

## Foreign Assistance to Agriculture: A Win-Win Proposition

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The United States Agency for International Development (USAID) cut aid to developing country agriculture by 20 percent in 1996. This was the latest major reduction in what is already a strong downward trend in aid to developing country agriculture. Bilateral and multilateral donors significantly cut foreign assistance to agriculture in the latter half of the 1980s. As a percentage of overall development finance, assistance to agriculture fell from over 20 percent in 1980 to about 15 percent in 1990. Figure 1 shows how USAID funding for agricultural research dropped by 62 percent from 1986-94. Donors will harm both developing countries and their own economies by these cuts. Foreign aid to agriculture creates jobs in industrial countries by expanding overseas markets. According to the study, each dollar invested in agricultural research in developing countries increases their imports of additional goods and services by more than \$4, thus expanding the world export market.

Aid directed to developing country agriculture, and to agricultural research produces a positive chain reaction that benefits both recipient and donor. First, aid to agricultural research or other aid for agriculture leads to increased agricultural growth. This agricultural growth then leads to greater incomes and thus greater demand for goods and services, resulting in broad economic growth. Part of the growth in demand is a demand for imports, including agricultural imports. The rise in imports generates export earnings and jobs in exporting countries.

### **Agricultural Research Leads to Agricultural and Overall Economic Growth**

Agricultural research is key to the technological advances that drive agri-

cultural growth. A 1984 study estimated that the rate of return to public agricultural research, in terms of the value of additional agricultural production, is generally two to three times higher than the return to other agricultural investments, which themselves compare favorably to private investments.

The effects of agricultural growth reverberate throughout the economy. IFPRI research shows that in Sub-Saharan Africa, for instance, each additional dollar of income from agriculture adds \$2 to \$3 to the overall economy. This report finds that, on average, a \$1 increase in agricultural production generates \$2.32 of growth in the overall economy.

One dollar adds so much to the economy because of its multiplier effect: The rise in agricultural production leads to higher demand for agricultural supplies and services. Employment then rises, as processing, distribution and storage activities expand to handle the increase in production. Someone receives increased income, either the producer—because of greater output, suppliers of farm inputs— if the increased production requires increased inputs, or the consumer, who— if the price of the agricultural product falls, due to increased output— can have added income to spend on other products. Increased income leads to the purchase of other goods, leading to a rise in production, income and employment in other sectors of the economy, as well.

### **Economic Growth Increases Imports**

Economic growth leads to an increase in imports. An increase of \$1 in gross domestic product (GDP) causes total imports to increase by \$0.32, agricultural imports to increase by \$0.07, and cereal imports to go up by \$0.03.

This result holds even when the economic growth results from agricultural growth. Theoretically, increased

domestic agricultural production could displace agricultural imports, but empirical studies consistently show that, for two reasons, growth in the agricultural sector actually increases agricultural imports by developing countries.

First, while some crops are grown in both developed and developing countries, many are not. For example, high-quality wheat is difficult to produce in many developing countries. Consequently, when developing country income expands, a significant portion will be spent on imports, including agricultural imports, due to an expansion of agricultural production. Developing countries generally do not increase production in the same crops that developed countries export, and so developed-country exports do not decrease when developing-country agricultural production expands.

Second, as noted, agricultural growth causes growth throughout the economy. The increase in domestic production may not be able to meet all the expanded demand, and so agricultural imports may increase.

### **Imports Increase Export-country Employment**

An increase in imports by one country is, of course, an increase in exports by another. These exports result in more jobs in the exporting country. Developing countries are a significant force behind the expansion in world trade, and exports to them are becoming increasingly significant to developed-country economies. The share of world exports going to developing countries increased from 13 percent in 1970-71 to more than 26 percent in 1992-93, with the share growing at an average annual rate of about 3 percent. These exports provide significant employment in developed-country economies. In the U.S., every US\$1 billion of exports creates 20,000 jobs. With annual exports to develop-

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## New Wheat and Rice Strains Benefit the United States

