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# Market Prospects for Upland Crops in Thailand

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### Objectives of the study

This study on market prospects for upland crops in Thailand has four objectives:

- to analyze dietary patterns and determine how changes in consumption patterns are related to income and urbanization;
- to analyze changes in the domestic demand and external trade performance of maize, soybean, cassava and rice;
- to make demand projections for maize, soybean, cassava and rice; and
- to review and analyze domestic market/processing systems, policies, export promotion efforts and make practical suggestions for improving market prospects and exports of selected commodities.

### Market demand prospects

The major conclusions concerning those parts of the study on dietary pattern and market demand prospects are summarized below:

- The study on the Thai dietary pattern shows that the Thai people have changed their consumption behavior. They are switching from rice and cereals and fish to meat products, vegetables and fruit.
- The consumption of meat products is expected to increase further in the future due to the increase in population and income. Urban people, who have higher incomes than rural people, will have a higher consumption rate.
- The study on the dietary pattern illustrates that upland crop products retain good domestic market demand prospects, because they are transformed into animal feed to become meat products.
- Maize and soybeans in particular have good domestic demand market prospects due to expansion of the animal industry. Both commodities are expected to be imported in response to domestic demand.
- Vegetables and fruit also have good market demand prospects because the Thai people have increased their consumption remarkably. Urban people consume more fruit than the rural poor. Thus, domestic market demand for these commodities is expected to rise.

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- Rice continues to have a stable demand outlook for the domestic market. The superior grade of rice is expected to have a better foreign market outlook than the inferior grade.
- For cassava, the study found a good prospect in terms of starch. However, it is difficult for Thailand to expand its already very large foreign market share for the commodity. Attempts to bolster starch production for domestic utilization have a reasonable prospect but, unless starch derivatives are exported, such attempts cannot really reduce the export dependency of casssava.
- Vegetable oil consumption also grew quite quickly although less than fat consumption. Urban people usually consume twice as much vegetable oil as the rural group.

**Emerging non-traditional commodities**

The objective of this part of the study is to explore non-traditional commodities which will have potential for production and marketing both domestically and internationally. This section presents briefly the results of a study on four commodities, namely longan, durian, mangosteen and babycorn, which are expect to have good market potential.

*Longan*

Longan is a popular fruit locally consumed both in fresh and processed form. The fruit has domestic production potential because of the suitable topography and climate coupled with farmers' long experience in cultivating longan. Thailand has exported longan to Asian markets for a long time. Presently, exports are gaining ground in European markets. Thus, longan is considered to have great marketing potential.

The existing data indicate that 62% of fresh longan production was consumed domestically and the rest (38%) exported in 1990. The major export items of longan products are classified as fresh, canned, dried and chilled longan. In 1994, the total export of longan products in fresh longan equivalent was approximately 86,722 tons worth 1,326 million baht. Additionally, there were exports without official record. The export of longan products in fresh equivalent grew significantly during the period of 1990 to 1994.

The major foreign markets are neighboring countries, namely Hong Kong, Singapore, Malaysia and Indonesia which account for 80% of total export. However, Europe especially England and France is a new potential market. Canada also poses a new market prospect because its import is increasing.

The major markets for canned longan are Singapore, Malaysia and the US. During the period of 1990 to 1994, the export of canned longan expanded at a rate of 7.42% which is much less than the expansion of export of fresh longan.

The major markets for dried longan are the existing markets of Hong Kong, South Korea, Singapore and new markets, such as the Republic of China. Export expanded at a rate of 31.63% over 1990-1994.

The major markets for chilled longan are the US and Japan, which do not allow import of fresh fruits. Exports have a decreasing trend of 11.63%, but the data show significant year to year variation.

Based on analysis of the data of past export performance coupled with interview of producers in Chiangmai and Lampoom provinces, processing factories and major exporters of canned fruit (Malee Sampran factory, General Food Company, Limited), and a seminar, the trade expansion of longan and its products has good prospects in both Asian and European countries. However, market expansion should be supported by the government and the private sector could follow to support further expansion. On the production side, when farmers have good varieties, technologies of production and harvesting can be developed.

*Durian*

As fruits gain both the public and private sectors' interest in development of commercialized production and marketing, durian emerges as a promising fresh and processed fruit.

Durian planted area, production and yield for 1988-1994 show a rising trend at rates of 5.7%, 11% and 6.4%, respectively. More than 90% of the durian production is locally consumed in both fresh as well as, in some cases, sweetened state. The rest is designated for export in the form of chilled, fresh durian and sweetened durian paste. The quantity and value of export show rising trends over the last 7 years, 1988-1994.

Processed durian is serving high value markets. While processing helps to remedy the durian price depression that normally occurs right

# Message from the Director

I had a chance to visit several island countries in the South Pacific, Tonga, Fiji, Vanuatu and Papua New Guinea, for the first time in August this year. Although my stay in each country was very short, I met many people and learned many things.

The conditions - the number and size of islands, total area, topography, climate, population, racial composition, religion, natural and energy resources, economy, politics, education, etc. - are very diverse among these island countries. However, the share and role of agriculture are equally important in their national economies.

I had many interviews with policy planners, administrative staff, research scientists, extension specialists and so forth in the agricultural sector in each country. Also, I tried to go on a short drive to look around at agricultural sites in the islands as often as possible.

I can summarize briefly the concerns of the people whom I interviewed: "how to maintain and develop the food security of the country." Although the demand and supply situation of the food varies among countries, the trade imbalance in food commodities has impeded the development of the small economies. For example, it is difficult for the governments to secure sufficient rice and flour to meet the changing dietary patterns of the people. The Melanesians and the Polynesians are said to be principally "root-eating people." However, in recent years, they prefer to take rice and bread together with meat in addition to such root crops as taro, yam, cassava and sweetpotatoes, while they have no experience in producing rice and wheat in their own fields.

Another subject they focused on was an insurance system to support farmers' recovery from the damage caused by occasional tropical cyclones. How to stabilize agriculture is a traditional but urgent issue in these countries.

On the other hand, there are of course many successful cases such as export of pumpkin from Tonga to Japan, ginger from Fiji to the United States, beef from Vanuatu to Japan, and coffee from Papua New Guinea to Europe.

Enthusiastic discussions and demonstrations given in fluent British English on their policies and research in agriculture facing pressure of the WTO regime were all very impressive. Although the peaceful landscape was very open and beautiful everywhere in these Pacific island countries, I must confess that I could not escape from an impression of constraint on the smaller islands. Then, at the same time, I felt a sense of duty in my mind that the CGPRT Centre must seek possibilities to work with them in the very near future for their further development.

