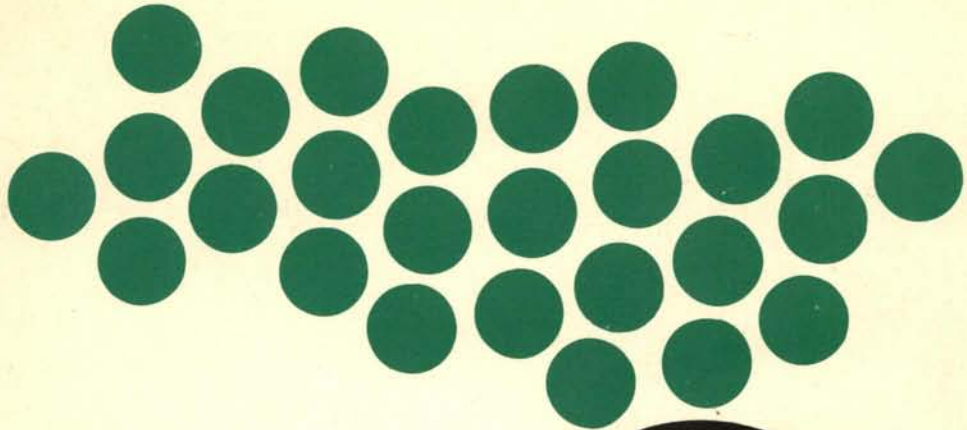


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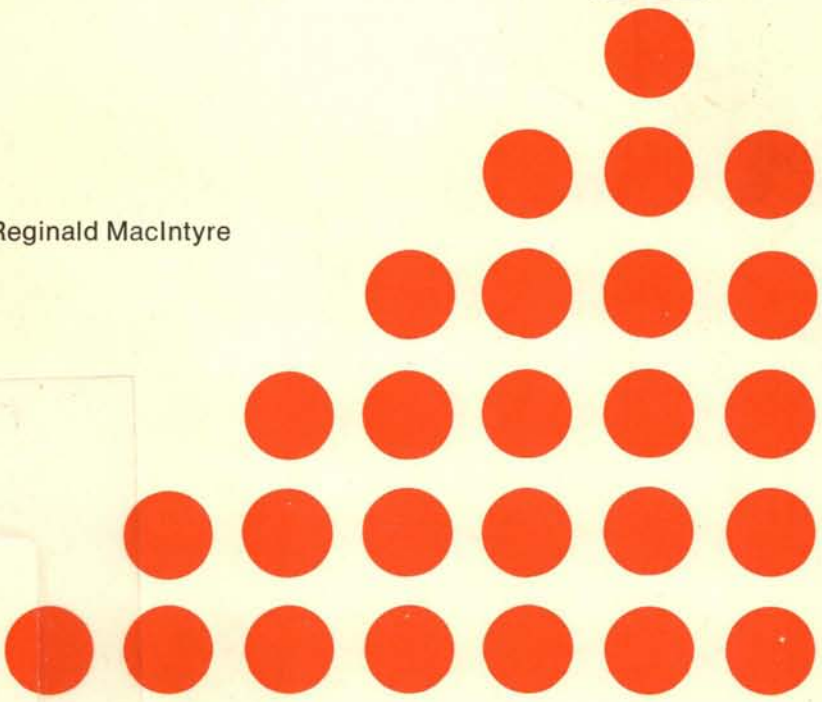
# Interaction of Agriculture with Food Science

Proceedings of an interdisciplinary symposium  
Singapore, 22-24 February 1974



IDRC-033e

Editor: Reginald MacIntyre



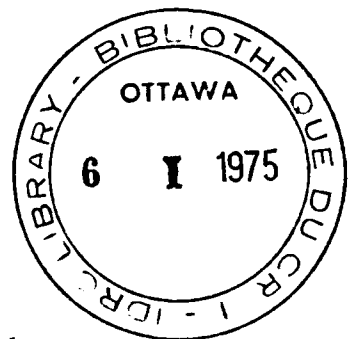
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*Editor:* REGINALD MACINTYRE

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*Sponsored by the* International Development Research Centre  
*in cooperation with the*  
International Union of Food Science and Technology

ISBN: 0-88936-038-3

UDC: 631:641

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Postal Address: Box 8500, Ottawa, Canada K1G 3H9

Head Office: 60 Queen St., Ottawa

Microfiche Edition \$1.

