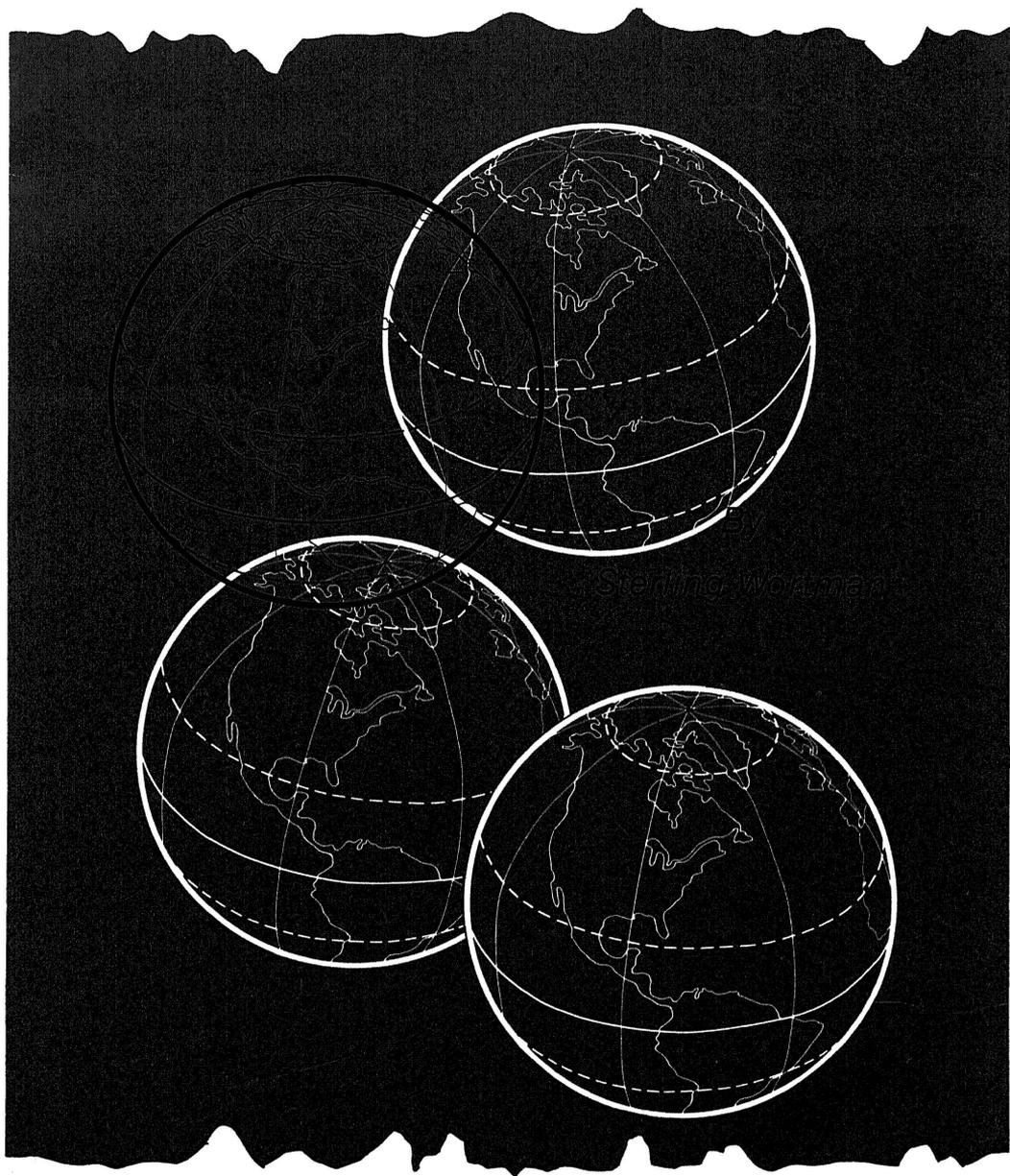


# International Agricultural Development



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Dr. Sterling Wortman



Dr. J. Milton Poehlman

As a tribute to the fruitful career and scientific accomplishments of Dr. Milton Poehlman on the occasion of his retirement, the Department of Agronomy and the College of Agriculture proposed to invite a distinguished scientist to deliver a lecture that would be a challenge and a resource to other faculty and to graduate students in further pursuit of the same objectives to which Dr. Poehlman has contributed so much during his career. In addition, it was proposed that the tribute should recognize specifically the contributions of Dr. Poehlman to international agricultural development.

