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Changes in Food Consumption and Basic Needs Coverage in Rural Indonesia

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Introduction

In developing countries agriculture generally has two essential functions, namely, establishing food security, and contributing to economic development and alleviation of poverty in the rural area.

On one hand, the agricultural sector has to provide enough food to ensure that adequate food is available for the population. On the other hand, the commercialization of agricultural products generates income for producers, which allows them to participate in the economic cycle of society and stimulates the national economy by satisfying internal demand and strengthening exports. Both factors, food and income, contribute in important ways to the nutritional situation of the population and coverage of the basic needs. Both food production and income work in tandem to achieve adequate food availability at the household level (Figure 1). This paper concentrates on these two components. It has to be considered, however, that food production and income are not the only determinant factors. Aspects such as health, living conditions or the capacity for proper care-giving are essential, in addition to adequate nutritional status. It has been concluded that several simultaneous improvements are needed in the diverse areas of health, education, income, and sanitation in order to improve nutritional status.

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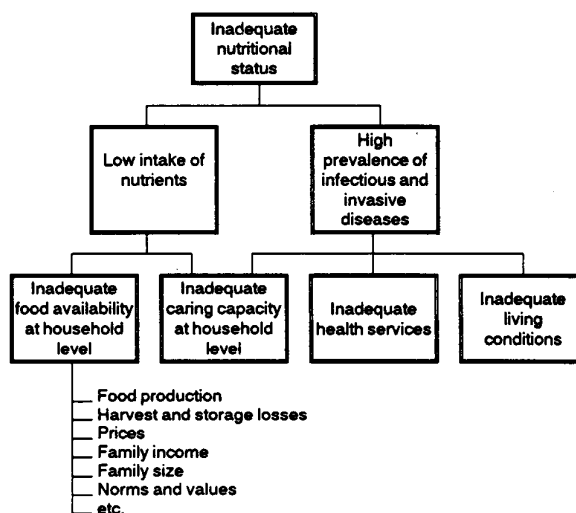


Figure 1 Simplified problem roots of nutritional status.

In rural households both food production and income directly influence household food availability. To ensure that individuals have an adequate food intake, food must be accessible to each member of the household. The distribution practices within households influence decision

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making at different levels starting at food purchase or production and ending with food intake and contribute to a population's food behavior. Food behavior can be broken down into six major components (Figure 2).

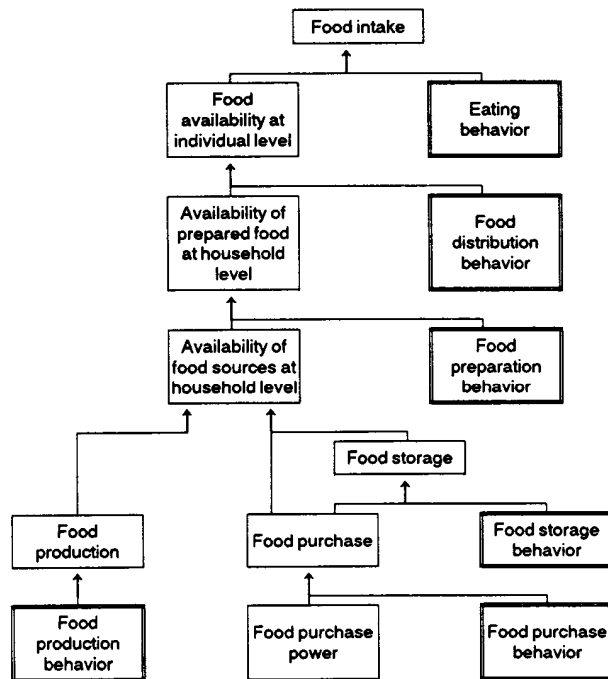


Figure 2 Food behavior cascade adopted from Gross and Dresrüsse (1991).

