SUSTAINABLE AGRICULTURAL PRODUCTION: IMPLICATIONS FOR
INTERNATIONAL AGRICULTURAL RESEARCH

A Report to the Consultative Group on International Agricultural Research

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The report of the World Commission on Environment and Development which focuses on issues related to sustainable development provides an excellent background for TAC's paper on sustainable agriculture. Although the Commission's report is, by its very nature, more comprehensive in scope, TAC's treatment of sustainable agricultural production is remarkably consistent with the manner in which the Commission has addressed the broad subject. Perhaps this is not surprising given the fact that economic growth in most developing countries is highly related to improvement in the agricultural sector. Consequently, factors impacting sustainable agriculture would also have a major impact upon sustainable development.

I suspect that many of the concerns which gave rise to the work of the Commission also prompted the development of the TAC paper.

About the time the Commission began its efforts, TAC initiated an in-depth study of the CGIAR System Priorities and Future Strategies. The priorities paper, presented to the Group in 1986, recognized that while there had been remarkable gains in agricultural productivity in some parts of the world during the last two to three decades, there was growing concern in the global
community that such gains could not easily be sustained. In recognition of this potential problem, TAC recommended that the word "sustainable" be included in the CGIAR's goal statement and that greater emphasis be placed upon increasing sustainable food production in the future work of the Centers.

The CGIAR took note of this recommendation and explicitly requested TAC to examine how this might be implemented and monitored. The TAC paper before you responds to this request.

Let me comment briefly concerning the process followed in developing this paper.

Acting on the request of the Group, the Chairman of TAC in late 1986 appointed a "sustainability" subcommittee, composed of Drs. deWit, Odhiambo, Nahal and myself. Dr. von Urff also worked closely with the subcommittee in its early deliberations and Dr. Arnold later joined the committee and played a vital role in developing the final drafts of the paper.

The Sustainability Subcommittee agreed to respond to its charge by developing a comprehensive paper which would characterize the problems of sustainability in agricultural systems and develop recommended strategies for the CGIAR to address these problems and to achieve sustainability objectives.

The IARCs both in and out of the CGIAR System were asked to provide specific information on the subject, including their assessment of sustainability problems, what they as Centers were doing to address these problems, and what, additionally, might need to be done by the respective Centers. Other
international organizations such as FAO and UNEP were also invited to comment. The responses of the Centers are summarized in the Annex to the paper.

Drafts of the paper were considered by TAC during its 43rd and 44th meetings in 1987 and were circulated to both Center Directors and Chairmen of Center Boards of Trustees. A draft was also circulated to members of the CGIAR in October, 1987. Moreover, several other organizations concerned with resource conservation and environmental issues received drafts for review and comment.

In January, 1988 TAC sponsored a three-and-a-half day workshop on the subject in Rome. In addition to the TAC Chairman and members of the Subcommittee, there were 23 participants, all invited in their personal capacities: four from the CGIAR donor community; eight from IARCs, both in and out of the CGIAR; six from international organizations such as FAO, UNEP and the World Bank; and five from national agricultural research systems.

Many helpful suggestions from all these different individuals and groups were incorporated in a paper which was considered finally and approved by TAC in March, 1988.

The paper has four Chapters plus the Annex to which I have already referred. Chapter One presents the Committee's concept of sustainable agriculture and makes a case for efforts to achieve sustainable agricultural systems.
Chapter Two considers the determinants of sustainability -- the various factors -- biological, physical, socioeconomic and legal -- which may affect sustainability.

Chapter Three provides a brief overview of how the IARCs are currently contributing to sustainability through their respective research programs.

Chapter Four is the key part of the paper, dealing with recommended strategies for research related to sustainability within the CGIAR System. In my limited time here today I will focus primary attention upon the content of Chapter Four.

First, however, let me consider briefly how TAC has characterized sustainable agriculture. In the course of our deliberations it became obvious that there were many different concepts of sustainability. A prominent dictionary definition of the term suggests that agricultural systems would be sustainable if production or output could be maintained at current levels. But TAC took the position that such a static concept was inadequate -- that sustainability should be treated as a dynamic concept, reflecting changing needs of a steadily increasing global population.