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## The Integration of Food and Agriculture Research in Asia

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**Abstract** This paper reviews food production in Asia, the current food problem, and the outlook for 1974. A strategy for meeting short-term food shortages is discussed as is the possible impact of the energy crisis on food production. A long-term strategy for the agriculture sector is discussed in terms of the overall economic growth and social objectives of developing countries.

**Résumé** Ce texte passe en revue les problèmes d'ordre alimentaire qui se posent en Asie: Production, situation actuelle, perspectives pour 1974. L'auteur expose une stratégie permettant de faire face aux pénuries à court terme ainsi que les répercussions possibles de la crise de l'énergie sur la production alimentaire. Il analyse également une stratégie à long terme applicable au secteur agricole dans le cadre de la croissance économique globale et des objectifs sociaux des pays en voie de développement.

### Introduction

ANY discussion of a long-term strategy for agricultural development in Asia must necessarily be preceded by an analysis of the food problem that has emerged in the world since the middle of 1972, as the problem will probably not ease for most of 1974. It would also be useful to examine why cereals form such an important part of our diets in developing countries and how the consumption patterns compare between the developing and the developed worlds. When such a comparison is made it is seen that on the average, the daily protein and caloric requirements are not being met in most areas of the world, with shortfalls being most marked in Central Africa and the Indian subcontinent.

It is only in recent years that the food problem has been examined in terms of the nutritional content of various food crops. Lord Boyd-Orr, FAO's first Director-General, wrote that "food production was never fully developed because Western civilizations' aim was not to produce the quantity of food necessary to satisfy human needs but rather that which could be sold at a profit (Pokrovsky 1972). It was not until international efforts were directed toward examining the nutritional value of the diets of poor people in developing countries that the food problem was viewed from a different perspective and not merely one of producing a commodity which could be sold for the maximum profit.

Initial research efforts in agriculture were mainly concentrated on cereals because they

provide almost half the protein and caloric intake in the diets of people of developing countries. Accordingly, research into increasing yields and the nutritional content of cereals assumed crucial importance. In spite of these efforts which resulted in spectacular increases in wheat and rice output, cereal production in developing countries barely kept pace with population growth during the 1960s, and in 1972 food production in developing countries declined for the first time since 1966, while per capita food production dropped to the lowest level since 1965 (IDRC 1973). Food production in the developing countries declined in 1972 for the first time since 1966. Per capita food production in the developing countries dropped to the lowest level since 1965 (IDRC 1973). Therefore no margin was available to meet the demand for higher consumption levels resulting from higher incomes. Developing countries could adopt one of two courses of action: compress consumption standards below present (1974) nutritional levels or import cereals from abroad by utilizing their already low foreign exchange reserves. Where no reserves were available, large foreign debts for imports would have to be incurred.

In the past, production increases in many developing countries were achieved mainly by expanding the cultivated areas. This has of course required tremendous inputs of capital to clear and irrigate land, and settle people in the new areas. Recent studies indicate that there are, at most, 3.2 billion ha of land potentially suitable for agriculture on earth. Approximately half of that land, perhaps the richest and most accessible, is under cultivation at this time (Meadows et al. 1972). If the balance of land is to be opened up for cultivation and irrigation facilities provided, immense capital expenditures would be required which are well beyond the reach of many developing countries. Costs of developing new land vary widely and recent estimates have shown that it could be as high as \$us 5275/ha. Therefore future increases in cereal production could be achieved mainly by further increases in yields and crop intensity, i.e. by reducing the maturity time of crops. The alternative would be, as

earlier stated, to use foreign exchange reserves where available or incur foreign exchange liabilities, both of which developing countries can ill afford, to satisfy the consumption demands of both an increasing population and a population with higher incomes seeking higher living standards.

### **Current World Food Problems**

The most important factor which led to the current world crisis in food grains was the purchase of 17.5 million tons of grain by the USSR in mid 1972, the largest-ever wheat purchase by a single country. World trade was able to expand to meet this demand by drawing down stocks of the major wheat exporting countries — Argentina, Australia, Canada, EEC and the United States. Stock levels in these countries, which amounted to 47.4 million tons at the beginning of the financial year (July 1) 1972–73, were reduced to 27.3 million tons by the beginning of the next financial year 1973–74, the lowest level since 1951–52. At the same time, drought conditions affected the production of rice and coarse grains in Asia and resulted in an additional import demand for wheat. However, because of the draw-down in stocks and sharp increase in market prices, this demand could not all be realized. At the beginning of the 1973–74 financial year, rice stocks had been reduced to virtually zero while wheat stocks were at their lowest level for 20 years and, therefore, world supplies in 1974 are entirely dependent on the success of the harvests.