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after harvest, some types of processing prolong the life of durian products with little change in quality. The typical processed durian products are durian paste, chilled and crispy fried durian.

The volume and value of the fresh durian export continue to grow with rates of growth of 17% year. The major import markets include Hong Kong, Malaysia and Taiwan.

Chilled durian exports and their value climbed significantly over the 1988-1994 period. Most of the chilled durian was exported to the USA, Canada and Australia. In comparison, export of the sweetened durian paste has been insignificant, but it has increased over the last four years.

Because of the suitable agro-climatic conditions, including the soil structure and texture, and the very long cultivation experience, Thai farmers are capable of producing durian of good quality, popular both locally and overseas. The durian export is currently 5% of the output, primarily to Asian markets where the taste and scent are well liked. In the European and American markets, Asian residents comprise the initial target group. As the durian fragrance is new and strong for both Europeans and Americans, it will take some time for them to get used to it. However, interviews with such prominent durian exporters as Thai Hong Fruits Co., and Fah Charoenporn Inter. Co., indicate that the future durian export trend will depend on price and quality. A reasonable export price range of 20-25 baht per kg is thought by the major exporter to induce a good export outlook. Furthermore, the foreign market expects a durian fruit of quality, well ripened with meat of a specific consistency. Only when these requirements are met, will a bright export market be found.

*Mangosteen*

Mangosteen is an exotic tropical fruit grown in the southern and eastern regions of Thailand where the weather is humid and hot. In the past five years (1989-1993), the planted area and production of mangosteen increased about 12.13% and 5.4% per year, respectively but yield remained stable. In 1994, production is expected to reach about 108,000 tons.

The major area of production of the mangosteen is Chantaburi province in the east, with 27% of the total planted area and 33% of the total production. Other producing provinces are Trad, Rayong, Chumporn, Nakhon Sri Thammarat, Narathiwat, Ranong, Surat Thani, Phangnga, and Trung.

Most of the production of mangosteen is consumed domestically. The domestic demand for mangosteen is 97% of the production and the rest is exported. Thailand exports the mangosteen in both fresh and chilled forms. The fresh mangosteen export is 64% of the total and the rest (36%) is chilled mangosteen. The quantity of mangosteen export is minimal, compared with the production. However, the export has been increasing since 1989. The quantity and value of the exports increased 4.5 and 5.1% per year, respectively .

Normally Thailand exports mangosteen to Taiwan, Hong Kong, Japan and America. More specifically most of the fresh mangosteen is currently exported to Taiwan (1994), while 98% of the chilled mangosteen is exported to Japan (1995).

Mangosteen is attractively scented and sweet tasting and the physical feature of the fruit makes it suitable for transport overseas. These facts imply that mangosteen has market potential. The figures show that the quantities and value of mangosteen exports have been increasing since 1989.

The government promotes mangosteen production because the fruit has export potential. The strategies related to mangosteen production and marketing are to allocate government budget to concerned agencies for their programs of research on varieties of mangosteen, for postharvest technologies and for a program of promoting farmers to produce mangosteen for export.

Promotional campaigns in importing countries about the delicacy of mangosteen are also suggested. However, cooperation between the private sector and government agencies is necessary.

*Baby corn*

Baby corn is a commodity which provides about 500 million baht income annually to farmers. In addition, it is also the source of foreign exchange of 1,000 million baht. According to export data for 1988-1994, the volume and value of the export of baby corn, especially canned baby corn, have increasing trends at rates of 9.06 and 10.64%, respectively. Fresh baby corn is popular in both domestic and foreign markets. During 1988-1994, the planted area of baby corn expanded remarkably, increasing from 9,340 hectares in 1988 to 16,860 hectares in 1994. Farmers, in addition to selling fresh baby corn at high prices, also add to their income by selling the husk, silk, panicle and stem of the plant after harvesting as by-products to dairy cattle farmers.

The planted area and production of baby corn in the past seven years (1988-1994) have expanded significantly while yield has not. Marketing channels of baby corn can be classified into: (i) canning factories, (ii) the domestic market for fresh baby corn, and (iii) the export market for fresh and chilled baby corn. Canning factories are the main market of baby corn accounting for 70-80% of the total production. Some factories purchase the product directly from farmers or purchase from collecting traders who gather baby corn with husk from farmers and hire labourers to dehusk it before selling to factories.

The quantities and prices of fresh baby corn purchased and consumed domestically are uncertain. The quality of the product is inferior to that of the product sold to factories. The collecting traders sell about 10-20% of the total production in the domestic market. The export market for fresh and chilled baby corn is for high quality baby corn. However, the quantities entering into this market are less than 5% of the total production.

The baby corn canning industry has expanded remarkably. Most of the factories originally canned vegetables or fruits and later included production of canned baby corn.

Canned baby corn exports have increased from 33,323 tons worth 710.9 million baht in 1989 to 46,187 tons worth 963.7 million baht in 1994. The major export markets for canned Thai baby corn are the US, Japan, and West Germany. Aside from canned baby corn export, there is also export of fresh and chilled baby corn. The major markets ranked by their export value in 1994 include England, Japan and Malaysia with a total export of 2,522 tons worth 36.7 million baht.

**Sucessful and unsuccessful attempts to stimulate production and marketing**

These case studies investigate the demand prospects, both domestic and export. They analyze past performance and lessons learned from successful and unsuccessful attempts to stimulate production and marketing of upland crops or products. Broilers, tomato and onion were selected as successful attempts and mango, cashew nut and cotton were selected as failed attempts.

*Broilers*

The broiler industry of Thailand is a very advanced and integrated enterprise that continues to regularly supply meat which is steadily gaining the favor of domestic consumers. In the past, broilers were more expensive locally than beef and pork, but currently they have become more competitive. The Thai broiler industry has emerged as a major export income earner, gaining annually. Moreover, the industry continues to have a bright outlook for market development and expansion. The advancement has generated several linkage industries such as the feed industry, breeder stock farming and hatching, veterinary drug and vitamin manufacture and administration, and slaughtering and processing of meat and by-products.

The greatly expanding commercialization of the industry is mainly due to the development effort for broiler products which suit the market requirement. However, an important part of the success of the industry is certainly due to the public-private sector coordination which is involved in broiler production and processing. Industry operations, however, have occasionally encountered problems and obstacles requiring solution.