We suggest, therefore, that sustainable agriculture should involve the successful management of resources to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources.
I would note that such a characterization of sustainable agriculture is consistent with the Brundtland Commission's treatment of sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs." TAC has been somewhat more explicit in emphasizing the need to conserve natural resources and maintain or enhance the quality of the environment in order to meet the needs of future generations. However, the thrust of the two statements is very similar.

Perhaps the reason for the similarities is the fact that many of the determinants of sustainable agriculture, as reflected in Chapter Two are also factors which directly affect sustainable development. It should be noted, however, that sustainability should be distinguished from productivity. While greater productivity will be required to achieve sustainability goals, that productivity must be achieved in such a manner as not to jeopardize the ability of agriculture to meet future needs. Or to put it differently, productivity goals can be achieved through short-range approaches which may not be sustainable. Efforts to achieve sustainability goals, however, must take into account long-range implications and needs.

If sustainability is considered in the context TAC proposes, agriculture must be managed to meet the needs of steadily increasing numbers and rising aspirations of people. This means not only that the pressures threatening current production levels must be alleviated, but also that major efforts must be made to increase productivity to meet growing needs.
Clearly, many of the circumstances that limit the achievement of sustainability as reflected in Chapter Two cannot be solved by the CGIAR or through agricultural research alone. National governments and their development services will bear the brunt of the problems, and success in achieving sustainability will ultimately depend upon their commitment. Nonetheless, continuing research is crucial for success. CGIAR institutions and national research systems must constantly review their programs to give greater emphasis and visibility to those aspects relating to sustainability.

Although TAC believes that the CGIAR System can make a significant contribution, its total effort must be kept in perspective. In 1980, total expenditures in the CGIAR System represented only 1.6 per cent of the global public sector expenditure and approximately 5 per cent of developing country expenditure on agricultural research. But the CGIAR Centers can have an impact far greater than their relative level of expenditure through their ability to influence research activities in other institutions throughout the world.

If, as TAC has suggested, sustainability relates to the successful management of resources for agriculture to satisfy future human needs, it might well be argued that most of the work of the IARCs is already contributing to this goal. Indeed, I suspect that many of the Centers would emphasize this very point. The key questions, therefore, are not so much whether the Centers are working to make agriculture more sustainable, but whether they should be doing more, whether there should be a different emphasis in the work, and whether major restructuring of the approach is necessary.
Now let us consider some specific sustainability-related issues as addressed in the paper.

One -- TAC does not see a separate or discrete area of activity that would be labeled "sustainability research." Rather, concerns with sustainability should be reflected in all aspects of productivity research. TAC, therefore, recommends that IARC research should be planned and conducted with a sustainability perspective. Moreover, in formulating or reviewing their strategic plans, Centers should give careful attention to means for maintaining such a sustainability perspective throughout their total programs.

Two -- the issue of balance in research. Should the commodity programs of Centers devote less relative attention to plant breeding and more to resource management, for example. Of course, the issue of appropriate balance of activities is one each Center must address. However, sustainability concerns may make it desirable, if not essential, for some Centers to give increased attention to problems of resource management.

Three -- the question of short-term vs. long-term objectives. The issue was addressed in the Brundtland Commission by indicating that sustainable development must meet the needs of the present without compromising the ability to meet the needs of the future. TAC takes essentially the same position with regard to research by suggesting that our goals in research should be to devise technologies that can meet short-term requirements while, at the same time, maintaining or enhancing the ability to meet long-term needs.
Four -- the question of input levels. The level of usage of commercial or industrial inputs, especially fertilizers and pesticides, raises many sustainability issues. Some believe that high levels of such inputs may threaten sustainability; others suggest that without greater usage of such inputs, increased productivity and related sustainability objectives cannot be achieved.

It is recognized that in many developing country situations, farmers do not have ready access to such inputs -- or, in some cases, may be unwilling to take the economic risks in using them. TAC considers that Centers should review the emphasis given to low-input farming in their research programs and increase it where appropriate. The objective should be to optimize productivity from the use of low levels of inputs where conditions dictate their use.