Dr. Wortman is indeed a distinguished plant scientist and international agriculturalist. He has performed those roles and gained that distinction through avenues of service such as a geneticist with the Rockefeller Foundation in Mexico; head of the plant breeding department and as director of the Pineapple Research Institute in Honolulu; associate director of the International Rice Research Institute, Philippines; director of agricultural sciences, vice president, and finally, president of the Rockefeller Foundation, and president, International Agricultural Development Service. He has served also as board member of the National Academy of Sciences, the International Rice Research Institute, and the International Center for Improvement of Corn and Wheat in Mexico, and as vice president of the General Education Board. As a plant scientist and international agriculturalist he identifies himself as friend, colleague, and peer of Dr. Poehlman.

Dr. Wortman's lecture is a fitting tribute to the career of Dr. Poehlman.

*J. Wendell McKinsey*  
J. Wendell McKinsey, Director  
International Agriculture

University of Missouri

Lecture

In Honor of

JOHN MILTON POEHLMAN

Sterling Wortman  
21 October 1980



## INTERNATIONAL AGRICULTURAL DEVELOPMENT

Sterling Wortman  
Consultant to the President  
The Rockefeller Foundation

The prospect of participating with you in this event was especially attractive to me for two principal reasons. The first was that you have chosen to honor John Milton Poehlman for a lifetime of contributions--to the education and training of innumerable students, to the greatness of the University of Missouri, to the economic development of Missouri and the nation, and to the promotion of international understanding and the advance of the poorer countries. It is a privilege and a pleasure to join his many colleagues and friends in saluting him on his remarkable achievements. His dedication, his friendliness, his humility, his many years of hard work have set an example worthy of emulation by both students and professional associates. He deserves the applause, not only of those of us who have been privileged to know him, but of countless others in this state, this nation, and in other lands.

The second reason why I was delighted to be invited to join you relates to the topic we are to discuss today --international agricultural development and the role of faculty and of the land-grant university in it. I hope to demonstrate that this subject is an important one to the University and to the state.

There is a third reason. For many years my parents lived on and operated a farm seven miles north of the town of Mountain View in the south central part of the state. Missouri, at least, has been a second home to me, and it is always a pleasure to return.

### The Scope of Agricultural Development

Let me begin by explaining my own concept of agricultural development, using this state as an example. What has occurred here must also occur elsewhere.

At the turn of the century Missouri, which is larger and more populous than many of the developing countries, was a land of family farms. Productivity of those farms largely depended on the fertility of your soils, your rainfall, the industriousness of your people. Yields were relatively low, as they were in other states. The size of a farm that a family could manage depended on its numbers and on the availability of animal power. During this century you have experienced an agricultural revolution, with output per acre and per worker increasing severalfold. That revolution has been science-based and industry-supported.

Scientists, such as Dr. Poehlman and numerous others in many fields, have contributed new technology which has permitted farmers to increase their output and income.

There have been advances in the yielding ability of crop plants through plant breeding. New means have been devised to control diseases and insect pests; to improve your soils; to provide information to farm people through extension services and through publications, radio, and television. Similar advances have been made in animal production.

The use of fertilizers has been greatly increased, and without them yeilds would be nearer the low levels of 1900.

There have been advances in the supply of irrigation water, and in the conservation of moisture on lands that are rainfed.

Surely it can be concluded that increased productivity of the farms of Missouri can be attributed to advances in a wide range of disciplines--plant breeding and genetics, chemistry, physiology, veterinary medicine, economics. In fact, a close examination would reveal that virtually all disciplines at a university such as this have contributed importantly.

Advances in farm productivity can be directly related to the education of the people of this state through its public schools, its technical and vocational institutions, its junior colleges, and its universities. An education population is central to agricultural and rural progress.

As farm incomes rose, the predominantly rural population increasingly provided a market for goods and services supplied by businesses and industries in rural towns and in smaller and larger cities, and therefore contributed to employment off the farms. Moreover, to support the conversion of your farms from essentially subsistence units to those marketing surpluses, there was a need for bettering the means of supplying inputs such as seed, fertilizer, insecticides, soil amendments, credit, machinery, and consumer goods demanded by prospering farm families. The rising productivity provided opportunities, in fact a need, for storage, processing, and marketing of farm product. In short, the number of farm families in the market economy of Missouri expanded; and thus came the expansion of wholesale and retail trade.

