved through strong national programs. The problem arises in the intervening period when national programs lack the capacity to do the work themselves and Centers, by outpostting staff, run the risk of becoming too involved in individual national programs. But the Centers have to strike a balance continually between the resources devoted to outpostting and those required to retain a "critical mass" at headquarters. Centers have responded to this need in part by engaging in network operations.

TAC has developed its views on these complex and interrelated issues in several parts of the Priorities and Strategies Paper. While endorsing the concept of the international center TAC has by no means rejected the decentralized approach. TAC sees networking arrangements as complementary to the Center concept and tending to reinforce it (Priorities Paper, Section 3.3.1.). Moreover, it foresees that the present trend towards decentralization will continue and perhaps become even more pronounced, particularly with respect to breeding programs (Priorities Paper, Section 3.3.2.).

Furthermore, TAC does not see the creation of additional centers as a necessary prerequisite for undertaking new activities. Its view is that the existing institutional framework is such that new activities could easily be undertaken without the need for creating new international centers (Priority Paper, Section 3.1.). Consistent with this view, TAC has recommended that the System should participate in regard to research on starchy bananas in the newly formed international network (Priorities Paper, Section 4.3.3.). A network approach is also suggested if the CGIAR decides to support work on coconuts and, implicitly, if it decides to support work on tropical vegetables (Priorities Paper, Section 4.3.6.).

5.3 Need for System-wide Strategies

In several different instances, the Impact Study suggests that there may be a need for a greater degree of System-wide centralization in formulating research philosophies and strategies. The point is made,

for example, with respect to work on plant protection. What should the CG approach be? Should it give more attention to the judicious use of chemicals, or should it continue to concentrate mainly on host-plant resistance and biological control? (Impact Study, Section 13)

A similar point is made in relation to the ecological damage being done to tropical environments through over-concentration on short-term agricultural productivity at the expense of long-term conservation of natural resources (Impact Study, Section 14.4.8.). The Study points out that the CGIAR could adopt one of two viewpoints: either it could regard these problems as lying beyond its sphere of influence; or it could examine the possibility of introducing a system-wide plan of action that gives greater emphasis to sustainability as the yard-stick of success.

Likewise, in the chapter on Farming Systems Research (Impact Study, Section 16), the need for Centers to be consistent among themselves is stressed, particularly in relation to training. In an entirely different context, the need for a System-wide policy is implicit in the criticism made at the end of section 6.4.3 which reads as follows:

"Some observers believe that there may be few actions that could confer greater benefit on the Centers than the banning of glossy reports and other sub-literature, and the promotion of orderly scientific publication in properly refereed journals..."

Commentary: The System-wide policies advocated by TAC have not, in general, been at the level of philosophies or strategies for conducting research in particular subject areas. These are considered to be primarily the concern of Center Boards and management staff. Specific questions that have arisen as a result of External Program Reviews have been dealt with on a Center by Center basis. Nevertheless, on the subject of the control of pests and diseases, TAC has expressed the opinion that "the search for sources of durable resistance and tolerance will remain at the forefront of the CG System approach" (Priorities Paper, Section 4.2.2.[a]). It has also endorsed the integrated approach to pest management in which the judicious use of chemicals forms an important part (Priority Paper, Section 4.2.2.[c]).

The broader issues of sustainability of production and conservation of natural resources have been extensively addressed by TAC in the Priorities and Strategies paper. While TAC supports the integration of much of this work into the multidisciplinary approach, it has recommended that the Centers should intensify their collaboration with other organizations working entirely in this area (Priorities Paper, Section 4.2.1.[c]). The role of the CG System should be:

"to catalyze new initiatives, contract out basic research necessary for its work in conservation, and participate in collaborative efforts, rather than assume full responsibility for research itself".

TAC identified ecological management and conservation on the grand scale, such as the transnational management of the world's large

river basins, as an issue of a long-term nature. Although requiring international action, problems of this type could probably not be tackled through the present institutional structure of the CG System (Priorities Paper, Section 5.6).

In farming systems research, TAC has encouraged Centers "to maintain an active dialogue aimed at evaluating, improving and harmonizing their respective approaches" (Priorities Paper, Section 3.3.2). Clear evidence that this is occurring was provided by the recent Intercenter Workshop on Farming System Research held at ICRISAT.

The issue of scientific publication is one on which TAC has not explicitly recorded its view, except in the context of the External Program Reviews of individual centers, which clearly vary considerably in this respect. It is to be regretted that, in the scientific community at large, many of the Centers are not held in high regard with respect to scientific publication. The relatively poor output of good scientific papers by some of them can reasonably be attributed, in part, to the nature of the work, which does not lend itself to frequent publication. There are many who believe, however, that it is also associated with a range of other considerations, such as the attitudes of Center scientists, the organizational pressures placed upon them and the inability of some of them to write well in English.