At the same time, it is recognized that significant increases in productivity may often be difficult if not impossible to achieve without the use of higher levels of purchased inputs. TAC considers that, under appropriate conditions, the use of high levels of industrial inputs in production systems can make important contributions to sustainability and recommends that high input production systems and related policy issues be included in research programs of the CGIAR Centers.

Much of the public concern in the industrialized countries about the sustainability of agriculture has been generated by the development of highly productive agricultural systems that require considerable industrial inputs. Without the existence of these systems, however, it would not be possible to meet the food needs of the increasing world population unless more, but less
suitable, land were brought into cultivation, further degrading the surface of the earth and destroying natural ecosystems in the process.

Without a more intensive agriculture, therefore, sustainability would be sacrificed. But with it, sustainability is not insured. On the contrary, there are many disturbing developments such as the degradation of irrigation systems; the wasteful use of fertilizers leading to contamination of aquifers; the buildup of noxious pests, diseases and weeds and the large dependency upon pesticides to control them. Obviously, the goal of Center research programs should be to develop techniques which might optimize returns from the use of inputs while avoiding, to the extent possible, the undesirable consequences of such usage.

Five -- the issue of sustainability and equity. There is continuing debate over who has benefited most from the generation and application of improved agricultural techniques through research. Socioeconomic studies have made it clear that increased production has led to falling prices of the main staple foods in much of the world, and that the principal beneficiaries have been the poorest consumers.

Such improved techniques have led to the greatest increases in productivity in the well-endowed agricultural regions. Farmers in less-endowed regions have not realized comparable increases in productivity and, furthermore, have often suffered as a result of falling prices associated with improvements in productivity in the better regions. This has often had negative impacts on sustainability since farmers in such less-endowed regions are often forced to sacrifice ecological stability for short-term needs. This has
often led to a conflict in equity between the needs of the farmers in the less-endowed regions and those of the poor consumers. Differing agricultural policies have been developed to resolve this conflict. Their application may lead to different agricultural production structures which, in turn, give rise to different sustainability issues.

TAC reaffirms its earlier recommendation that the Centers should give greater emphasis to the development of techniques that are applicable in less-endowed regions. In addition, TAC stresses that assessment of these techniques with respect to sustainability requires a thorough analysis of evolving agricultural policies in the domains of their application.

Six -- improved production systems.

While the productivity of traditional farming systems may become inadequate to meet growing needs, the principles on which they are based have permitted them to persist for generations. Research has already led to considerable understanding of the strengths and limitations of many aspects of traditional systems. Others, such as the effect on pests and diseases of complex mixtures of crops, are more difficult to analyze, and research methodologies for this purpose are still evolving.

There are dangers both in disregarding the principles of traditional systems and in assuming that, because they are appropriate in some circumstances, they will remain appropriate in others.
Generally, there is a need for much more research on the management of crops and livestock in production systems that exploit the principles of agro-forestry in order to optimize production and insure sustainability. There is also a need to investigate more fully the wide range of multipurpose trees and shrubs that might find a place in production systems of this type.

TAC encourages Centers to continue to investigate aspects of more intensive systems that could evolve from sound traditional systems.

Seven -- advances in biotechnology.

In the common effort to achieve sustainable production, research workers, scientific leaders and policy makers must remain alert to the implications of the evolving frontiers of knowledge in the biological sciences. New techniques emerging from the biological sciences already offer important opportunities. It is necessary for Centers to assess on a continuing basis the potential cost effectiveness of incorporating new capabilities in biotechnology into their research programs in relation to other demands on their resources. TAC considers that Centers involved in productivity research should have the capability to monitor advances in biotechnology and, when appropriate, develop the in-house capacity to use techniques that would assist their research programs in a cost-effective manner.

Eight -- policy research.

Chapter Two of this report clearly indicates that many of the problems that threaten sustainability relate to economic, social, political and institutional
considerations. Although these problems do not have technological solutions, they lend themselves to policy research aimed at discovering those options most likely to create circumstances that are favorable for the promotion of sustainability.

