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Improving human nutrition through agricultural research: Overview and objectives

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Abstract

There has been little dialogue in the past between agricultural scientists and human nutritionists to explore ways to solve the problem of malnutrition in developing countries together. This conference, held at an agricultural research center in a developing country, provides a unique opportunity to have such a dialogue. About one-half of the 95 in attendance are trained as human nutritionists, and nearly an equal number are plant scientists.

International agricultural research has made a major contribution to growth in food supplies in developing countries. It is widely recognized that lowering the prices of food staples has had a tremendously beneficial impact in alleviating malnutrition. However, the magnitude of micronutrient malnutrition as a public health concern, and the crucial role of poor dietary quality as an underlying cause, have now become widely recognized. Does agriculture have an equally important role to play in addressing micronutrient malnutrition as it has had in alleviating low energy intakes? It is at this crossroads that this conference meets.

Formally, the conference has been convened as a meeting of scientists from the 16 centres that comprise the Consultative Group on International Agricultural Research (CGIAR), with the objectives of taking stock of human nutrition-related research at CGIAR centres, determining research gaps and priorities for future CGIAR research, and identifying opportunities for outside collaboration and cooperation. A three-day conference agenda is designed to accomplish these goals, while at the same time allowing a general discussion of agriculture–nutrition linkages with partners from outside the CGIAR.

The need for a dialogue between agriculture and nutrition

Agriculture is the primary source of nutrients that sustain human life. This is sufficiently obvious that it is often ignored or forgotten. Malnutrition has long been recognized as a major public health problem in developing countries. Poor diets are a fundamental cause of malnutrition. Yet there has been little dialogue in the past between agricultural scientists and human nutritionists in exploring ways to solve this problem.

The 16 agricultural research centres that comprise the Consultative Group on International Agricultural Research (CGIAR) as a group have formally recognized reduction of malnutrition as a CGIAR goal, through such mechanisms as increased food production, more stable food supplies, and increased purchasing power of the poor [1]. The focus of past CGIAR research activities related to nutrition, with a few exceptions, has been on protein–energy malnutrition. Research by plant scientists has concentrated on increasing crop yields, ensuring yield stability, reducing costs of production, and protecting the environment, while recognizing that nutritional benefits may accrue indirectly from increased crop production and so lower food prices.

Human nutritionists have focused on supplementation, fortification, and dietary diversification as the three principal interventions to reduce micronutrient malnutrition. Little attention has been paid by human nutritionists to agriculture per se as a complementary means to solving the dietary quality problem and the contribution that plant scientists might make in this area.

Can we do better than this? What are the benefits to an interdisciplinary dialogue on agriculture–nutrition linkages and identifying follow-up actions? Is it imperative that we do better than this? What are the consequences if the interactions between agriculture and nutrition are ignored by scientists and policy makers?

This conference provides a unique opportunity for having a dialogue between plant scientists and human nutritionists and for seeking answers to these

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questions. About one-half of the 95 in attendance are trained as human nutritionists. The remaining participants are primarily trained as plant scientists who have an interest in applying plant science to improving human nutrition. Social scientists are also here in smaller numbers. We come from research, implementing, and donor institutions and from international and national agencies, based in both developing and developed countries. We are meeting at an International Agricultural Research Centre, the International Rice Research Institute in the Philippines.

The role of international agricultural research in fighting malnutrition

International agricultural research has made a major contribution to growth in food supplies in developing countries. In the early 1960s, there was serious concern that population growth would outstrip the ability of the agricultural sectors of poor countries to produce sufficient food staples to keep food prices from rising and to avert widespread hunger. The opposite, of course, has happened. Rice, wheat, and maize prices, adjusted for inflation, have declined since Green Revolution varieties first became available to farmers in the latter part of the 1960s. Lower cereal prices have been a benefit to all consumers, but especially to poor consumers who spend a large share of their income on food. Producers have been more than compensated for lower prices by increases in productivity, i.e., lower costs per unit of output provided by modern high-yielding varieties developed at international and national agricultural research centres. The best evidence of their continued profitability is the widespread acreage of modern cereal varieties planted in developing countries.

During the 1960s and 1970s, ensuring sufficient energy was thought to be the most serious dietary constraint to improved human nutrition. It is widely recognized that lowering the prices of food staples, the most inexpensive sources of energy in the diet, has had a tremendous beneficial impact in alleviating malnutrition. This was accomplished despite a doubling of world population and the reaching of a land constraint for increasing agricultural production. Although malnutrition persists and is even getting worse in parts of Africa, the situation would certainly be far worse today if cereal prices had remained constant or risen.