Final figures of wheat production for 1972–73 show that production (excluding People's Republic of China) estimated at 310 million tons was approximately 10 million tons less than in the previous year, a decline of 3%. The main decreases in production were in the USSR by 13 million tons, the United States by 2 million tons, and Australia by 2.4 million tons, and these were partially offset by increased output in Eastern Europe and elsewhere. The volume of trade increased by 15 million tons in 1972–73 to 67.6 million tons, mainly as a result of the large purchase by the USSR. During this period, international prices increased by over twofold. The cost of a ton

of wheat FOB US Gulf Port increased from us\$60/ton (it is reported that the Soviet deal was concluded at us\$60/ton) in July 1972 to us\$110/ton in June 1973. Since the end of the last financial year wheat prices reached a peak of us\$200/ in August 1973 and stabilized at around us\$190-195 at the end of September 1973. Comparable prices are not available for the period after the end of September 1973.

In 1973-74 it is expected that production (again excluding the People's Republic of China) would increase to 325 million tons which is considered adequate to maintain balance with the increased demands from developing countries facing food shortages due to drought conditions. This increase has been achieved partly by favourable weather conditions in the main wheat growing areas and partly by actions taken by the United States to remove the mandatory set-aside provisions from its 1973 wheat program, by Canada to increase initial payments for wheat deliveries from the 1973 crop, and by the Australian Wheat Board to increase the wheat delivery quota.

In the case of rice, 90% of which is produced in Asia, unfavourable weather conditions reduced production in 1972-73 by about 10 million tons to an estimated 196 million tons, a reduction of nearly 5%. Due to monsoon failures and floods in certain areas which took place later, rice output declined all over Asia with very few exceptions. The most severely affected were India, Bangladesh, Indonesia and the Philippines while the traditional exporters, Thailand and Burma, also suffered reductions in output. The out-turn of the crop for 1973-74 is not yet known. However, the supply-demand imbalance which emerged in 1973, due to the draw-down in stocks in exporting countries to virtually zero, resulted in a sharp increase in export prices. To illustrate the price increase, the FOB price of Thai rice (5% broken) moved from us\$137/ton in July 1972 to us\$205/ton at the beginning of March 1973. No regular quotations are available since that date but it is reported that transactions were entered into by private traders for prices as high as us\$250/ton. To meet this situation, most countries in the area

have launched crash programs to increase rice production and substitute food crops such as cassava. It has also resulted in the stimulation of production in non-Asian countries such as the United States, which has announced a 20% relaxation of the rice acreage limitation that had been in force, as in the case of wheat.

Unlike in earlier years of rice shortage (e.g. 1966-67) when wheat and other coarse grain supplies from Western countries on concessional terms were substituted for rice, in the current crisis developing countries have had to face reduced supplies and higher prices of wheat. Further, freight rates have increased, both due to higher fuel costs and shortage of shipping tonnage, caused by the extraordinary transportation requirements of cereal to deficit countries. Developing countries had to face price levels in 1973 which were more than double those that prevailed earlier. It has been estimated that an additional minimum of us\$2 billion was required for food imports in 1973 over 1972, nearly a two-third increase in the food import bill of all developing countries. The additional cost of food imports by developing countries would have been greater if supplies were available to meet consumption requirements in a normal year, leave alone an increase in consumption to nutritional levels comparable to those prevailing in Western countries. The extra outlay of foreign exchange, where no substantial foreign exchange reserves were available, resulted in a cutback of allocations to other production sectors. For example, in Sri Lanka imports of rice and flour in 1972 accounted for 16% of the total import bill. In 1973 the import value of these two commodities increased by nearly 90% and accounted for 30% of the import bill. Since Sri Lanka does not have any cushion of foreign exchange reserves, this resulted in a reduction in the allocations for industrial raw materials and spares, with consequent adverse effects on economic growth.