In its study of priorities and future strategies, TAC recommended a significant increase in policy research in the CGIAR System. Recognizing the contribution that policy research can make to solving problems of sustainability, TAC reaffirms its recommendation.

Nine -- relations with national agricultural systems.

The recommended emphasis by Centers on research related to sustainability has obvious implications for their relationships with national agricultural research systems. Centers could be very effective in encouraging national agricultural systems to give greater attention and priority to considerations of sustainability, as well as in helping to strengthen their capacity to do so. Such emphasis by national programs is especially needed because many problems of sustainability are location specific.

TAC recommends that Centers afford high priority to strengthening the capacity of national agricultural research systems to incorporate a sustainability perspective into their endeavors.
Ten -- training programs.

Center training programs provide a vital mechanism for helping national agricultural research systems to strengthen their capacity to address sustainability issues. TAC recommends that CGIAR Centers afford higher priority to the incorporation of a sustainability perspective in training programs, making adjustments where necessary to meet, more effectively, the needs of national agricultural research systems in this respect.

Eleven -- the role of developing countries.

In its global perspective of problems related to sustainability, TAC reiterates that however strongly the Centers may support national systems through research and training, success will ultimately be dependent upon the commitment of the developing countries themselves. Accordingly, TAC urges all members of the CGIAR and associated organizations to use their influence to create greater awareness of the problems of sustainability among those who determine national policy and priorities.

Twelve -- collaboration within the system and with institutions outside it.

In addition to strengthening the sustainability perspective and adjusting the balance of their research programs, the Centers will increasingly be drawn into large scale problems of sustainability. Solutions to problems of this type will involve comprehensive, long-term, national programs of research and development. To contribute effectively to such programs on an international basis may well be beyond the expertise of a single Center or even beyond the
collective expertise of the CGIAR System. The need for a strong commitment by the Centers to effective collaboration is, therefore, greater now than ever before, not just with national systems but among all the institutions that can make a contribution whether within the CGIAR System or not. And we recognize fully that there are several international centers outside the CGIAR System whose work relates very directly to critical sustainability issues.

In separate papers, TAC has recently developed its views on sharing responsibilities among Centers and on promoting collaboration between CGIAR Centers and other research institutions. TAC is also reviewing the relationships with national agricultural research systems. The purpose is to help clarify and hence to strengthen the basis of successful working relationships.

TAC recommends that Centers continue to explore the potential for collaboration with other research institutions, including those in the private sector, particularly with a view to strengthening their research related to sustainability.

Thirteen -- research needs and resource implications.

While the Centers and the national agricultural research systems already make important contributions to the solution of problems related to sustainability, the total current effort is unlikely to be adequate to meet the needs with the urgency required. A large proportion of current expenditures on productivity research is needed to maintain past gains (perhaps as much as
70 per cent of current expenditures are devoted to this purpose). At the same time, research activities need to be expanded in a number of critical areas.

In view of the serious problems limiting the achievement of sustainability and the urgency of additional research to assist in their solution, TAC recommends that Centers review the priority accorded to sustainability in their budget allocations, and increase it where appropriate.

Indeed, the Centers must add a substantial new dimension, both to their own efforts and to their partnerships with the national systems, if sustainability is to be attained. TAC consider that because much of the required additional work relates to protection of the environment and the conservation of natural resources, it may well be possible to widen the avenues of donor support for this vital new thrust, compared with support for research on productivity per se. TAC will support the Centers in attempts to attract funding for well-conceived new programs related to sustainability.

TAC suggests that the issue of agricultural sustainability has major implications for the further development of the Third World and, indeed, for future global security. TAC considers that the international donor community as well as the governments of developing countries have crucial roles to play in emphasizing the need to consider sustainability when allocating future resources and orientating future thrusts.

The common challenge facing all concerned is to find ways of removing the impediments to sustainable agricultural production, whether the causes are technical, economic, social, institutional, political or some combination of all.
A significant part of this challenge rests with the International Agricultural Research Centers. Accepting it offers them opportunities for making unprecedented contributions to the global community, as they help to find solutions to serious problems that threaten the future welfare of humanity.