But that was not all. The agricultural development of this state required the elaboration of your networks of roads, the extension into rural areas of electrical systems, the construction of dams and reservoirs, the elaboration of telephone and other communication systems--of highway, rail, or water transport.

The increase in the productivity and incomes of Missouri's farms has been the result of four essential factors. First, through research you have provided the technology necessary for higher crop or animal yields. Second, through extension, you have instructed your farm people in the use of such technology and related practices on their own farm units. Third, largely through private enterprise you have developed systems for delivering supplies and credit to farms, and fourth, you have established markets to which farm producers can deliver their excess produce and obtain prices which most of the time have provided sufficient profit to compensate farmers for their work, their investment, their risk. No farmer can or will raise productivity if any one of these requisites is missing.

To the extent that any element is weak, farm productivity will be adversely affected.

The development of the State of Missouri clearly has been the result of the combined efforts of the public and private sectors--of government, of the public institutions, of private businesses, and of course of the farm people.

## The Generation of Wealth

It is important to understand the place of agricultural development in any agrarian area or nation. Let's take the case of any farming district, a rural town and its surrounding trade territory. For any such locality there are six prime sources of wealth, of money that can be generated and circulated locally, thereby supporting the retail stores, the banks, the shops, and other suppliers of goods or services to the local population.

The first possibility is extractive industry. If a community has mines, or forests, or oil or gas wells, resources can be extracted and marketed outside the area. This can bring in funds--as profit or as salaries for local employees--which then are spent in part in the local community or saved.

Manufacturing plants in a locality provide employment and incomes for local people as a result of marketing those products outside the area.

To the extent that farmers buy supplies locally and sell through local markets, and pay taxes, they contribute to the local economic activity.

In some towns or cities which are financial or trading centers serving wider areas, income will be derived from such transactions.

The other two possible streams of income for a locality are tourism and local activities or people financed from federal or state sources.

All of these six sources of wealth--extractive industry, manufacturing, agriculture, tourism and federal and state services, and trade--may contribute to the economic vitality of a region.

Each of us can quickly guess at the relative importance of these various income streams to the economic vitality of our home localities.

## Creating Domestic Markets

In many rural areas of the developing countries where there is a high concentration of farms with low productivity, increasing their output is the first and

most important way to contribute to the generation of wealth. Increases in employment will occur as businesses are set up or expanded in rural trade centers to service the farm areas. Many of today's developing regions are not unlike Missouri as it was in the late 1800s except that the family farms are likely to be tiny, only an acre or two in size, as in Japan.

One could take the next step and indicate that the economy of the State of Missouri depends heavily on prime income streams derived from extractive industry, manufacturing, interstate and international trade, tourism, agriculture, and federal payrolls.

Each of the developing countries is seeking to advance its prosperity and, in doing so, must resort to a similar set of prime income streams. But with the exception of a few city-states, such as Hong Kong and Singapore, the countries are primarily agrarian, with high proportions of their people still dependent on agriculture. Many of them are subsistence farmers seeking out a livelihood from long impoverished soils.

It is interesting that both Sir Arthur Lewis and Dr. Theodore Schultz, winners of the Nobel Prizes in Economics last year, are noted for their emphasis on the necessity that such developing countries give first attention to getting their agricultural yields and incomes up. This is necessary, not only to allow those nations to meet higher proportions of their food needs, but to increase rural prosperity to provide the domestic markets for goods and services of their towns and cities.

The intensification of agriculture, the modernization of agriculture tailored to their own requirements, is of first priority to low-income countries.

### Food and Poverty

Prior to World War II Africa, Asia, and Latin America as regions were all net exporters of basic food grains. Following the War all three regions became net importers on an increasing scale--with considerable year-to-year fluctuations because of weather. By 1964 their imports had reached some 24 million tons, and Dr. Lester Brown, then an economist with the United States Department of Agriculture, published the first projections of food deficits to the end of this century.

They were expected to become ever larger, and Brown noted that the developing countries were losing the capacity to feed themselves. As he projected, those deficits have grown, and today there are only a handful of nations--the United States, Canada, Australia, Argentina among them--which are consistent exporters of staple foods on any substantial scale.