Despite this success, the focus of the international nutrition community has now shifted. As outlined by Barbara Underwood in the following paper in this volume, as a result of much new research in the 1980s and 1990s, the magnitude of micronutrient malnutrition as a public health concern has become more widely recognized [2]. The crucial role of poor dietary quality as an underlying cause of this problem is now

more fully appreciated at the turn of the millennium.

It is at this crossroads that this conference meets. Does agriculture have an equally important role to play in addressing micronutrient malnutrition as it has had in alleviating low energy intakes? Indeed, some take the view that the Green Revolution has caused a reduction in the diversity in diets, which in turn has increased micronutrient malnutrition. Such claims, however, typically do not consider the plight of the poor and the nutritional situation under the counterfactual situation of lower cereal yields and rising prices for food staples.

Conference objectives

Within this broader context, we have formally convened as a CGIAR-wide meeting, "Improving Human Nutrition Through Agriculture: The Role of International Agricultural Research," with the following objectives:

- » to take stock of activities related to human nutrition currently being undertaken at CGIAR centres;
- » to identify gaps in the present CGIAR research agenda related to human nutrition;
- » to communicate to outside agencies current and proposed research activities in order to identify complementarities with existing programmes and opportunities for collaboration and cooperation;
- » to discuss whether a new direction for institutional arrangements is needed for undertaking human nutrition-related research within the CGIAR.

Conference agenda

A three-day conference agenda is designed to accomplish these four specific CGIAR goals, while at the same time allowing a general discussion of agriculture–nutrition linkages. To frame the broad policy and research issues, during the morning of the first day we hear primarily from participants outside of the CGIAR. The opening address by the First Lady of the Philippines, Dr. Luisa P. Ejercito-Estrada, lays out the challenges faced and programmes being implemented by the government to improve nutrition in the Philippines. Her very participation at our conference, I think, is indicative of the high priority that developing-country governments place on nutrition and health programmes.

Next on the first morning agenda are viewpoints on agriculture–nutrition linkages from three disciplinary perspectives: those of human nutrition, plant science, and economics. These papers provide both a background on the malnutrition problem in developing countries (its prevalence and consequences and the evolution of interventions) and a conceptual framework for analysis

of food systems and agriculture–nutrition linkages. These papers are followed by remarks by representatives of implementing institutions: a developing-country government (the Ministry of Planning in Bangladesh), a developed country research agency (US Department of Agriculture–Agricultural Research Service [USDA-ARS]), a multilateral donor (the Asian Development Bank), and a bilateral donor (US Agency for International Development [USAID]).*

During the second half of the first day and all of the second day, we then take stock of ongoing CGIAR research activities related to human nutrition. These are primarily presentations by CGIAR scientists, with commentary or complementary research reported on by technical experts from outside the CGIAR. This discussion is broadly divided into two parts, dealing with staple foods and non-staple foods.

First, plant-breeding research directed at changing the nutrient content of staple foods is reported. This discussion includes the use of both conventional plant-breeding and biotechnology; strategies to increase the mineral, vitamin, and protein content of plants and to reduce antinutrients; and research to determine the bioavailability of nutrients to humans.

Second, various efforts are reported to increase the supply of livestock, fish, vegetables, fruits, and pulses and so to diversify and improve the quality of diets, with a particular emphasis on research and other activities to understand the consequences for improvements in human nutrition. The discussions here cover descriptions of centre activities and strategies for improving human nutrition, studies of the effects on human nutrition of adoption of CGIAR technologies by farmers, and plant-breeding and processing methods for reducing toxins in foods.

Agricultural strategies must fit into a larger milieu of non-agricultural interventions to reduce micronutrient malnutrition. The morning of the third day provides an opportunity for human nutritionists to provide perspective for the plant scientists on the successes and limitations of existing micronutrient programmes and policies. This background can then lead into a discussion of how agricultural interventions can be dovetailed with existing strategies. This is accomplished by means of an in-depth case study of Philippine micronutrient programmes (to some degree representative of the Asian setting), with summary remarks on policies and strategies for Africa and Latin America, and some historical perspective from Europe.

The remainder of the third day is devoted to a discussion of priorities for future CGIAR research activities related to human nutrition and of post-conference follow-up activities both within the CGIAR

and in collaboration with outside institutions. This is accomplished through participation in break-out groups that cover specific subtopics, followed by plenary discussions. The questions addressed by the various groups and conclusions reached are presented in the summary chapter at the end of these proceedings.