Data collection

Frequencies of food consumption are presented for different populations residing in rural areas of Indonesia. These societal groups have different food behaviors influencing their food consumption. A comparison between groups is made to discuss future changes and possibilities for Indonesian agriculture. Tables 1 to 3 categorize food consumption patterns by profession in the two Indonesian rural areas, West Sumatra and East Lombok. The data originate from two surveys which were carried out in GTZ-assisted project areas in 1990 and 1991 in about 1,600 households. The data collection in the surveys was carried out in a standardized way.

The questionnaires contained sections on socio-economic data, hygiene data, public health data and nutritional data. Additionally, children under five years of age were weighed and measured. The

surveys were carried out in selected rural areas, which were not necessarily representative for the whole province or district. Households with at least one child under five years of age were chosen through multi-staged random sampling using villages as clusters. According to information received from the different project areas, the daily cash income/household in West Sumatra is about US \$ 1.70 while in Lombok it is about US \$ 0.75.

Food consumption patterns

Table 1 illustrates the differences in consumption frequencies of selected staple foods among different households. Rice is the main staple food eaten by virtually all the people at least one time per day at both sites. Maize and/or cassava are eaten at least once per day if sufficient rice is not available. This may be the case if production is too low to satisfy the needs of the household and additional incomes are insufficient to purchase rice. Only a small number of households headed by farmers, fishermen and unskilled labourers and none of the civil servant's households in West Sumatra eat maize or cassava every day. This is in contrast with East Lombok where more than 50% of rural households eat maize or cassava once each day, a situation related to the lower income of rural populations in East Lombok. Wheat is not a traditional staple food in Indonesia. However, bread is eaten at least once a day in more than a quarter of the households belonging to civil servants, twice as high as the percentages in the other occupational categories. About ten percent of the households of food producers spend money to buy bread.

Table 1 Staple food consumption in households of different occupations in West Sumatra (1991) and East Lombok (1990), Indonesia.

	Rice	Maize	Cassava	Bread
West Sumatra:				
Farmer (n=563)*	99.6**	1.6	2.3	14.8
Fisherman (n=68)	98.5	2.9	1.5	11.9
Unskilled labourer (n=39)	100.0	0.0	2.9	11.7
Civil servant (n=54)	100.0	0.0	0.0	27.0
East Lombok:				
Farmer (n=369)	96.5	63.6	58.2	
Fisherman (n=57)	98.2	59.7	52.6	

* n = number of surveyed households.

** percentage of population.

Editorial

Agricultural Transformation

Seiji Shindo
 Director
 CGPRT Centre

Agriculture in Asia is in the midst of changes. While diversities in agriculture remain among countries and within them, there are remarkable similarities in the direction and implications of these changes. The underlying cause of the changes in agriculture is the fast economic growth experienced by countries in the region since the 1980s, led by the industrial sector. As a consequence of this, the linkage between agriculture and other sectors of the economy has strengthened, reflected by increasing commercialization of agriculture on one hand, and widening income disparity between rural and urban areas on the other.

There is a need for agricultural transformation or adjustment under such circumstances. Agriculture must diversify

and increase value-added production to generate higher farm income to respond to changing demands for food and other agricultural products, while maintaining food security.

An additional element of change is the trend towards open economies, which exposes agriculture to regional and international markets. As seen in the recent conclusion of the GATT Uruguay Round and other developments in inter-regional economic cooperation, it is becoming increasingly difficult to insulate an industry from outside forces, even if only for the sake of facilitating transformation. As a result of this, direct competition with international markets is inevitable, which adds complexity to the transformation of an agricultural system dominated by small farmers, at least in the short run.

An important function of agriculture in a rapidly growing economy is absorption of the rural labour force. Expansion of agricultural employment in rural areas lessens the rate of urban population

growth and helps to achieve more equitable and sustainable economic development. Governments should focus their efforts in this direction.

At the start of a new year it may be worthwhile to think about the future of agriculture, both regionally and nationally. What kind of agriculture should be envisaged after a decade or even a quarter of a century? Is it possible to make the transformation to large-sized and specialized farms, with competitive and efficient production technologies? Or, if the present structure of agriculture cannot be drastically changed, how can the income of farm households be increased to keep pace with that of urban households? An important service of economists and policy planners is to draw possible scenarios with respect to future visions of necessary actions. Starting in 1994, the CGPRT Centre will gradually expand its collaborative activities with its partners in this area.