In the 1940s, a team of scientists began work to improve wheat yields in Mexico as part of a joint program created by the Rockefeller Foundation and the government of Mexico. Under scientist Norman Borlaug, breeders sought to develop a high-yielding plant resistant to rust fungi. Work was slow, because breeding progress was limited to one cross per growing season. To speed things up, breeders developed an innovation known as shuttle breeding. They grew two breeding cycles per year instead of just one by shuttling successive generations of plants between an irrigated, sea-level region in Sonora and a cool, rainfed, highland plateau in Toluca. Plants sown in the fall in Sonora and harvested in the spring were transferred to Toluca for immediate planting. This innovation not only cut in half the time required to develop improved varieties but also produced disease-resistant varieties that could be grown in a wide range of environments. A later advance crossed American semidwarf varieties with the rust-resistant Mexican varieties, producing disease-resistant, high-yielding strains of wheat that could grow in many different conditions. These strains required more fertilizer, water, and pesticides than traditional vari-

eties, but they yielded two to three times more. The varieties developed in Mexico were particularly well-suited to conditions in many developing countries, and in the 1960s and 1970s, they spread rapidly through the developing world. They were instrumental in the Green Revolution, which averted the catastrophic famine that had been predicted for Asia. A similar effort to increase Asian rice yields began in the 1960s.

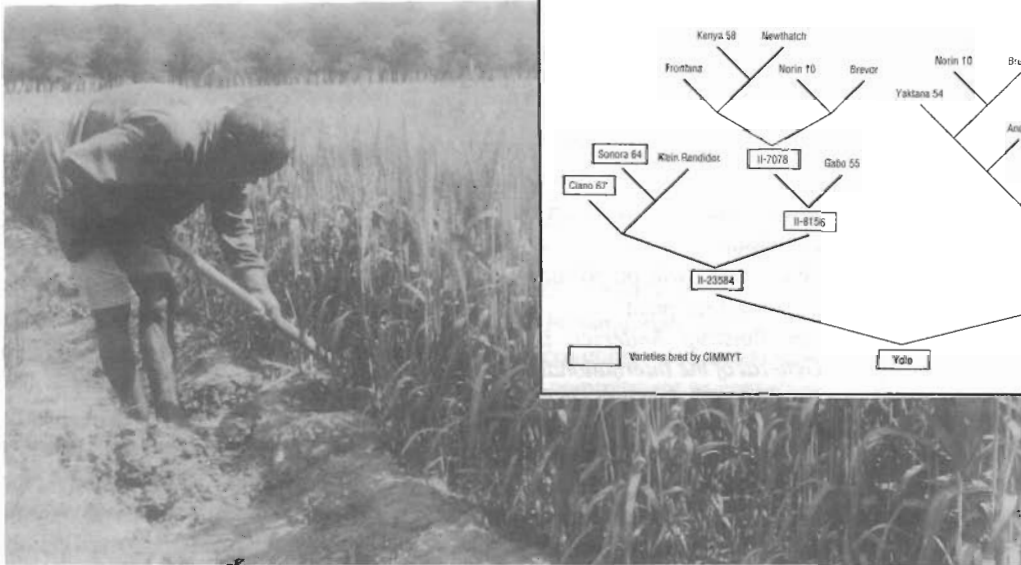
These pioneering efforts to increase agricultural production evolved into the Consultative Group on Agricultural Research, a global network of 16 research centers and other organizations. To improve wheat and rice crops in developing countries, the U.S. contributed \$134 million between 1970 and 1993 to CIGAR, "foreign aid" that turned out to have enormous domestic benefits, as U.S. farmers adopted the new varieties, resulting in increased output.

To measure the benefits to the U.S. economy due to CIGAR research, Philip Pardey and colleagues traced the development and use of varieties of wheat developed by the International