For a number of years world attention focused on means of increasing food output in the food-deficit countries as a solution to the worsening hunger problem. In more recent times there has been a growing recognition that food production in the poorer countries, important as it is, is only part of the solution to under nutrition and malnutrition.

The other requirement is that the purchasing power of the hungry be increased, for that is the only way that they can gain access to food or other necessities or amenities of life. The nations' food deficits are becoming far too large for the affluent countries to cover either with donations or through sales at subsidized prices. Nor can the government of the poorer countries afford to distribute food free on the scale required.

We must remember that with few exceptions no one today is going to bed hungry if he or she has money in his pocket.

The solution of the hunger problem in the poorer countries clearly consists of two parts: first, food production must be increased largely through higher output on existing small farms, and second, incomes of rural poor (and urban dwellers too, for that matter) must be increased by any of the means previously mentioned--through intensified agriculture, manufacturing, extractive industries, tourism, international trade, or financial assistance.

It is now obvious that poverty is a root cause of hunger. Poverty also prevents access to improved health care, better housing, education for the children. It fosters a sense of hopelessness, of helplessness, which can lead to restlessness, to violence, to revolutions.

## Requirements for Rural Development

Agricultural development cannot flower in the absence of rural development. There must be roads, transport, and communication systems; electrical grids; irrigation and drainage systems; wholesale and retail supply; processing and marketing systems. And, of course, there must be direct efforts to assist farm families to get their productivity up and to do so as quickly as possible for the time for action is short.

Given the small scale of many of the farm operations, it is necessary to tailor improved crop and animal production systems, and the supply and marketing systems to their situations. Certainly we can agree with B. F. Schumacher that "small is beautiful." But let us not forget that big also is beautiful insofar as that applies to the requirements for transport and communication and power systems, to extractive industries, and to some forms of manufacturing.

Everything required for the development of the State of Missouri is also necessary for the development of a poorer country. There is need for a blend, for a balance, between activities of government and those which can best be handled by competitive private businesses.

### Emphasis on Speed

There are several ways in which the problems confronting developing countries differ from that of Missouri and our nation. One, of course, is the much smaller size of individual farms. The second is the need to achieve improvements in output and incomes at a rate much faster than has occurred in our own country. Since World War II our agricultural output has increased at the rate of one-and-a-half to two percent a year, with some variations in the upward trend associated with weather. That has been quite adequate for our purposes and, as a matter of fact, we have been more concerned with intermittent surpluses. But many of the developing countries are striving to raise agricultural output at the rate of four to six percent per year. Their population growth rates are two to three percent. The rate of agricultural growth must exceed those levels if they are to improve food availability per person. This calls for development at a pace with which we in this country are simply not familiar.

I have no question that given a national problem of similar urgency, as in a wartime situation, our country could expand agricultural output far faster than we are now doing. The point is that we have not found it necessary or even desirable to move at that speed in the United States.

We have not been concerned in this country with strategies for moving agricultural development as fast as possible, and at costs which poorer developing countries can afford. To do so is a challenge worthy of our best minds as well as theirs.

### Emergence of Educated, Experienced Leaders

One of the great contributions of United States universities, public and private, has been the education of thousands of students from abroad, often on a subsidized basis. These people are now in positions of leadership in their own countries. Not only are they equipped with fine educational backgrounds but many have 10, 20, or even 30 years of experience in grappling with problems in their own national settings. Most have experienced both frustrations and successes. Many have become strategists, and in many countries one finds centers of strategic thought which in many respects surpass those in the United States or Europe. This has changed the requirements for technical assistance in important ways. Resident expatriates are not needed for general development or educational purposes in the numbers once necessary.

### New Economic Frontier

It long has been fashionable to consider United States cooperation with developing countries as "assistance," a one-way flow of expertise, technology, and funds from our country to theirs. Many of us, including our lawmakers, have considered work with and support of other countries as primarily a charitable or philanthropic venture. And, given such problems as inflation and unemployment at home, there has been relatively weak support in Congress for "foreign aid." State universities, in many cases, have been under pressure from state legislators to devote their energies almost exclusively to state or domestic problems for understandable reasons; after all, such universities were set up to

serve the states and largely are supported with funds contributed by state taxpayers.