We extend our wishes for a happy and prosperous year to all of our readers.

Table 2 shows the frequency of consumption of vegetables and papaya. Households of wealthier West Sumatra consume green leafy vegetables more frequently than households of poorer East Lombok. Almost all civil servants' households consumed green leafy vegetables each day compared to only every second fisherman's household. The consumption of green leafy vegetables appears to be associated with income. In East Lombok other vegetables, such as cabbage and green beans, are consumed more often than in West Sumatra.

Papaya is consumed all over Indonesia and is available throughout the whole year. It is the cheapest and most popular fruit. Because of these attributes, it was selected for study (Table 2). The greatest variability in fruit consumption is shown by households of civil servants in West Sumatra.

Table 2 Consumption of vegetables and papaya by households according to occupation in West Sumatra (1991) and East Lombok (1990), Indonesia.

	Frequency	Green leafy vegetables	Other vegetables	Papaya
West Sumatra:				
Farmer (n=563)*	at least once/day	76.6**	13.7	67
	at least once/week	22.7	37.1	398
Fisherman (n=68)	at least once/day	51.5	13.5	45
	at least once/week	45.6	44.8	492
Unskilled labourer (n=39)	at least once/day	61.5	19.4	108
	at least once/week	33.3	33.3	270
Civil servant (n=54)	at least once/day	87.0	11.8	19
	at least once/week	11.1	45.1	555
East Lombok:				
Farmer (n=368)	at least once/day	28.5	31.0	84
	at least once/week	43.2	32.3	147
Fisherman (n=57)	at least once/day	26.3	40.4	141
	at least once/week	59.7	36.8	246

* n = number of surveyed households.

** percentage of population.

In rural Indonesia fish has the predominant role as food of animal origin (Table 3). Almost all families of fishermen eat fish every day, which is less frequently done in the other household types. However, even in households of farmers, fish plays a far more important role than meat or eggs for animal protein intake. Daily consumption of meat is practiced in only 2 to 3% of the households, and farmers eat meat even less often. Meat and eggs are consumed most often in households of civil servants. Even unskilled labourers eat eggs more often than farmers. The greatest variation of intake of animal food sources is found among civil servants' households. In general, households in East Lombok consume less animal foods than those of West Sumatra, which again may reflect the lower cash incomes of those households.

Table 3 Consumption of selected animal foods in households of different occupational categories in West Sumatra (1991) and East Lombok (1990), Indonesia.

	Fish		Meat	Eggs
	fresh	dry general	chicken general	
West Sumatra:				
Farmer (n=563)*				
at least once/day	39.1	**	0.4	9.5
at least once/week	51.8		7.6	52.
Fisherman (n=68)				
at least once/day	95.6		2.9	7.4
at least once/week	4.4		2.9	47.
Unskilled labourer (n=39)				
at least once/day	50.0		2.6	13.
at least once/week	50.0		5.3	63.
Civil servant (n=54)				
at least once/day	59.2		1.9	16.
at least once/week	38.9		18.9	70.
East Lombok:				
Farmer (n=368)				
at least once/day	17.3	22.3	0.0	1.3
at least once/week	50.0	36.4	3.3	14.
Fisherman (n=57)				
at least once/day	49.1	64.9	0.0	1.8
at least once/week	29.8	29.8	0.0	15.

* n = number of surveyed households.
 ** percentage of population.

Formal education may be an important factor contributing to food habits and preferences. Table 4 describes the formal educational experience of the male heads of households in West Sumatra and East Lombok, categorized by occupation. Civil servants clearly have the highest level of education,

with 39% of them attending university or professional training institute, whereas fishermen possess the lowest level of formal education. In general, the rural population of East Lombok has received far less formal training than the population of West Sumatra. About two thirds of the household heads in East Lombok are illiterate.