In many cases, the enhanced draw-off of fertilizers for the numerous crash programs launched by developing countries to meet this deficit situation, have increased prices to astronomical levels. As a result, several countries of the region are unable to purchase the fer-

tilizers required for these programs due to the non-availability of foreign exchange, thereby perpetuating the vicious circle of food shortage created by the present circumstances in the world market.

### **Short-Term Strategy**

It is no longer possible to treat the current global shortage of cereals as a phenomenon which will not happen again. As mentioned earlier, rice shortages in drought years in the past have been met by sales of concessional wheat and other grains from exporting countries in the west. In fact, the grain reserves of the major producing countries, in particular the United States, and the reserve crop land which is normally idle in the United States, and amounts to nearly 50 million acres out of a total of 350 million acres, have been the world's major reserves in battling periodic food shortages. The current shortage of wheat which had its origins in the heavy grain purchases by the USSR have made it necessary to reconsider this strategy. The USSR, India and the People's Republic of China are the three most populous countries in the world, accounting for 45% of world population and 40% of cereal consumption and they are operating close to self-sufficiency in grain production given normal weather conditions. Due to the enormity of their markets and production, year-to-year fluctuations in the production and domestic requirements could change the entire supply-demand balance of cereals in the world. For example in the case of the USSR, this is the third time in a decade that it became a net importer (vs a net exporter) of wheat in any normal crop year. In 1963-64 and 1965-66, the USSR imported a total of 18 million tons while in 1972-73, a total of 17.5 million tons was imported. Earlier purchases also had a destabilizing effect on world trade but the purchase in 1972-73, being much larger and coupled with purchases of wheat of 4 million tons by China and 2 million tons by India, made it a disastrous year for other importing countries. The situation in India would have been much worse had it not been for the buffer stock of 9 million tons of food

grains built up from periods of good harvests in earlier years. Therefore, in a situation where stocks in major exporting countries have been reduced to their lowest level in the last 20 years, it is certainly not possible to prevent any deficit of the magnitude which emerged in 1972-73 in the three largest countries of the world, from having disastrous effects on the rest of the world.

It is in this situation that the Director-General of the FAO warned the international community that temporary stockpiling of grains will not solve the long-range problems that have emerged since mid 1972. He called for international cooperation to ensure that national food stocks are maintained at adequate levels to offset year-to-year fluctuations in output and to maintain a steady expansion in consumption. Whilst this exercise would have to begin with each country setting a target level of stocks to protect itself from crop failures, an internationally managed stock control would have to take account of the distribution of these stocks, both geographically and between importers and exporters and the commodity composition of the cereals. The FAO Director-General stated recently that "the object would be for developed countries to build up stocks sufficient for their domestic requirements and for regular commercial exports and also, where appropriate, for food aid to meet crop failures or natural disasters in other parts of the world." In the case of poorer nations, they would be encouraged to gradually build up reserves to make them progressively more self-reliant in food needs. In developing countries, national stock levels should be determined only after providing for consumption levels necessary to raise them above the present inadequate levels.

The value of reserve stocks is clearly illustrated by India's experience in 1972-73, when that country was able to avoid a disastrous situation because of the 9 million tons that had been accumulated from earlier years. Yet even this stock was hardly more than a month's supply based on the current annual rate of demand of around 100 million tons of food grains. India is proposing to raise its stock target to about a 2-3-month supply at an



initial capital cost of around us\$500 million since available stocks have now been exhausted. To maintain this stock, additional annual costs would be very high. Such stock levels obviously cannot be financed by developing countries without international support. Therefore, any proposal to set up internationally controlled buffer stock would, at the same time, have to consider the financing requirements of setting up both the storage and grain reserves needed to build up such a buffer. Such international action would stabilize the world grain market since the quantities entering world trade are only a small share of the world's production of grains.

### **Possible Impact of Energy Shortage**

Increased fertilizer usage has been a major factor in increasing yields of food crops along with the use of high-yielding varieties of seeds. The effective use of the agricultural extension services and the introduction of credit facilities for the purchase of agricultural inputs have made it possible to demonstrate to farmers the clear gains that are achieved in productivity by the application of fertilizers. About 4 years ago an excess of nitrogenous fertilizers in the world market resulted in major fertilizer manufacturers of the world exerting pressures on their respective governments to extend long-term credit to developing countries for the purchase of these excess supplies. However, the supply-demand imbalance that existed at that stage resulted in a curtailment in the expansion plans of fertilizer production by major suppliers. Further, the failure of India, a large consumer, to achieve the target for fertilizer production in the Fourth Five-Year Plan, and the higher worldwide demand for fertilizers to support the intensive food production programs of developing countries, have created a situation of shortage in the world fertilizer market. During the visit to Southeast Asia by Prime Minister Tanaka of Japan, he was urged by ASEAN countries to keep up supplies of certain critical inputs in spite of the energy crisis, one of which is fertilizers.