The success in marketing broilers is judged to be quite high. The success story is based on, among the other factors, the helping hand of the government which sets forth agri-business policies on the one hand and implements its functions on the other hand. The government co-ordinates with the private producers as follows:

- Private companies have good management controlling the supply of broilers. The government, on the other hand, supports disease control.
- The Ministry of Commerce keeps a constant watch and, when necessary, launches price stabilization programs on some feedstuffs, fixing maximum-minimum prices to suit the circumstances. In other events, it permits liberal import of maize and fishmeal in order to keep down the production cost. Only when the price levels for locally produced maize and fishmeal go below the minimum prices is a special levy imposed. The arrangement of international trade funds is also aimed to enhance the export capacity of local exporters.
- The Bank of Thailand offers financial assistance to livestock operators by discounting their reliable promissory notes 50% of the face value through banks, the Industrial Finance Corporation of Thailand and the Bank for Agriculture and Agricultural Cooperatives, with as low as 5% interest charges. Those iinstitutions lend out the remaining 50% of the face value at a maximum of 10% interest.
- Export promotional measures have been put into effect.

*Tomato*

Tomato is an important economic crop of Thailand. It is consumed in the form of fresh tomato which can be cooked in many foods. Moreover, it is used as a raw material in processing industries, for example, to produce canned fish and tomato juice.

Tomato can be grown as a second crop after rice in the northern and northeastern regions where farm income per capita has been low compared with other regions. The planted area increased modestly by 1.25% per annum and the production grew faster at 10.43% per annum.

The domestic market can be divided into two markets, namely the market for fresh tomato and the market for industrial tomato. The demand for industrial tomatoes is in winter because there is a good supply of tomato and the prices are often low. In general, entrepreneurs collect tomatoes from local merchants for manufacturing. The marketing contract between farmers and factories is a forward market type where the factories determine a forwarding quantity and price of the tomato. However, large factories usually have their own tomato farms in addition to the contract farms.

Past development of the regional marketing contract has indicated a major problem of raw material supply arrangement and cooperation between farmers and processors. Moreover, those interested groups of the Bank for Agriculture and Agricultural Cooperatives (BAAC), government agencies, processors and farmers alike involved in the agro-business have experienced difficulties and, in many cases, business failures. Although technological advancements are utilized, at times there are problems of farm surplus, inadequate supply, irregular supply and substandard quality or a product not meeting the requirement.

To solve these problems, a contract marketing project has been attempted not only for production and marketing management but also for enhancement of farm income. The Kaset Esan Company established a project on contract marketing to ensure adequate and regular tomato supplies for processing. The Bank for Agriculture and Agricultural Cooperatives (BAAC) provides credit to the farmers for purchasing inputs under the project

Following introduction of the contract marketing project, close cooperation developed between farmers and entrepreneurs, leading to success in production and marketing management. There are many factors that facilitated the success, as listed below:

- The appropriate technologies of production have been transfered to the participating farmers.
- High yielding varieties of tomato are provided by the company.
- Suitable, fertile planting area of tomato is selected.
- The farmers are able to produce tomato in accordance with the factory demand and they receive a fair price as stated in the marketing contract.
- BAAC provides farm credit efficiently.

*Onion*

Production of onion in Thailand has not coped with domestic demand from 1989 to 1994. Thus, there was import of onion in the range of 600 to 5,000 tons annually. Farm gate prices for local onion have varied depending on production. Farmers faced a very low price in some years due to the production in different llocations flowing to market at the same time because there are no concerted production plans and the growers do not have bargaining power in pricing. In addition, growers have little knowledge concerning production and storage. Therefore, the Ministry of Agriculture and Cooperatives set forth a policy to manage onion. With the approval of the Policy and Agricultural Development Committee, there are now policy measures to manage production of onion to meet the demand by controlling the import quantity of onion seeds. This tool is used to determine annual onion production and the Office of Agricultural Economics is currently in charge of this matter.

Production management measures include:

- control import of onion seeds for each producing area;
- control planted area in each location by determining agro-economic zones for onion;
- onion seeds can only be imported by registered farmers' organizations;
- production targets of onion have to be set annually by projecting demand for onion before importing the seeds; and
- establish farmers' cooperatives and a Thai federation of onion growers cooperatives to support the above measures.

Measures for stabilizing farm prices include:

- provide incentives for onion exports at the beginning of the season;
- support farmers to plant onion in the onion agro-economic zones and to form more farmer groups;
- support greater coordination of farmer groups in the producing areas;
- support and promote research on techniques of growing onion off-season; and
- support private businesses, farmer's organizations and individual farmers to store onions collected at the beginning of the harvest season in order to sell them for a better price.

Promotion of onion production and marketing is a successful project of the Ministry of Agriculture and Cooperatives. It assists farmers to sell their products at stabilized prices. In addition, onion is produced to meet the domestic demand and also for export. Production targets are set, and the planning mechanism involves coordination between government agencies and farmer organizations to prevent a surplus supply and low price.

. Factors which contributed to the success of the onion enterprizes are:

- establishment of onion farmers' cooperatives and a federation of onion growers cooperatives that focus on production and marketing plans and consistent management;
- controlled import of onion seeds;
- controlled planted area; and
- production targets of onion set annually by projecting demand for onions before importing seeds.

*Mango*

Mango is an exotic fruit which is popular in both fresh and processed forms in domestic and foreign markets; it is regarded as a substantial export income source. Thailand is climatologically suitable for growing mango. In the Fifth and Sixth Plans (1982-1991), the government set out development and promotion policies for fruit such as mango, which resulted in expansion of the area planted to mango. Presently, its planted area ranks first among the fruit trees, and farmers themselves have developed and adopted new technologies to improve their mango production. However, there are some difficulties for exporting which restrain production.

Thailand has expanded export of mango to Japan. However, before 1987, Thailand could not export mango to Japan because Japan exercised restrictions on the import of mango. The mangoes have to be treated to get rid of oriental fruit fly and melon fly by vapor heat treatment at an inner mango temperature of 46.5°C for 10 minutes. Thus, the Thai government made a request to the Japanese government for a joint research project to get rid of the fruit flies. The Department of Agriculture obtained a budget to build its first vapor heat treatment building at Bang Khen. The private sector has rented the treatment building to treat its products. Since 1989 up to 1991. Japan has allowed import of three more varieties of Thai mango, namely Nam Dok Mai, Keaw Sawuey and Rad. Since the start of the vapor heat treatment in 1989 up to 1994, Thailand has been able to export only a small volume (208 tons) of mango to Japan.