Changes since the previous CGIAR-wide meeting on human nutrition

It has been 15 years since the CGIAR has convened a system-wide conference on human nutrition. In the proceedings for that conference [4], 14 recommendations for follow-up activities are listed, which may be grouped as follows:

- » Seven institutional and staff-related recommendations for increasing the capacity of CGIAR scientists to undertake nutrition-related research (both internally and in collaboration with other institutions) and to increase the priority of nutrition-related considerations in CGIAR research activities.
- » Three recommendations to undertake research on the nutritional impacts of CGIAR technologies and of agricultural programmes and policies.
- » One recommendation to incorporate nutritional considerations into CGIAR training programmes.
- » One recommendation to develop methodological improvements for incorporating nutritional considerations into farming systems research.
- » One recommendation to undertake research into ways that post-harvest storage and processing can enhance the nutritional content of foods.
- » One recommendation for monitoring the nutrient and antinutrient content of new plant materials to avoid release of lines with standards below those normally accepted.

The agenda outlined above for the present meeting suggests a much more proactive and direct role for plant scientists in helping to solve nutritional problems than was perhaps perceived possible or useful 15 years ago. What is different now?

The 1984 meeting was heavily influenced by the troubles experienced by the Centro Internacional de Mejoramiento de Maiz y Trigo (CIMMYT) in the development of quality protein maize (QPM), the first major effort by a CGIAR centre to breed for nutritional quality. These difficulties are chronicled by Vasal [5] in this volume; these research activities were at a low ebb in the early 1980s. Although it took longer than originally expected, QPMs are now a success story.

New and more powerful plant-breeding techniques are available today. The use of biotechnology is a much debated and highly visible topic.

As already mentioned, our understanding of the nature of human nutritional problems is more complex. Micronutrient deficiencies are high on the public

*Although the remarks of the First Lady and these four speakers are not published in these proceedings, specific points made are referenced in the concluding chapter [3].

health agenda, alongside energy. Food production, environmental, and human nutrition and health systems are increasingly strained as a consequence of population growth and the closing of the land frontier. Consequently, in finding solutions to problems that arise within these systems, it is more difficult today to ignore interdependencies among these systems.

Yet the fact that a CGIAR-wide meeting on human nutrition issues has not been held for 15 years is telling evidence that human nutrition is probably no higher on the CGIAR agenda than it was at the 1984 meeting. It is our challenge, then, to evaluate the potential of incorporating agricultural strategies into the fight against malnutrition. If that potential seems sufficiently high, we must then find ways to convey the message to other scientists, policy makers, and donor institutions that more resources need to be spent on new, innovative, and cost-effective agricultural approaches to improving human nutrition.

References

1. Technical Advisory Committee of the Consultative Group on International Agricultural Research. CGIAR priorities and future strategies. Rome: Technical Advisory Committee Secretariat, Food and Agriculture Organization, 1987.
2. Underwood BA. Overcoming micronutrient deficiencies in developing countries: Is there a role for agriculture? *Food Nutr Bull* 2000;21:356–60.
3. Bouis HE. Improving human nutrition through agriculture: the role of international agricultural research. Conference summary and recommendations. *Food Nutr Bull* 2000;21:549–65.
4. Pinstrup-Andersen P, Berg A, Forman M. International agricultural research and human nutrition. Proceedings from a workshop held at the International Livestock Centre for Africa, 29 February–2 March 1984. Washington, DC: International Food Policy Research Institute, and Rome: United Nations Administrative Committee on Coordination/ Sub-Committee on Nutrition, 1984.
5. Vasal SK. The quality protein maize story. *Food Nutr Bull* 2000;21:445–50.

In closing, we thank those participants from outside the CGIAR for attending and helping us in this planning and priority-setting exercise. We appreciate the support of the agencies and institutions that you represent for providing the funding for you to come to the meeting. In this regard, we thank the USDA-ARS in particular, which sent six participants. We thank the USAID and the Government of Norway for providing major funding for the attendance of participants from developing countries and technical experts, and for the costs of publishing these proceedings. Thanks also to the staff of the International Rice Research Institute (IRRI) for their competent management of many logistical arrangements for such a large gathering and to IRRI for co-hosting this conference with International Food Policy Research Institute (IFPRI).

A map showing the locations of the 16 CGIAR agricultural research centres can be found in the Annex at the end of this issue.