As clearly indicated by Table 4, educational experiences differ notably between occupational categories. Therefore education, rather than professional background, may be the main cause of different food consumption frequencies. Table 5 describes the consumption frequency of selected foodstuffs according to educational experience among the farmers of West Sumatra and East Lombok. Since about 95% of the farmers of West Sumatra possess primary and secondary school education and 85% of the farmers of East Lombok were illiterate (< 3 years school education) or visited a primary school for 3 to 5 years, other formal educational experience was too negligible to mention.

Table 4 Relationship between education and profession of the father (expressed as percentage in each category).

Education	Farmer	Fisherman	Unskilled labourer	Civil servant
West Sumatra:				
Less than 3 years	5.9	7.2	4.9	0.0
3 - 5 years	57.6	65.3	41.5	5.1
6 - 11 years	36.2	26.1	43.9	55.9
University/ professional education	0.3	1.4	0.0	39.0
East Lombok:				
Less than 3 years	60.8	67.9		
3 - 5 years	25.9	18.9		
6 - 11 years	13.4	13.5		
University/ professional education	0.0	0.0		

Formal education of male heads of household did not play any role in frequency of food consumption among farmers of West Sumatra (Table 5). The situation in East Lombok shows that households of illiterate farmers consume less green leafy vegetables and eggs per week than households of literate farmers. The data suggest that literacy may influence positively food behaviour, whereas once literacy has been achieved, further formal education did not positively influence food behavior. It seems that schooling did

not contribute much to improving health and food behavior. Social norms and values had far more impact on consumption frequencies than did the level of formal education.

Table 5 Consumption frequency of selected foodstuffs according to education of farmers in West Sumatra and East Lombok.

Formal education	West Sumatra		East Sumatra		
	Bread	Green leafy vegetables	Eggs	Eggs	
< 3 years					
at least once/day			28.0	0.4	
at least once/week			37.9	9.3	
3-5 years school					
at least once/day	34.5	20.7	14.3	24.2	0.0
at least once/week	14.6	59.3	27.9	56.6	18.3
6-11 years school					
at least once/day	32.1	21.7	13.5		
at least once/week	18.6	59.6	24.4		

Figure 3 summarizes the findings of the Indonesian food consumption frequency studies. In the case of subsistence farmers, food production systems, education and norms and values are influencing food consumption in the household. In the case of food and cash crop farmers and fishermen, additional income is another factor which determines food consumption. The example of civil servants illustrates that in the case of non-food producers or pure cash crop farmers, the food production system itself has less direct influence on food consumption. Therefore, there is a wider range of foodstuffs to be consumed and choices can be made more freely and new food habits may arise. In general, income elasticity is highest in expensive animal food sources, followed by vegetables and is lowest in staple foods.

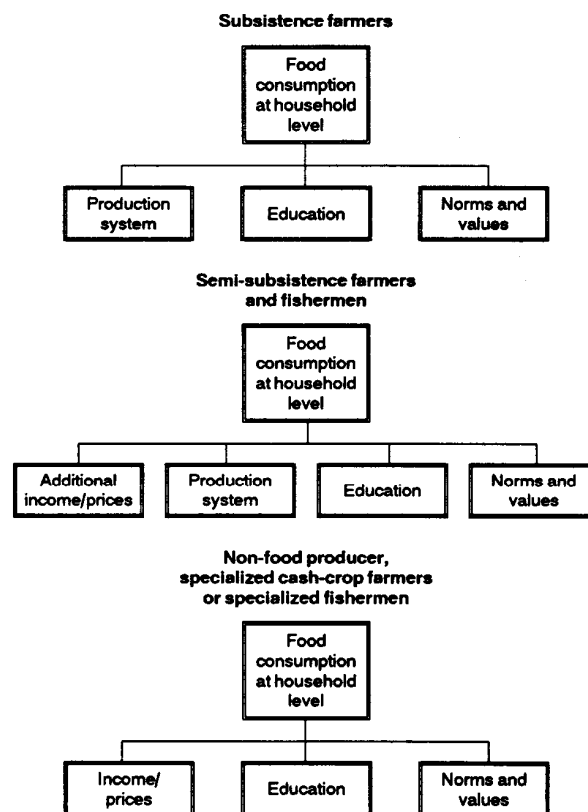


Figure 3 Factors contributing to food consumption at the household level among subsistence farmers, semi-subsistence farmers and fishermen, and non-food producers or specialized cash crop farmers.