The volume and value of mango export to Japan have not increased much during the past five years (1989-1994). This indicates that Thailand has not succeed in exporting the fruit to this country. Causes of the export failure are:

- Japan puts serious restriction on mango imports both in quality and size.
- Varieties of mango which are favored by the Japanese are not the same as those favored by Thais. Thus, farmers are not interested in growing the different varieties, because, if the products are not permitted to enter Japan, farmers will not be able to sell them in country either.
- The implementation of vapor heat treatment is costly so that the fruit products from Thailand are more expensive, and thus, not competitive with Mexican and Philippine mangoes.
- Most Thai mangoes get black mold, which is unattractive to the Japanese. This is due to incorrect post harvesting methods.

*Cashew nut*

The producing areas of cashews are mainly scattered in the southern provinces of Thailand. Thailand has exported cashew nut and earned foreign exchange of about 50 to 100 million baht. During the past decade, the government began to reduce cassava planted area and cashew is one of the crops selected to replace cassava.

The government, namely the Ministry of Agriculture and Cooperatives, in coordination with the private sector and financial institutions, set up a promotion project for substituting cashews for cassava under the Public-Private Coordination Program for Agricultural and Agro-Industrial Development. The target areas are concentrated in the northeastern region. Under the program, the planted area of cashew has expanded remarkably.

During project implementation, there were many problems that kept lowering the output of cashew nut below the expected target. More than half of the participating farmers wanted to quit producing cashews. Most of them made requests for substantial financial assistance to improve their production or to invest in other crops. This illustrates the failure of the project.

The project to promote cashew cultivation did not succeed because the participating farmers ran into farm difficulties. Consequently, production did not reach the expected target. In 1988, the farmers obtained an output of 18% of the target, and their income was only 37% of the target. In 1989, the output and income were 30 and 57% of the targets, respectively. In 1991, however, the output and income decreased to 26.7 and 21.4% of the targets. Therefore, the farmers did not earn adequate income for their subsistence and repayment of their loans. Subsequently, about 60% of the participating farmers quit the project. About 85% of the farmers who want to continue growing cashews need more investment loans.

The situation caused losses in return to resource investment. It wasted time of the farmers because the cashews should be in the productive stage yielding good returns. On the contrary, the farmers had to go out of business.

*Cotton*

Cotton has been a promoted economic crop since 1961 due to a very rapid expansion of the textile industry and the agencies concerned have carried out research on variety improvement, farm practices and technology transfer.

Although the policy for cotton promotion has been in place for a long time, problems of cotton production and marketing still exist, especially pest and disease infestation, quality of the cotton lints, low yield and unstable prices. In addition, cotton farmers often lack investment funds. Production of cotton is insufficient to cope with the textile industry's demand. Consequently, cotton lint valued at more than ten billion baht is imported annually. It is expected that imports will continue to increase.

To solve these problems, the government has attempted to accelerate research and development, to increase production and improve the quality of cotton products to cope with market demand. However, limitations of the government budget have caused discontinuation of the implementation of these prolicies and declining cotton production.

Policies and related measures include:

- In the fourth development plan (1977-1981), the government set up a promotion policy on cotton production to substitute for imports. To achieve the objectives, price support measures and an aerial spray pilot project were set up.
- In the fifth development plan (1982-1986), the government continued the import substitution policy for cotton with the following supporting measures: (i) a production increase and cost reduction program; (ii) a crop insurance project; and (iii) determination of cotton economic zones.
- In the sixth development plan (1987-1991), the government concluded that cotton locally had low potential of production. Thus, it formulated no special support measures although domestic demand was high and the import tended to increase over time.

Although cotton is a crop for which the government set forth policy and measures to promote the production to substitute for imports since 1977, production still did not meet the demand and the import of cotton increased over time. The causes are as follows:

- Implementation of the projects did not have continuity due to limitations of the government budget.
- Cotton is a crop that often faces infestation of pests and disease. It needs regular application of many kinds of pesticides.
- Cotton prices were uncertain and did not provide sufficient incentive to farmers.
- There was a lack of coordination among the agencies concerned. Market prices have long been determined by traders and the farmers have had no bargaining power.

*Conclusions derived from case studies*

The results of case studies on successful attempts, i.e, broilers, tomato and onion show that the major factors contributing to the success of these enterprises are the close cooperation between private and public sectors and advance planning of production and marketing. The private sector includes farmers, entrepreneurs and banking institutions providing financial assistance. The production and marketing plans were formulated in advance with coordination among all interested parties. Understanding their functions in implementation of the businesses helped all players to achieve consistent management in their pursuit of success.

On the contrary, studies of the failed attempts, i.e, mango, cashew nut and cotton show that the major factor contributing to the failure is the lack of farm management skills and investment funds for the participants of the newly introduced businesses, indicating insufficiency in the transfer of technical know-how to operate their businesses. At times, the operation of the businesses concentracted mainly on production, leaving marketing considerations and arrangements aside. Moreover, it seems that lack of close coordination among the responsible initiating agencies resulted in only partial support of each other and, thus, the eventual business failure.

**Polices and measures to improve market prospects**

To improve market prospects, it is necessary for Thailand to undertake a detailed study before formulating production and marketing plans, so that Thailand can take a more progressive approach to commodities for which Thailand has great demand. This study covers only selected commodities while other commodities which have substantial domestic and export market prospects should be investigated for their potential. Then, strategies for upgrading production efficiency of these commodities can be introduced so that they can be competitive even without support measures.

Within the context of competitiveness in the world market, the following developments should be taken into consideration when formulating the policies and measures to enhance market prospects of agricultural products in Thailand:

- Aspects of quality control and standardization of the commodities will have to be a major area of concern. Quality defects of some agricultural export items in the past have been harmful to both the image and marketability of the export products.
- Thailand has to switch from production of traditional cash crops which have production and marketing problems to commodities which have market potential. Instrumental to this will be technological breakthough. However, low productivity coupled with high cost of production consequently causes high prices of products. Thus, adoption of appropriate technology will not only increase productivity but also lower the cost.
- Not only do the commodities have to be produced at cost effective prices, but they have to meet the specific requirements of the markets. Furthermore, the presentation of the product has become, in effect, as important as the quality of the product itself as are brand names which can certify product quality. Efficient production itself is, therefore, no longer sufficient unless accompanied by appropriate and effective marketing campaigns.
- Investment promotion undertaken by the Board of Investment is one important measure to bolster market prospects especially in the agro-industry area. With the provision of tax incentives, an infant industry in the country can be supported during its initial period until it is competitive in the market.

