THE CONSULTATIVE GROUP ON INTERNATIONAL AGRICULTURAL RESEARCH
TECHNICAL ADVISORY COMMITTEE

Eighteenth Meeting, Rome, 14-20 February 1978

BASIC RESEARCH,
AT OR ON BEHALF OF
THE INTERNATIONAL AGRICULTURAL RESEARCH CENTRES

Agenda Item 11

TAC SECRETARIAT
FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS
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1. Basic research, defined for the purposes of this discussion as the search for new knowledge on which advances in technology may be made has, as the TAC document shows, been discussed by it on several occasions, more especially with respect to specific problems, e.g. nitrogen fixation by grain legumes, sources of plant nutrients, etc.

2. Donors, more particularly the European members, have also been interested in this topic; they have suggested that the centers were perhaps not always making full use of their (the donors') resources in this aspect of agricultural research. Part of this feeling has arisen because of the structure of center staff, since about 30% are from the U.S. and the major part of the developing country nationals (about another 30%) are U.S. trained; naturally these staff tend to look to the U.S. for their contacts.

3. The centers have, of course, recognized the need for such research to support their on-going efforts, though it is seldom explicit in their research planning. The TAC quinquennial review of CIMMYT, for example, suggested that the center might consider more research, internally or externally, to support further advances. In the draft of the long-range planning committee's report, IRRI has stated that "the importance of mission-oriented basic research will increase in the future as technologies that capitalize on existing knowledge are discovered."
4. During the discussion on this topic at the Consultative Group meeting in September 1977, the center directors expressed themselves generally satisfied with the work that was going on and stated that they had been able to take advantage of collaborative programs with advanced institutes where this was considered necessary. One Board Chairman did however point out that the most important people in such a discussion, the center scientists who would normally be the best able to define those areas needing additional knowledge, had not been brought into discussions so far. The suggestion in the Integrative Report that a meeting of center scientists be organised, would give them the opportunity for such a discussion.

5. In all the discussions on this topic, there has been a recognition that a considerable amount of work is being undertaken already, mainly at universities and institutions conducting basic research, but to some extent at the IARC's, though they are principally concerned with applied research. The question at issue is whether the needs of the IARC's, well into the future, will be met. Is basic research presently underway adequate to provide the basic knowledge needed to underpin the applied research of the centers 5 or 10 years from now? And is it necessary or worthwhile to formalize or prepare a mechanism that would facilitate collaboration and which would concentrate on certain problems of system-wide importance rather than those of specific centers?

6. Annex A details a list of problems set out in the National Academy of Sciences report on research which indicates some fields where system-wide collaboration might be profitable.

7. As indicated in Paragraph 2, the European donors have indicated an interest in this subject and the Overseas Development Ministry of the U.K., which is sponsoring the next meeting of European donors in April 1978, will present an opportunity for discussion of this subject. The deliberations of the TAC at its 18th Meeting would form a useful basis for this discussion. This could lead to a workshop as suggested in the TAC document. Such a workshop should include not only certain scientists but others from developing countries with advanced research programs.
8. Specifically the procedure suggested is as follows:

(a) Each center to consider its needs for basic research for a substantial period ahead;

(b) The centers then to consider their needs collectively and to determine where they have needs in common;

(c) The results of this consideration to be reviewed by TAC;

(d) TAC to make its recommendations to the Consultative Group.

The workshop suggested could take place in conjunction with, or following, (b).
Types of Research

The following seven areas of research to reduce the vulnerability of plants to stress should have high priority:

- Studying the morphological, physiological, and biochemical differences between susceptible and resistant varieties of the same species in order to make a sharp distinction possible early in the life of the plant. Success in this endeavor would lead to rapid screening techniques in a breeding program.

- Incorporating resistance to the conditions of acid soils, particularly aluminum toxicity, into new, higher yielding varieties of crop plants exposed to such stresses.

- Breeding crops for a shorter growing season to utilize the periods when drought or frost is least likely, and to allow for planting a substitute crop, if early crop failure occurs.

- Breeding for deeper and wider root penetration; extensive root development permits crops to use more of the scarce water and mineral nutrients in the soil, thus increasing drought resistance. Breeding for root penetration, shorter seasons, and tolerance to aluminum toxicity complement and reinforce each other in overcoming drought. The capacity of some grasses to penetrate deeply into inhospitable soils may establish root channels that can be used by other crops.

- Improving the symbiotic relationship between soil fungi and plants. Certain fungi (mycorrhizae) associate with plant roots and in effect extend the reach and functioning of the roots resulting in greater absorption of soil moisture and mineral nutrients.

- Breeding for higher tolerance to salinity, making use of wild species or varieties as a base. This will permit higher yields in extensive irrigated and semiarid dryland areas where yields are now depressed and permit more extensive use of irrigation waters of inferior quality.
Modifying farming systems so that stress is prevented or reduced. For example, shading by intercropping reduces high temperature stress on the lower crop.