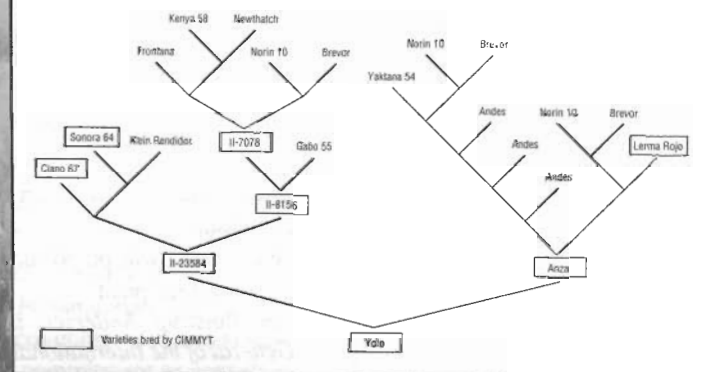
Rice Research Institute (IRRI), the International Maize and Wheat Improvement Center (CIMMYT), and U.S. breeders, and identified the yield gains and increased economic value realized by U.S. farmers that were attributable to these new varieties.

The United States gained at least \$3.4 billion and as much as \$13.7 billion from 1970 to 1993 from the use of improved wheat varieties developed by CIMMYT. Since U.S. government support of what improvement research at CIMMYT has amounted to less than \$71 million since 1960, the country's investment amounts to less than 1 cent for every \$100 of increased U.S. wheat production—an extremely high return. [The wide variation in estimates is due to the lack of a standard methodology for estimating the contribution of past genetic varieties to present ones. The range is due to the application of various methods of estimating the contribution. See Fig. 1 for the genetic tree of the modern wheat variety Yolo].

In the same 23-year period, the United States gained at least \$30 million and up to \$1 billion through the use of improved rice varieties developed by IRRI, while spending only



**Figure 1. Pedigree of the Wheat Variety Yolo.**



Winter wheat,  
Karnal, India.  
Photo: FAO/I. de  
Borhegyi

**Figure 1. USAID Funding for Agricultural Research**

Type of Funding	1986 (in millions \$)	1994 (in millions \$)
CGAR Centers	\$46.2	\$33.7
Africa	46.7	8.7
LAC	8.9	0.3
Near East	5.7	6.0
Asia	45.6	5.1
Other S and T	• 37.0	18.0
Total	190.1	71.8

Source: U.S. Development Assistance, A Visual Briefing, Environmental and Energy Study Institute, April, 1995.

ing countries of US \$197 billion, almost 4 million U.S. jobs depend on sales to developing countries. Exports from developed countries to developing countries totaled more than US\$728 billion in 1993. If the U.S. figure holds for other developed countries, these exports would have created more than 14 million jobs in those countries.

### Putting the Pieces Together

By linking the effects of agricultural growth on overall economic growth to the effects of economic growth on imports, the report estimates how agricultural growth affects imports, specifically agricultural imports. It finds that, on average, for all developing countries, a \$1 increase in agricultural growth leads to an increase of \$0.73 in the value of imports, of which \$0.17 is agricultural imports, and \$0.07 cereal imports.

The report also specifically quantifies the effect of agricultural research on the export market available for developed countries. To determine the effect of agricultural research on agricultural growth the study uses a conservative assumption, based on previous studies, of a 40 percent annual return to investment in agricultural research in terms of increased agricultural production. By then estimating the effect of agricultural growth on imports, the study shows that \$1 invested in agricultural research leads, on average, to increases of \$0.29 in total imports, \$0.07 in agricultural

imports, and \$0.03 in cereal imports each year.

Increases in agricultural production generated by new agricultural technologies continue for many years. When the flow of additional imports over time is taken into account, the \$1 investment in agricultural research generates \$4.39 of additional imports. The \$1 investment also generates, over time, an additional \$1.06 of agricultural imports and \$0.45 of cereal imports.

### The Joint Rewards of Foreign Assistance

While expanded export opportunities do not assure that a particular donor country captures the gains from the increase in exports, all donors have the potential to do so. Developed-country producer groups and aid donors have traditionally feared that foreign aid to agriculture would reduce agricultural exports. This report shows just the opposite: Such aid can bring economic gains to both developing and developed countries. Foreign assistance is thus not a drain on the national treasuries of donor countries, but rather a win-win proposition for both donor and recipient.

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*article is based on Foreign Assistance to Agriculture: A Win-Win Proposition by the authors (see References). This document may be obtained free of charge by writing to IFPRI, 1200 17th Street, N.W., Washington, D.C. 20036-3006.*

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