# Domestic Demand Composition and Projections for Major Upland Crops

*Sotaro Inoue and Boonjit Titapiwatanakun* *

Major upland crops, maize, soybean, cassava and rice, are consumed in various forms. In order to study the future market prospects of these crops, domestic demand was divided into major uses or demand components which were analyzed by country. Demand composition of the four commodities is summarized in Table 1. Moreover, middle-term demand projections were carried out. In estimating the future quantity demanded, a common simple econometric method using income and population growth rates and income elasticities was employed as far as possible. In cases where relevant income elasticities were not available, the most simple time trend approach of the amount produced was applied. The results of demand projections to the year 2000 are summarized in Table 2.

**Maize**

Among the seven countries only China, India and the Philippines provided information on maize demand divided into direct human consumption, feed and industrial use. However, statistics available in Indonesia, Pakistan and Thailand for feed demand and other industrial uses are not separated. In the case of Vietnam, only seed demand is specified in the total use (Table 1).

Maize demand composition differs mainly according to the development level of the domestic livestock industry. India and Pakistan are countries where maize is consumed mainly as direct human consumption. In terms of percentage, maize is directly consumed at 79.0% and 66.7% of the total maize demand or production in India and Pakistan,

* CGPRT Centre, Bogor, Indonesia and Kasetsart University, Bangkok, Thailand. This paper is taken from the Integrated Report of the Project “Market Prospects for Upland Crop Products and Policy Analysis in Selected Asia Countries.” Working Paper No. 28, Bogor: CGPRT Centre.

respectively. On the other hand in China, the Philippines, Indonesia and Thailand, maize is mostly used as animal feed or in processed forms. In particular, a large share of feed demand (64% to 99% of the total maize production) is observed in China, Thailand and the Philippines.

China and Vietnam estimate relatively rapid increases in demand for maize, of which the compound annual growth rate from the base year to the year 2000 is 6.7% and 7.9%, respectively (Table 2). Feed demand is the most important contributing factor to the maize demand projection in China. For Vietnam, there is no information available for specifying which usage is the determining factor. Pakistan estimates that demand for maize is increasing at 2.6% per year in which feed demand is expected to increase rapidly. These three countries clearly indicate that future demand change is closely linked to development of the livestock industry in the country. India, the Philippines and Thailand expect a moderate increase or stagnant demand for maize. Since Thailand has a promising livestock industry, the projected feed demand in the year 2000 may be an underestimate.

The seven countries as a whole are expected to have a quantity demanded of maize totaling 178.316 million tons in 2000 (Table 2). This figure is far larger than the amount produced in 1994 of 132.105 million tons. The seven countries may turn into an importing area of maize in 2000.

**Soybean**

Information on soybean demand by each use is available in five countries, excluding Indonesia and Vietnam. Around half of the total domestic demand for soybean is for direct human consumption in China and India (Table 1). In Thailand, due to the well developed domestic livestock industry, soybean meal demand is very high (82.9%). In Pakistan and the Philippines soybean demand is still limited. Pakistan's total demand is 102 thousand tons in 1996/97 and the Philippines' total demand is 52 thousand tons during the period of 1989-1993. In Indonesia direct human consumption of soybean is very limited at only 0.8%. This may be due to the fact that the consumption of processed soybean food such as *tempe* is not included.

Soybean demand is expected to increase more rapidly compared to maize demand. The countries that estimate rapid increase of soybean demand are China, Pakistan, the Philippines, Thailand and Vietnam in which projected annual growth rates are 6.7%, 7.1%, 14.4%, 6.8% and 10.2%, respectively. In all the participating countries, the share of direct human consumption is projected to decrease while other uses, particularly the proportion of the demand for soybean meal, are expected to increase except for the case of India. Similar to maize, the future demand of soybean is closely linked to development of the domestic livestock industry. However, the demand projection is based on the past production trend in Pakistan, the Philippines and Vietnam, where soybean production is still limited. Therefore, their soybean demand projections may have to be treated carefully.

The participating countries as a group are estimated to have a total soybean demand of 22.926 million tons in the year 2000. The quantity of soybean produced in 1994 is 21.773 million tons. Therefore, the seven countries as a whole may remain as importing countries of soybean.

**Cassava**

In the five countries studied, India, Indonesia, the Philippines, Thailand and Vietnam, the domestic cassava demand is not large. Indonesia has the biggest domestic demand of cassava among the five countries. Thailand's cassava production is chiefly for export and its domestic demand was only 3 million tons in 1993 while its production was more than 19 million tons in 1994.

Cassava is mainly used in a processed form. Thailand, Indonesia and the Philippines directly consume 15 to 20% of their cassava while in India 40% of cassava is used for direct human consumption. The high direct use in India probably due to the undeveloped cassava-processing industry in India.

In general relatively moderate demand increases are expected (Table 2). Thailand estimates a relatively high demand increase of 4.5% per year, probably due to its growing domestic cassava-processing industry. India, Indonesia and the Philippines project a moderate increase of less than around 2% per year. Vietnam even expects a decreasing demand of -1.3% per year. This may be due to the lack of cassava usage information in Vietnam. In fact one can expect Vietnam to become an exporting county of cassava products in the near future.

The total production of the five countries is 43.912 million tons in 1994. The estimated total cassava demand of the five countries in 2000 is 30.584 million tons. Therefore the five countries as a whole probably will remain important exporting countries. It is very likely that these countries will be key players in the international trade of cassava products. However, the total quantity of cassava trade may not increase due to the decreasing import in the EU. Therefore, as pointed out earlier, the region may face a problem of surplus cassava if production increases at the current rate.

**Rice**

Rice is an important staple food for all the participating countries. Five countries, China, India, Pakistan, Thailand and Vietnam, studied the domestic demand composition and projected the quantity demanded in year 2000. In contrast to the other major upland crops, rice is mostly consumed in an unprocessed form or as milled rice. In Pakistan, Thailand and Vietnam, the proportion of direct human consumption of rice is around 95% (Table 2). However, China has very high percentage of rice used as feed (11.1%). The underlying reason is that there may be a large amount of low quality rice produced in China and that rice would be used mainly for animal feed.

Rice demand is expected to increase moderately in the middle term. The compound annual growth rate of China, India and Thailand is 0.7%, 2.4% and -0.0%, respectively. Pakistan and Vietnam expect relatively rapid increases of 6.2% and 4.1% per year, respectively. It is worth noting that the growth rates of rice demand are very much in line with trends of dietary pattern changes and the stage of economic growth. For instance, Thailand which has the highest per capita income among the five countries has zero growth rate of rice demand. Unfortunately the available data are not sufficient to make any further reference to the quality of rice consumed.