However, the example of rural households in East Lombok which consume less daily of the prestigious maize and cassava, indicates that income increases would still be used for purchasing rice as a main staple.

In general, in rural areas food producers tend to use their own products as a source for their daily diet. This may lead to the consumption of a daily diet containing only a limited number of foodstuffs. Food consumption of non-food producers with higher income differs since they eat:

- more livestock-originated food sources,
- more vegetables and fruits,
- more processed food,
- a higher diversify of foodstuffs.

Causes and consequences of changing agricultural production systems

The food consumption behavior of non-food producers with higher income is of substantial consequence to future food production and import. Increasing income and a decreasing proportion of the population economically active in the agricultural sector, in general, including subsistence farmers, will lead to changes in food habits which will in turn create implications for food production.

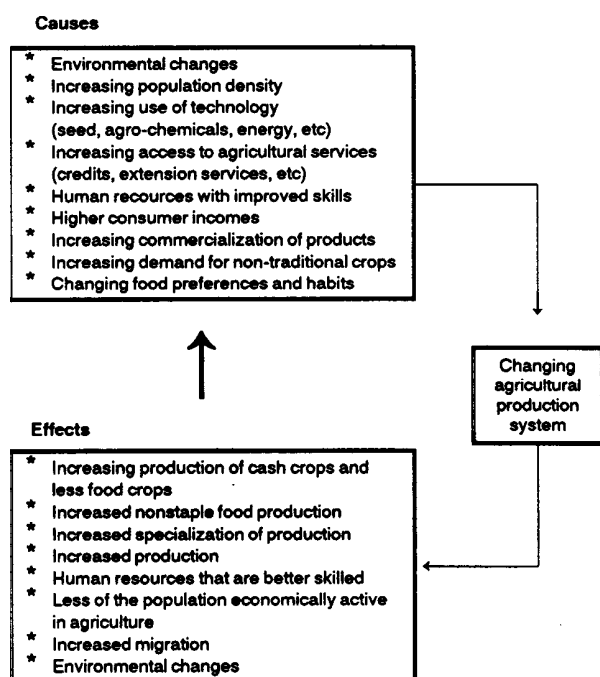


Figure 4 Causes and effects of changing agricultural production systems.

Southeast Asian agriculture, as in other parts of the world, is characterized by a period of transition. Factors such as environmental alterations, increased population density and new technologies contribute to this transition of agricultural production systems (Figure 4). Furthermore, changing food habits will trigger a more diversified demand for agricultural products. A consequence of a general increase in agricultural production with a greater degree of specialization will be the employment of more highly skilled human resources. This will lead to fewer job opportunities for the rural population. In the future, unskilled and landless labourers may migrate in increasing numbers to urban centers and change from food producers into purely consumers.

Some of the described effects of the changes in agricultural production systems become the causes of further changes which accelerate this process. This enormous transformation has macro-economic consequences as well as consequences for the nutritional situation of the population.

Table 6 shows the average annual production growth rate of selected Southeast Asian countries during the last decade. As in the previous example, food purchasing is influenced by rising gross domestic product (GDP) and declining dependency on home food production. Both factors contribute strongly to an increased consumption of food of animal origin which is translated macro-economically into a disproportional increase of livestock production.

Table 6 GNP, gross domestic product growth rate and average annual production growth rate between the years 1979 and 1989.

	GNP*	GDP GR	Rice	All crops	Horti- Livestock culture	
Indonesia	500	5.3	4.5	4.5	5.0	8.0
Malaysia	2,160	4.9	-1.9	4.3	1.1	10.5
Philippines	710	0.7	1.9	0.8	-0.4	1.5
Thailand	1,220	7.0	2.2	2.9	1.7	3.5

Source: World Bank, World Development Report, 1991; FAO, Agricultural Production Yearbook, 1991.

