Bridging the Yield Gap in Food Crop and its Implications

Edward Pulver and Peter Jennings

FLAR, CIAT, A.A. 6713 Cali, Colombia

E mail: e.pulver@cgiar.org

World food production is not maintaining pace with population growth, especially in developing countries, resulting in a continuing food security crisis. Rice is the world's most important food crop and there have been marginal advances in world production during the last decade. However, two-thirds of the recent production advances are a result of increased area in production and average yield has stagnated at levels far below the yield potential of available genetic material. Yield of other major food crops, such as beans, maize and cassava are also low and grossly inferior to the yield potential of the crop. The difference between farmers' yield and the potential of the crop is referred to as the yield gap. The yield gap is apparent in all food crops. In irrigated rice, the yield gap is 3 t/ha as evidenced by success in bridging the gap in RS, Brasil. In maize, the gap is over 4 t/ha, dry beans over 1 t/ha and in cassava more than 5 t/ha.

Simply bridging the yield gap will have major impacts on world food production, resulting in production increases similar to the Green Revolution. The Green Revolution was a product of improved genetics and the bridging the yield gap is based upon crop management. The technology for improved crop management is known but has not been extended to the farmers. A major effort in technology transfer is required to bridge the yield gap and this will require funding and leadership. The international research centers are the obvious choice for leading efforts to implement a major effort in technology transfer but have narrowly defined their role as "research for development" and as a consequence the centers have not been able to demonstrate impacts and have lost much credibility within the international donor community. The centers will require a major restructuring of priorities and staffing if they are to lead efforts to improve food production at the farmer level. There are other potential groups that could participate, such as farmer organizations, but many are poorly focused and often pursue profit or political motives and not the welfare of their farmer-members.

However, the opportunities and rewards are obvious. Bridging the yield gap in food crops offers the opportunity for large gains in food production and rural poverty alleviation, leading to an Agronomic Revolution that is equivalent in magnitude to the Green Revolution. The causes of the gap are due to inadequate attention to crop management and extension. A massive program for training young agronomists in extension is urgently required. Financial resources are available but reallocation of funds will be necessary, meaning less support to upstream research efforts such as biotechnology. Vested interests of researchers will impede efforts to refocus resources. National agencies will also resist change and more dynamic leadership will be required. Traditional funding agencies that have long supported research without impacts will also feel threatened by the paradigm shift in priorities.