The total estimated demand of rice by the five countries in 2000 is 322.226 million tons. Since the total production of the five countries in 1994 is 342.867 million tons, the five countries as a whole will remain exporting countries in the near future.

**Regional implications**

Due to the changing domestic food demand, demand projections for the four commodities yield different results. Maize and soybean are mainly demanded as feed or other processed forms in the countries studied. Therefore the demand for these two crops is expected to increase rapidly in the seven countries as a whole. In particular, the countries which have well developed livestock industries will expand the demand for these two commodities as feed ingredients. For the international market, China's supply and demand situation is particularly important due to its huge potential in both importing and exporting, which will have a significant impact on trade among the seven countries and on world trade. Although the country reports do not quantitatively analyze the supply aspects of the studied commodities, according to simple comparison with the production level in 1994, the projections may imply that the seven countries as a whole will turn into importing countries of maize and remain as importers of soybean.

At present the domestic demand for cassava is not very high, because the development level of domestic cassava-processing industries is limited in the four countries studied except for Thailand. In general moderate demand growth is expected. According to a simple comparison with the production level in 1994, the five countries as a whole will remain as a net exporter of cassava; however, Thailand, the biggest cassava exporter, expects a relatively high domestic demand increase of 4.5% annually due to the cassava-processing industry development in the country. At any rate, one should bear in mind that the world market for cassava starch is not expanding at a significant rate. Therefore, cassava exporting countries in the region may have to adjust their cassava production to avoid an excess supply of cassava.

As mentioned previously, per capita cereal consumption is decreasing in almost all the participating countries. The demand for rice as a staple food is expected to grow moderately or stagnate in China and Thailand. The estimated demand in 2000 is lower than the quantity produced in 1994. Therefore the five countries studied as a whole will probably remain as exporting countries of rice. It is interesting to raise a question regarding the future scenario of the world rice market. For example, will there be an over supply in the world rice market? Will there be any significant change in the region's consumers' preference for the quality of rice? Although these questions could not be accurately answered from the results of these studies, the general discussion on dietary pattern changes indicates that income does determine changes in dietary patterns towards higher value food items. Thus, it is worthwhile placing more emphasis on the rice quality issue.

**Table 1 Domestic demand composition: maize, soybean, cassava and rice (in million tons).**

| | **China** | | **India** | | **Indonesia***[6] | | **Pakistan** | | **Philippines** | | **Thailand** | | **Vietnam***[18] | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maize** | | | | | | | | | | | | | | |
| year | 1994 | | 1992 | | 1995 | | 1994/1995 | | 1989-1993 | | 1994 | | 1996 | |
| | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) |
| Total Demand | 99.3 | 100 | 9.1 | 100 | 8.1 | 100 | 1.2 | 100 | 5.4 | 100 | 3.7 | 100 | 1.1 | 100 |
| 1. Direct human consumption | 20.0 | 20.0 | 7.2 | 79.0 | 1.1 | 13.6 | 0.8 | 66.7 | 1.0 | 18.0 | na | - | 1.1*[19] | 98.4 |
| 2. Feed | 65.0 | 64.0 | 0.2 | 1.9 | na | - | 0.4*[8] | 29.4 | 3.9 | 72.1 | 3.7*[14] | 99.2 | na | - |
| 3. Industrial use | 14.3*[1] | 16.0 | 1.7*[3] | 19.1 | 7.0*[7] | 86.4 | na | - | 0.5 | 8.5 | na | - | na | - |
| 4. Seed and wastage | na | - | na | - | na | - | 0.1 | 4.8 | 0.1 | 1.3 | 0.0 | 0.8 | 0.0 | 1.5 |
| **Soybean** | | | | | | | | | | | | | | |
| year | 1992 | | 1992 | | 1995 | | 1996/1997 | | 1989-1993 | | 1996 | | 1996 | |
| | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) |
| Total Demand | 9.5 | 100 | 1.2 | 100 | 2.5 | 100 | 0.1 | 100 | 0.1 | 100 | 1.5 | 100 | 0.2 | 100 |
| 1. Direct human consumption | 5.0 | 52.1 | 0.6*[4] | 52.4 | 0.0 | 0.8 | na | - | na | - | 0.1 | 7.8 | 0.2*[20] | 97.7 |
| 2. Soybean meal | 3.1 | 32.8 | 0.2 | 18.5 | na | - | 0.1*[9] | 98.0 | 0.0*[12] | 1.9 | 1.2 | 82.9 | na | - |
| 3. Soybean oil | 0.6 | 6.7 | 0.4 | 29.1 | 2.4*[7] | 99.2 | 0.0 | 1.0 | 0.5*[13] | 92.3 | 0.1 | 6.6 | na | - |
| 4. Seed and wastage | 0.8 | 8.4 | na | - | na | - | 0.0*[10] | 1.0 | 0.0 | 5.8 | 0.0 | 2.7 | 0.0 | 2.3 |
| **Cassava** | | | | | | | | | | | | | | |
| year | | | 1992 | | 1995 | | | | 1989-1993 | | 1993 | | 1996 | |
| | | | | (%) | | (%) | | | | (%) | | (%) | | (%) |
| Total Demand | na | - | 5.3 | 100 | 14.9 | 100 | na | - | 1.8 | 100 | 3.0 | 100 | 2.3 | 100 |
| 1. Direct human consumption | na | - | 2.1 | 40.1 | 3.5 | 25.1 | na | - | 0.3 | 15.9 | 0.7*[15] | 23.0 | na | - |
| 2. Feed | na | - | 0.5 | 9.1 | na | - | na | - | 0.1 | 6.0 | na | - | na | - |
| 3. Industrial use | na | - | 2.3 | 44.0 | 11.2*[7] | 74.9 | na | - | 1.4 | 78.1 | 2.3 | 77.0 | na | - |
| 4. Wastage | na | - | 0.4 | 6.8 | na | - | na | - | na | - | na | - | na | - |
| **Rice** | | | | | | | | | | | | | | |
| year | 1993 | | 1992 | | | | 1996 | | | | 1996 | | 1996 | |
| | | (%) | | (%) | | | | (%) | | | | (%) | | (%) |
| Total Demand | 179.9 | 100 | 73.3 | 100 | na | - | 2.4 | 100 | na | - | 14.3 | 100 | 22.9 | 100 |
| 1. Direct human consumption | 143.0 | 79.5 | 63.5 | 86.7 | na | - | 2.3 | 94.0 | na | - | 13.7*[16] | 95.8 | 22.0*[21] | 96.4 |
| 2. Feed | 20.0 | 11.1 | 0.3 | 0.5 | na | - | na | - | na | - | na | - | na | - |
| 3. Industrial use | na | - | na | - | na | - | 0.1*[11] | 6.0 | na | - | na | - | na | - |
| 4. Seed and wastage | 16.9*[2] | 9.4 | 9.4*[5] | 12.8 | na | - | na | - | na | - | 0.6*[17] | 4.2 | 0.8 | 3.6 |