My guess is that attitudes will change rather drastically over the next decade, that increasingly we will realize that agricultural and economic development abroad is in our national interest. It may contribute importantly to our prosperity, our employment levels, the profitability of our businesses.

Consider the following. The Overseas Development Council, in its recent publication, THE UNITED STATES AND WORLD DEVELOPMENT: AGENDA 1980, reports economic data on 172 countries and geopolitical entities. Total imports of all countries other than the United States were valued in 1978 at \$1,188 billion. Our exports were valued at \$141 billion, or about 12 percent of the total.

Of that \$141 billion, agricultural exports accounted for \$29.4 billion--or one-fifth--mostly through commercial sales. Exports of manufactured articles including chemicals, machinery and transport equipment, and other manufactured goods, totalled about \$95 billion. Such a volume of sales of agricultural and manufactured goods contributes importantly to the vitality of the American economy and to employment in this country. It is important to Missouri.

If we examine our imports carefully, we will find that we rely heavily on the developing countries for many supplies necessary to the performance of our own economy. Among them are petroleum, manganese, cobalt, platinum, aluminum, tin, nickel, mercury, zinc, tungsten, and, of course, a wide range of tropical food products which we value highly. Increasingly, we are importing machinery, cars, and other manufactures.

One of the major objectives of each of the 135 or so developing countries is to increase their prosperity, to expand their own domestic economies. And, some are making rather remarkable progress.

Our population of about 221 million people, with our current affluence, makes the United States market one of the largest in the world. But, some feel that with the slowdown in our population growth rate and the near-saturation of our own market with food and manufactured goods, we will be hard pressed to keep our manufacturing establishment working near capacity. The

result could be high rates of unemployment.

My own view is that the developing countries which need so desperately to increase the productivity and the incomes of their people, to bring large numbers of rural dwellers into the market economy, represent a new economic frontier--a population of several billion people with rising aspirations. A basic question is "to what extent will the United States participate?" And, one might ask, what does this imply for the State of Missouri?

Other nations, notably Japan and Germany, are pursuing the new international markets with considerable vigor. Our share of manufactured exports has declined from about 27 to 12 percent during the 1970s, and this worries many authorities in this country. While not an authority, I am concerned.

### The Role of the University

I have been asked to address the roles of the land-grant university--particularly the University of Missouri --in international agricultural development, and I shall now attempt to do that.

First, I suggest that the major mandate of the University continues to be to assist in every way possible to strengthen the economy and to educate the young people of this state. It will be important for students and faculty alike to understand the state's potential sources of economic growth, and the means by which the state might derive maximum benefit from them. The fortunes of the University largely will be determined by the prosperity of the state's people and businesses, and the degree to which they perceive the University to be a leading element in efforts to improve their well-being.

Second, it is essential to recognize that agricultural progress can occur only in the context of rural and general economic development, whether in Missouri or a poor country. Consequently, the process requires the involvement of authorities in most fields of study represented at a great land-grant university. An interdisciplinary approach is required, involving economists and business people, engineers and agricultural sciences, management and medicine, finance and law--groups which have the common purpose of advancing the well-being of

the state or a nation and the will to work together in common cause.

Third, the processes, the strategies, of agricultural, rural, and general economic development need to be increasingly understood and taught. The principles which apply to Missouri are also applicable elsewhere with some important modifications. In the tropics, cropping continues year-round. Farms generally are small, and will continue to be for years to come. Mechanization must be tailored to such farm sizes.

The technology required for intensive farming systems cannot generally be transferred in to developing countries, but the scientific principles and strategies are highly transferrable. The developing countries need maximum progress at low cost; the factors of speed and economy are important to them. In 1978 my colleague Ralph Cummings, Jr. and I described the key strategies for rapid agricultural development of poorer countries, as we understood them, in the volume TO FEED THIS WORLD: THE CHALLENGE AND THE STRATEGY. No doubt many improvements in strategies are needed and will be made. And, greater attention to strategies in university curricula could be helpful.

Fourth, the vital importance of business and industry needs to be better understood.