The shortage of fertilizers would be felt

mainly in the nitrogenous varieties, of which urea accounts for nearly 60% of the amount used in Asia. This product is at present controlled by three major manufacturing groups, one each in Japan, Europe and in the Persian Gulf. In the face of the recent sharp increase in the price of crude oil and the cutback in supplies, it is inevitable that naphtha, a by-product in the manufacture of petroleum fuels and a major input for the manufacture of nitrogenous fertilizers, would be similarly affected. In this situation, it is likely that major producers in Japan and Western Europe would be unwilling to work their plants to capacity, thereby leaving the world supply position to the response of the Persian Gulf producers to meet this shortage. The impact of the changed supply-demand position would be felt mainly in the Asia region which, apart from Japan, Korea and Taiwan, depends on imports for nearly half of its total consumption.

In this context, Indonesia, which is the largest producer of oil in the Asian region, would have a major role to play in meeting the demand for nitrogenous fertilizers in future. According to present estimates, Indonesia would require a manufacturing plant of nearly half a million metric tons of urea to be self-sufficient and only additional production capacity could fill the import needs of developing countries in the Asian region. Therefore, it is almost certain that the ASEAN group of countries would take this up as a matter of high priority in drawing up their contingency plans to meet the impact of the energy crisis on food production programs in the region.

### **Long-Term Strategy**

There is now a greater awareness of the need for equity and social justice to be a part of the growth process in developing countries. The mere pursuit of economic growth in overall terms, as recent examples have shown, has often created social upheavals which threaten the very institutions instrumental in setting up the framework for achieving rapid economic growth. This realization has made it necessary for economic planners to examine the nature

and quality of this growth. According to statistics of income distribution available for 40 developing countries, on the average, the upper 20% of income earners receive 55% of the national income, the upper 40% receive 75% of the national income, while the lowest 20% receives only 5% of the country's total national income. This illustrates the severe inequalities that exist in the distribution of income in our societies, in spite of a rate of growth of over 5% achieved during the First United Nations Development Decade. It also shows that the rate of growth of national income is based heavily on the increase in incomes achieved by the upper income groups in our countries.

The President of the World Bank and the International Monetary Fund urged in 1973 the adoption of "a socially oriented measure of economic performance" which would give an equal weight to a 1% increase in the incomes of the poorest groups in society as to a 1% increase in the incomes of the upper echelons of society. This would be an important step in redesigning the development policies by giving a greater weight to the problems of social welfare and ensure "the allocation of resources in a much more comprehensive way." Such a statement might sound heretical to conservative bankers in the western world. Nevertheless, a word of caution is necessary to development planners, subject to the stresses and strains of active political systems, in case there is a desire on their part to pay a greater emphasis to welfare criteria. The social aspects of development should certainly not be at the expense of high investment rates necessary to achieve rapid growth in national income.

In support of this argument, Sri Lanka, which in the post-independence era of over 25 years, has followed liberal social welfare policies. For example, Sri Lanka has had extensive health services provided free of charge, education from the primary school to the university, also provided free of charge, subsidized public transportation, the issue of one pound of rice per week free to every member of the population (until early 1974 two pounds per week was issued free) and numerous other subsidies

which extend over the entire range of economic activities in that country. These welfare policies have been instrumental in reducing the disparities in income, and according to recent data made available from a socioeconomic survey of households, the top 10% of income receivers account for only 29% of total national income compared to 42.5% in 1953, and during the same period the lowest 10% of income receivers increased their share of national income from 1.5 to 4.7%. This achievement in the redistribution of income has been in marked contrast to the other developing countries in Asia, but these changes have been achieved in a period of sluggish economic growth of around 3-4% per annum. These extensive welfare programs, which in the initial stages were financed from the revenues siphoned off by government from a buoyant export sector, made serious inroads into development expenditures when world market conditions caused a secular decline in earnings of our major export crops and, in some years, fairly substantial declines in export earnings. During this period when successive post-independence governments in Sri Lanka were pursuing social welfare policies, which only developed countries of the Western world could really afford, the aspirations of the people in regard to employment opportunities and consumption standards increased because of improved educational and health standards. However, in a background of only a moderate increase in the productive capacity of the economy, there was no possibility of employment opportunities matching the aspirations of the people, and it ultimately led to a social upheaval in 1971. Such a situation clearly illustrates the need to map out a new strategy for development, in which social objectives play as great a part as that of increasing investment to achieve a faster rate of economic growth in the country. In other words, the two factors should complement one another.