na: not available

Note: 1) Including seed and wastage. 2) Including other uses. 3) Including seed and wastage. 4) Including seed and wastage. 5) Including other uses. 6) Figures of Indonesia are projections. 7) All the demand except for direct human consumption. 8) Including industrial use. 9) Soybean meal and imported soybean meal. 10) Seed plus wastage. 11) Other uses. 12) Feed. 13) Processing. 14) Demand from the feed industry. 15) Household consumption. 16) Rice and rice products. 17) Seed. 18) Figures of Vietnam are projections. 19) Maize and maize products. 20) Soybean and soybean products. 21) Rice and rice products.

**Table 2 Domestic demand projection for the year 2000: maize, soybean, cassava and rice in million tons based on compared annual growth rates.**

| | China | | India | | Indonesia | | Pakistan | | Philippines | | Thailand | | Vietnam | | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Maize** | | | | | | | | | | | | | | | |
| Approach | demand growth rate approach | | demand growth rate approach | | demand growth rate approach | | time trend approach | | time trend approach | | demand growth rate approach | | time trend approach | | |
| Compound annual growth rate (%) | 6.7 | | 1.4 | | 2.6 | | 2.6 | | 1.4 | | 0.4 | | 7.9 | | |
| | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) | |
| Total demand | 146.3 | 100 | 10.1 | 100 | 9.2 | 100 | 1.4 | 100 | 6.0 | 100 | 3.8 | 100 | 1.5 | 100 | 178.3 |
| 1. Direct human consumption | 19.0 | 13.0 | 8.0 | 78.9 | 1.2 | 12.8 | 0.8 | 59.5 | 1.2 | 20.1 | na | - | 1.5*[17] | 98.6 | |
| 2. Feed | 103.8 | 71.0 | 0.2 | 2.0 | na | - | 0.5*[7] | 35.9 | 4.0 | 68.3 | 3.8*[13] | 99.2 | na | - | |
| 3. Industrial use | 23.4*[1] | 16.0 | 1.9*[3] | 19.1 | 8.0*[6] | 87.2 | na | - | 0.6 | 10.3 | na | - | na | - | |
| 4. Seed and wastage | na | - | na | - | na | - | 0.1 | 4.6 | 0.1 | 1.3 | 0.0 | 0.8 | 0.0 | 1.4 | |
| **Soybean** | | | | | | | | | | | | | | | |
| Approach | demand growth rate approach | | demand growth rate approach | | demand growth rate approach | | time trend approach | | time trend approach | | demand growth rate approach | | time trend approach | | |
| Compound annual growth rate (%) | 6.7 | | 4.7 | | 2.0 | | 7.1 | | 14.4 | | 6.8 | | 10.2 | | |
| | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) | | (%) | |
| Total demand | 16.0 | 100 | 1.8 | 100 | 2.7 | 100 | 0.1 | 100 | 0.1 | 100 | 1.9 | 100 | 0.3 | 100 | 22.9 |
| 1. Direct human consumption | 6.6 | 41.0 | 0.9*[4] | 51.6 | 0.0 | 0.8 | na | - | na | - | 0.1 | 6.7 | 0.3*[18] | 98.1 | |
| 2. Soybean meal | 6.9 | 43.1 | 0.3 | 19.6 | na | - | 0.1*[8] | 98.4 | 0.0*[11] | 21.8 | 1.6 | 84.7 | na | - | |
| 3. Soybean oil | 1.3 | 7.8 | 0.5 | 28.7 | 2.7*[6] | 99.2 | 0.0 | 0.8 | 0.1*[12] | 75.9 | 0.1 | 6.4 | na | - | |
| 4. Seed and wastage | 1.3 | 8.1 | na | - | na | - | 0.0*[9] | 0.8 | 0.0 | 2.3 | 0.0 | 2.2 | 0.0 | 1.9 | |
| **Cassava** | | | | | | | | | | | | | | | |
| Approach | | | demand growth rate approach | | demand growth rate approach | | | | time trend approach | | demand growth rate approach | | time trend approach | | |
| Compound annual growth rate (%) | na | | 0.2 | | 2.4 | | na | | 1.6 | | 4.5 | | -1.3 | | |
| | | | | (%) | | (%) | | | | (%) | | (%) | | (%) | |
| Total demand | na | - | 5.4 | 100 | 16.8 | 100 | na | - | 2.0 | 100 | 4.1 | 100 | 2.2 | 100 | 30.6 |
| 1. Direct human consumption | na | - | 2.4 | 44.0 | 4.0 | 24.8 | na | - | 0.4 | 22.9 | 0.8*[14] | 19.2 | na | - | |
| 2. Feed | na | - | 0.5 | 8.6 | na | - | na | - | 0.1 | 2.8 | na | - | na | - | |
| 3. Industrial use | na | - | 2.2 | 40.6 | 12.3*[6] | 75.2 | na | - | 1.5 | 74.3 | 3.3 | 80.8 | na | - | |
| 4. Wastage | na | - | 0.4 | 6.8 | na | - | na | - | na | - | na | - | na | - | |
| **Rice** | | | | | | | | | | | | | | | |
| Approach | demand growth rate approach | | demand growth rate approach | | | | demand growth rate approach | | | | demand growth rate approach | | time trend approach | | |
| Compound annual growth rate (%) | 0.7 | | 2.4 | | na | | 6.2 | | na | | -0.0 | | 4.1 | | |
| | | (%) | | (%) | | | | (%) | | | | (%) | | (%) | |
| Total demand | 189.0 | 100 | 88.8 | 100 | na | - | 3.1 | 100 | na | - | 14.3 | 100 | 26.9 | 100 | 322.2 |
| 1. Direct human consumption | 145.3 | 76.9 | 77.0 | 86.6 | na | - | 2.9 | 94.0 | na | - | 13.7*[15] | 95.8 | 26.0*[19] | 96.7 | |
| 2. Feed | 26.0 | 13.7 | 0.5 | 0.6 | na | - | na | - | na | - | na | - | na | - | |
| 3. Industrial use | na | - | na | - | na | - | 0.2*[10] | 6.0 | na | - | na | - | na | - | |
| 4. Seed and wastage | 17.8*[2] | 9.4 | 11.4*[5] | 12.8 | na | - | na | - | na | - | 0.6*[16] | 4.2 | 0.9 | 3.3 | |

