

Recommendations of International Meeting on « Towards a Second Green Revolution »

1. *North-South Network for the development and application of new biological technologies in Agriculture in the Tropics.*

The first phase of the Green Revolution in the tropics has helped in raising food production above the rate of growth of population in most countries of Asia and Latin America. Improved productivity in tropical farms has resulted in many benefits to economically under-privileged farmers and consumers.

The agricultural advances of the last 20 years both in developing and developed countries have however raised the following issues which deserve the consideration of scientists, technologists, policy makers and political leaders.

a) There is abundance of food in the world today but millions of children, women and men remain hungry due to lack of the necessary purchasing power to buy food. Inadequate purchasing power is in many cases due to lack of opportunities for gainful employment. Therefore, in the next phase of the Green Revolution, as much attention will have to be given to *fighting the famine of jobs* as to working for *adequate food supplies*, nutritional level and protection from disease (primary health care and control of disease).

b) *The ecological sustainability* of new production technologies needs to be incorporated in new production technologies. The aim should be the continuous improvement of terrestrial and aquatic productivity without detriment to the long term production potential of soil and water resources. Also the conservation of the basic agricultural assets of land, water, flora, fauna and the atmosphere should be the foundation on which yield-enhancement agro-technologies should be developed.

c) *The economic and social sustainability* of new technologies needs greater attention. The new technologies should not only be culturally responsive and *environment-friendly* but also friendly to small holders, landless labour and economically poor consumers. *Labour-friendliness* can be assured if new technologies lead to the creation in rural areas of diversified opportunities for employment. For example, the preparation of a wide range of value-added products from agri-

cultural products could help to generate more jobs and income in villages, particularly for women. Moreover an appropriate development of animal husbandry is important for labor, food and manure while care should be exercised to avoid overgrazing and environmental degradation.

d) For enhancing yields without increasing the cost of production, farm grown biological inputs should be emphasized as a possible substitution for market purchased chemical inputs. Modern biotechnology techniques would be particularly helpful in such research efforts. Also, integrated systems of pest management and nutrient supply while conserving soil and water resources will have to be popularised. It should be emphasized that more inputs, particularly nutrients and water, will be needed for greater output. Therefore, equal attention should be paid to the improvement in the efficiency of the use of chemical inputs as to the production on the farm of appropriate biological inputs.

e) The technologies which led to the Green Revolution of the last 20 years were generated, largely by public sector organizations, either funded nationally or multilaterally as in the case of the international research centers supported by the CGIAR (Consultative Group for International Agricultural Research). *If the first Green Revolution from the angle of research was essentially a product of public sector organizations*, the second Green Revolution triggered by genetic engineering and biotechnology will increasingly be based on research discoveries made by private sector companies. There is therefore need for a Research Network which can help to bring the latest tools of "upstream research" for solving the "downstream" problems faced by small farmers in the Tropics.

For developing a mutually beneficial "Upstream-Downstream Research" strategy which can help to promote the growth of a second Green Revolution rooted in the concepts of ecological and economic sustainability of yield improvement techniques, it is proposed to set up a *Future Action Committee*.

The aim of the Future Action Group will be to bring together the following three groups into a symbiotic partnership:

I. Non-profit national and international research organizations supported largely by public funds, such as Government Laboratories, Universities and CGIAR Institutes.

II. Private sector: industrial research and development organizations.

III. Third world Research and Development institutes represented by the Third World Academy of Sciences.

If these 3 groups can work together in a mutually supportive and reinforcing manner, we can help to launch a symphonic agricultural production system where there is harmony between the short and long term goals of agricultural development for people.

A Future Action Committee (*) should take speedy steps for bringing such a Trilateral Partnership into action. The Italian Academy of Sciences has volunteered to undertake the first effort for starting the initiative.

2. *Organization of Pioneer Pilot Projects on the "Second Green Revolution Technology".*

In order to popularise the different components of the new technologies based on biological and knowledge-intensive inputs, it will be useful if a few pioneer or pilot projects are organized in suitable villages in some countries of Asia, Latin America and particularly Africa. Such pilot demonstration projects should be organized by multidisciplinary teams of scientists and extension workers. They should involve an integrated approach to biological and social engineering, with consideration of agriculture and food, but, equally important, of energy and environmental resources. Emphasis in such projects should be placed on the generation of self-sustaining, productive employment.

The Future Action Committee should take early steps to get such pilot projects organized with the help of appropriate national, bilateral and international agencies, so that interest in packaging and spreading the different components of the second Green Revolution technology becomes widespread. It is suggested to start with one or two projects in Africa. In identifying and defining these projects, a major contribution should come from the African Academy of Sciences.

(*) Formed by a group of scientists representing international organisations as well as industry.