In adopting such a strategy, it is clear that in Asia, as in other parts of the developing world, the main outlet for the ever-increasing numbers entering the labour force would be the agricultural sector, for on average, rural

communities in developing countries account for over two-thirds of the total population. Table 1 illustrates the current importance of the agriculture sector in total gross domestic product (and much more in terms of employment if statistics were available) for selected Asian countries. These figures show that in spite of policies aimed at achieving rapid industrialization, the agriculture sector would continue to be the most important for providing employment opportunities in the foreseeable future.

TABLE 1. Agriculture as a share of Gross Domestic Product.

	%
Philippines	31.8 <sup>a</sup>
Malaysia	30.5 <sup>b</sup>
Thailand	29.5 <sup>c</sup>
Indonesia	43.6 <sup>d</sup>
India	48.2 <sup>e</sup>
Sri Lanka	34.7 <sup>f</sup>
South Korea	31.3 <sup>g</sup>

<sup>a</sup>1972: Agriculture as a share of net domestic product (Four Year Development Plan FY 1974-77).

<sup>b</sup>1973: (Mid-Term Review of the Second Malaysia Plan 1971-75).

<sup>c</sup>1971: (The Third National Economic & Social Development Plan 1971-76).

<sup>d</sup>1971: GDP at current market prices (Indikator Ekonomi. Monthly Statistical Bulletin Oct. 1973).

<sup>e</sup>1969 GDP at current factor prices (UN Statistical Year Book for Asia and the Far East).

<sup>f</sup>1972: (1972 Annual Report — Central Bank of Ceylon).

<sup>g</sup>1970: (UN Statistical Year Book for Asia and the Far East).

If one examines the agriculture sector closely, the first striking feature is the fragmented nature of farm holdings. A recent FAO survey has shown that the wealthiest 20% of land owners in most developing countries own between 50 and 60% of the total crop land, and in countries such as Venezuela, it is as high as 82%. Further, tenancy arrangements are enforced which make it necessary for

farmers to hand over more than 50% of their crop to absentee landlords. Given such a distribution of land ownership and tenancy arrangements, the fruits of the Green Revolution of the 1960s could not obviously be reaped by the small-scale farmers who were struggling against adversity for survival. Despite the rapid increases achieved in the production of agricultural crops by the introduction of high-yielding seed varieties, the lack of ready access to credit, agricultural inputs, and other facilities made it impossible for the small subsistence farmers to enjoy the full benefits of the Green Revolution. Further, the fiscal policies of the governments in developing countries have been helping the wealthier farmers. Overvalued exchange rates and ready access to credit at low rates of interest made it possible for the larger landowners to indulge in excessive mechanization earning larger incomes from the rapid increases in production, thereby accentuating the inequalities that already existed in this sector. At the same time, these policies were in conflict with those designed to provide employment opportunities for the large numbers entering the country's labour force.

Thus it is clear that the new strategy for development should have policies designed to accelerate the pace of land reforms and land distribution. These should be coupled with programs to provide greater access to credit, greater availability of agricultural inputs such as fertilizers, and extensive irrigation facilities where none exist at present. In other words, what is proposed is not a perpetuation of the lot of the traditional subsistence farmer, but an improvement in the image and prospects of this sector which would attract the young, educated masses entering the labour force to participate in the improvement of this traditional sector.