There are in this state a number of corporations with strong international networks of activities abroad, and which are considered to be highly ethical in their operations. Some, like Ralston-Purina of St. Louis, are particularly important to the agricultural development of other countries. They provide ready and needed processing facilities and markets for farm products and make available foods, feeds, and services of high quality. They train local people to operate their own developing-country businesses. Such companies are particularly important to Missouri and the nation for several reasons. They provide employment to Americans, here. They bring back some of their profits; in fact, in 1979, international companies earned abroad and brought back some \$65.9 billion, while earnings of others in the United States, and transferred out, were only \$33.5 billion--a net contribution to our economy and balance of payments of over \$32 billion. Such international companies do more. By helping to expand the economies of other countries they increase

opportunities for sales there of a broad range of other American goods and services. And, most such companies (there are exceptions) build goodwill for the United States. And they serve to increase our understanding of other countries because of their detailed knowledge of them.

Behind the international operations are a host of smaller companies whose products are sold abroad directly or are components of other products which find their way to international markets. In 1980 a survey of 511 top executives of small-to-medium sized businesses (sales of \$5 to \$105 million) in New York State resulted in some interesting findings. For example, 49 percent of all businesses are engaged in overseas production or in the export or import of goods and services. In the metropolitan area, 54 percent of the businesses are so involved, as might be expected. But, of the businesses in outer areas, 29 percent are engaged in international activities. Perhaps the percentage in Missouri is less, but one should not be surprised if the involvement is substantial.

The positive contributions of business and industry to development abroad are generally underestimated by what I suspect are wide margins. Were it not for the array of innovative free world businesses, large and small, including the international companies, there would be little hope for the conquest of hunger, for improvement of health and housing and education, for economic advance in the poorer countries. There would be no international airlines, shopping companies, communications systems, banking networks, international traders, food and feed processors. Without them, there would be little prospect for a new economic frontier in which the United States can share. With benefits to all concerned, including the out-of-work American as well as the millions abroad still shackled by poverty. Without this array of business and industries we would, indeed, face a bleak future.

Fifth, one of the great contributions America is making to progress of other countries is the education of their young people, by the tens of thousands, in our universities and colleges. And, a number of our universities have actively engaged in the strengthening of educational institutions abroad, as has Missouri.

Increasingly the United States must learn directly

from the new authorities of developing countries if we are to keep abreast of the rapid pace of change abroad--technical, social and economic. Assistance, in the thinking of many abroad, is no longer a welcome concept. Cooperation is.

Finally, the role of a state university in international agricultural or rural development, will be determined by those who control the funds. In what ways might the state, its businesses, its labor force benefit? Well-documented analyses are needed if they are to be convincing to those who count in political and administrative circles.

It would seem desirable to determine, and document to the extent possible, the significance to Missouri businesses and people of international trade. What are Missouri's imports and exports? Of what importance to Missouri is an expanding world market-economy?

#### A National Mechanism

In recent years a study has been underway to determine if a privately organized and financed United States center for international development--including a national staff college for development--might be desirable and feasible. With a central campus, and with joint sponsorship by the nation's universities, foundations, private voluntary organizations, and businesses, it would offer intensive non-degree training in all important aspects of development and on each country abroad. It would have a modest core staff, since most courses offered would be conducted by experienced individuals on the staffs of our universities, businesses, government, or other private organizations, and, importantly, by individuals from other countries.

In any United States university, there will be found only a limited number of faculty members with primary interests in international development. Most have other agenda, and understandably so. Existence of such a center, by serving all cooperating institutions, would permit frequent exchanges and facilitate cooperation among interested persons on the various campuses. Presentations by authorities from abroad could be attended by interested faculty from a number of institutions, enriching their own courses.

The center would serve American or foreign students who would come to it for relatively short periods of intensive study or development, perhaps by arrangement with a university at which they were enrolled in work leading to a degree.

It would serve the business community as well, offering intensive study of development topics or of a particular country in which there are or may be business interests.

Given our pluralistic society, the United States appears to need a mechanism through which our diverse public and private organizations can cooperate easily in furthering the expansion of the market economy and of our participation in that process. It would allow us to keep our finger on the pulse of international economic activity, and to build friendship around the world.

### The Stakes

In the final analysis, the role of the university and its faculty in international agricultural development must be determined by those of you who best know your capabilities and the interests of your state. But, there seemingly is a new economic frontier opening up, offering attractive new opportunities for American participation in an expanding world economy--the only realistic way to overcome hunger and misery, while contributing importantly to invigoration of our own sluggish economy. The stakes are high, with important implications for business, for labor, for universities, for us as individuals, and for generations to come.