na: not available

Note: 1) Including seed and wastage. 2) Including other uses. 3) Including seed and wastage. 4) Including seed and wastage. 5) Including other uses. 6) All the demand except for direct human consumption. 7) Including industrial use. 8) Soybean meal and imported soybean meal. 9) Seed plus wastage. 10) Other uses. 11) Feed. 12) Processing. 13) Demand from the feed industry. 14) Household consumption. 15) Rice and rice products. 16) Seed. 17) Maize and maize products. 18) Soybean and soybean products. 19) Rice and rice products.

# CGPRT Centre News and Activities

## SUASA - 2

A visit to China for the project Economic Assessment of Selected Resource Management Techniques in Marginal Upland Agriculture (SUASA-2) was conducted from 22 September to 2 October 1997. The project expert, Mr. Min-jae Kim, and the Centre's R&D Programme Leader, Dr. Kedi Suradisastra, paid a visit to Mr. Ni Hongxing and Dr. Gu Shuzong, the SUASA-2 country experts, and discussed the progress of the projects. They also visited one of the project study sites located at Huangyuan County, Qinghai Province.

## TRADELIB

The Trade Liberalization project started in this quarter of the year. The project expert, Dr. Michio Kanai, has started working at the Centre and has conducted a planning meeting from 27- 28 August 1997. Eight national experts and a regional advisor, Dr. Boonjit Titapiwatanakun, attended the meeting. Each country expert presented his comments and suggestions for the study. The planning meeting actualized the project's study plan and tentative content of the report.

## Hands-on Training in GIS

From 8 to 11 July 1997, hands-on training in GIS was provided by the database section to the following persons:

Ir. Sabarella and Sheh Usman
Departement of Agriculture, Sub- Bidang Data Tanaman Pangan Hortikultura dan Perkebunan, Jakarta.

From 29 July to 1 August 1997

Ir. Erni Susanti and Ir. Woro Estiningtyas
CSAR, Center for Soil and Agroclimate Research, Bogor.

## HRD/IS

On 8 - 19 September 1997, a regional working seminar on Integrated Database Management (IDBM) for agricultural planning and research was held. The seminar was attented by fifteen participants from twelve countries: Bangladesh, India, Indonesia, Lao PDR, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand and Vietnam. The seminar focused on database management and spatial analysis. The software involved was Excel, Access, GIS, Linear Programming and MapInfo.

The seminar consisted of three parts. The first part covered setting up databases (Access), processing data (Excel), to move to GIS for spatial analysis and representation. In the third part various spatial analytical techniques, based on simple maximization procedures were discussed. These are essential for land use modeling, resource use modeling and economic projections.

The participants were quite satisfied with the course. It was mentioned that such seminars indeed cater to the very real demand for skills to creatively handle information and data, in a practical management setting.

# Announcements

## 27th International Course on Integrated Pest Management

**International Agricultural Centre**
**Wageningen, the Netherlands March 22 - July 4, 1998**

The course is designed for university trained plant protection and advisory officers who are engaged in advising farmers on all aspects of plant protection, as well as for lecturers in general plant protection at agricultural colleges and those engaged in applied plant protection research. Applicants should have been working in plant protection for several years. They should be engaged in plant protection in the widest sense and be interested in all subjects dealt with in the course.

## 27th International Potato Course: Production, Storage and Seed Technology

**International Agricultural Centre**
**Wageningen, the Netherlands April 13 - July 17, 1998**

The objective of the course is to provide persons working in developing countries, who are engaged in aspects of potato production, with further knowledge and understanding of and skills in various aspects of their work. These aspects include: physiology, growth and production; storage, handling and utilization; diseases and pests; seed technology, seed production and seed supply; breeding and varieties.

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Telegram INTAS
Telex45888-INTAS NL

## 28th International Course on Applied Plant Breeding

**International Agricultural Centre**
**Wageningen, the Netherlands March 8 - June 20, 1998**

The course is an in-service training course intended for university trained specialists in plant breeding, mainly from developing countries, who have not recently had the opportunity to acquaint themselves with modern plant breeding techniques. Its aim is to upgrade the participants' knowledge of and to give information on new developments in applied plant breeding through lectures and practical training. To be eligible, candidates should have been engaged in plant breeding activities for several years, either in a breeding programme, in teaching or in a crop improvement programme where breeding is a major component.

## New Perspectives in Rural Extension: Challenges and Prospects

**International Agricultural Centre**
**Wageningen, the Netherlands August 24 - September 18, 1998**

The course aims to:

- familiarize participants with the recent changes in rural extension theory and practice;
- provide them with a platform for discussing these changes with colleagues and international extension scientists and practitioners;
- provide them with the basic tools to bring about change in their own organizations in preparation for the extension tasks in the twenty-first century.

**CGPRT Centre**

The Regional Co-ordination Centre for Research and Development of Coarse Grains, Pulses, Roots and Tuber Crops in the Humid Tropics of Asia and the Pacific (CGPRT Centre) was established in 1981 as a subsidiary body of UN/ESCAP.

**Objectives**

In co-operation with ESCAP member countries, the Centre will initiate and promote research, training and dissemination of information on socio-economic and related aspects of CGPRT crops in Asia and the Pacific. In its activities, the Centre aims to serve the needs of institutions concerned with planning, research, extension and development in relation to CGPRT crop production, marketing and use.

**Programmes**

1. Research, which entails the preparation and implementation of studies covering production, utilization and trade of CGPRT crops in the countries of Asia and the South Pacific.
2. Training of national research and extension workers,
3. Information and documentation which encompasses the collection, processing and dissemination of relevant information for use by researchers, policy makers, and extension workers.

***Palawija News***

Contributors are invited to submit concise summaries of significant social research related to CGPRT crops for publication. Figures (graphs or tables) may accompany the article. All articles are subject to editing to meet space limitations.

Please send all queries relating to articles in *Palawija News* to Publications Section, CGPRT Centre, Jalan Merdeka 145, Bogor 16111, Indonesia.

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