Agricultural research and extension services have a major role to play in achieving an increase in the productivity of the small farmers. The inadequacy of the extension services in developing countries could be illustrated by the fact that on an average one extension officer is available for over 400 farm families in the developed world, while the ratio is one

to over 8000 farm families in the developing world, with even fewer available to the small subsistence farmer. To correct this imbalance, additional funds have to be allocated by governments of developing countries to train a larger number of agricultural extension officers, and to provide adequate career incentives for the educated youth to seek such jobs. In regard to research the imbalance is even greater. In spite of the prognostications of the Club of Rome (Meadows et al. 1972) that man would soon be battling with physical barriers to increase food production, the research efforts which initiated the Green Revolution provide us with confidence that improved technologies can solve the massive food problem that has been forecast for the future. However, the following comparison will illustrate the inadequacy of research efforts in developing countries. Governments of five major developed countries are allocating us\$20–50 per farm family for research purposes annually, whereas the comparable average for five major developing countries is in the range of us\$0.50–2 per farm family (Meadows et al. 1972). To illustrate this further, McNamara observed that the United States, Northern Europe, Australia, Israel and Japan spend an equivalent of between 1 and 3% of agricultural commodity value on research, whereas the percentage is between one-tenth and four fifths of 1% in the developing countries of Asia and South America. It was this overall disparity in research efforts that prompted the World Bank, in coordination with the FAO and the UNDP, to sponsor the setting up of a Consultative Group on International Agricultural Research (CGIAR). Since the first meeting of this Group in May 1971, a number of international centres have been set up with support from the Group, including the IDRC, directing research efforts into new areas. At the time the Consultative Group was set up, five international centres were in existence: 1) CIAT — Centro Internacional de Agricultura Tropical (Bogota, Colombia) — Cassava; 2) CIMMYT — Centro Internacional de Mejoramiento de Maiz y Trigo (Mexico) (International Maize and Wheat Improvement Centre) — Maize, Wheat and Triticale; 3) CIP — International

Potato Centre (Peru) — Potato; 4) IRRI — International Rice Research Institute (Philippines) — Rice; 5) IITA — International Institute of Tropical Agriculture (Ibadan, Nigeria) — Sweet Potatoes and Yams. Since the setting up of the Consultative Group, the following centres have been created: (a) ICRISAT — International Crops Research Institute for the Semi-Arid Tropics (Hyderabad, India) — Sorghum, Millet and Legumes; (b) ILRAD — International Laboratory for Research on Animal Diseases (Kenya) — Livestock; and (c) ILCA — International Livestock Centre for Africa (Proposed) (Ethiopia) — Livestock.

### Conclusion

In conclusion I would like to refer briefly to some of the agricultural research projects supported by IDRC in Asia. The first is a recent grant of Can\$90,000 approved for a research study by the University of Brawijaya in East Java for the development of cassava production combining the tree and normal cassava. The system, which was discovered over 20 years ago by a poor farmer in the East Java region, is expected to increase yields by at least five to six times, compared to the normal average of 5–15 tons/ha. This research project would also enable Indonesia to be linked to the cassava research network that is administered by the IDRC and based at the Centro Internacional de Agricultura Tropical in Colombia. A related project is one undertaken by the University of Malaya with IDRC support to develop fermentation processes for upgrading starches such as tapioca roots for use as swine and poultry food. The second is a grant of Can\$496,000 to the International Crop Research Institute for the Semi-Arid Tropics at Hyderabad for research activities to develop better varieties of pigeon pea and chick pea, which are fertilizer-responsive and better adapted to the conditions prevailing in semi-arid tropics, and to train research and extension workers in the improved technologies of production. This institute, which commenced operations in 1972, was the sixth international

agricultural research institute that was set up, and it is concerned with the development of sorghum, millet, and legumes on a worldwide basis. The third example I would like to quote is a grant of Can\$230,800 to the International Rice Research Institute in the Philippines to develop the basic technological knowledge required for the introduction of multiple-cropping systems to small farms. This grant enabled a continuation and expansion of a study which had been initiated by IRRI and the University of Philippines, Los Baños, and also enabled six pilot projects to be set up in the Philippines to test the results achieved earlier, but under actual field conditions. The IDRC recently approved a further grant of Can\$442,950 for a second phase of this project to enable IRRI to continue their program of research work and to add a further six pilot communities. Apart from studying the basic technological conditions for multiple-cropping systems, the program also provides for training young scientists from countries in the Asian region. At the same time, the IDRC has also provided a grant of Can\$208,300

to Kasetsart University in Thailand to develop multiple-cropping systems in the Central Plain of Thailand, and it is likely that similar projects would be developed in other countries of the Asian region. These are but a few examples of IDRC efforts at developing international research programs designed to improve the well-being of rural communities, and enable farmers in the developing world to increase their incomes above the subsistence levels that presently prevail.

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