* US\$ per capita, 1989.

In Indonesia rice production increased at the same rate as all other crops together. This confirms the findings of the food frequency surveys, that macro-economically there are still wide consumer layers which utilize increasing family incomes to purchase rice. However, non-staple production is increasing as well in Indonesia. Agricultural food production in richer countries, such as Malaysia, shows remarkable growth rates, mainly in livestock production.

Nutritional status

As mentioned earlier, the nutritional status of a given population depends not only on the food availability but also on the health, living conditions, and education level of that population. FAO (1975) stated: "The causes of inadequate nutrition are many and closely interrelated, including ecological, sanitary and cultural constraints, but the principal cause is poverty."

Nutritional status reflects quite well the basic quality of life of the population. In cases of chronic inadequate food intake, both of quantity and quality, children reduce their bodily growth. Therefore, age-related body height can be used as an indicator for basic needs coverage in a community, and a low body weight-height relationship indicates acute malnutrition. Table 7 shows the nutritional status of children in several parts of Indonesia where there are GTZ-supported projects. The data show that the best situation is found in Java. The worst situation is found in the eastern part of Indonesia. This disparity has been recognized by the Indonesian government and therefore eastern Indonesia receives priority in national planning policy.

Table 7 Nutritional status indicators of children (< 5 years old) according to occupation of household head.

Occupation of father	Chronic malnutrition* (%)	Acute malnutrition** (%)
West Sumatra (1991)	49	12.9
Farmer	40	12.1
Fisherman	59	21.7
Unskilled labourer	38	15.4
Civil servant	42	13.0
East Lombok (1990)	51	9.8
Farmer	57	9.7
Fisherman	49	12.3
		11.0
Flores (1989)	50	12.3
West Kalimantan (1991)	47	7.6
East Java (1992)	38	

* Stunted children % below 2 standard deviations of the mean of height related to age, according to the National Child Health Survey reference population.

** Wasted children % below 2 standard deviations of the mean of weight related to age, according to the National Child Health Survey reference population.

Data from West Sumatra show that, in rural areas, food producers such as farmers and fishermen are still slightly more affected by poverty than are non-food producers, unskilled labourers and civil servants. However, despite the fact that civil servants have consumption patterns with greater diversification, there is no special positive effect on nutritional status of their children compared to children of farmers and unskilled labourers. This may be caused by the fact that the general living environment has a high density of disease-causing agents which negatively effect the nutritional status, eg. gastro-intestinal parasites.

The nutritional situation of Indonesia has substantially improved during the last decade. The data presented show that the nutritional situation and the developmental stage of the rural population still differ according to location within Indonesia. This difference is strongly influenced by the food habits of the local population. The education and economic situations, next to social values, influence the demand for foodstuffs. Nutritional status, as an indicator of basic needs coverage, correlates well with the different patterns of food consumption.

Changes in Food Consumption in Sri Lanka with Special Reference to Livestock Products and Selected Subsidiary Food Crops

G.A.C. De Silva*

Introduction

Rice is the most important food crop of Sri Lanka. The achievement of self-sufficiency in rice has been the national goal of many successive governments. Food crops other than rice, mainly the coarse grains, pulses, roots and tubers, are commonly called the subsidiary food crops, other field crops, upland crops or CGPRT crops. Although subsidiary food crops have not received the same pre-eminence as rice, development of these crops is important as they provide food for human consumption and raw materials for the livestock feed industry.

It is generally accepted that the consumption of economically high value foods, such as livestock products, and certain pulses and tubers, increases with increase of income. In such a situation, the increase in demand for livestock products creates an additional, derived demand for those subsidiary food crops which can be used as feed raw materials.

This paper analyzes the economic situation of Sri Lanka with respect to national income and changes in food consumption. The relationship between per capita income and changes in food consumption is

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presented using simple statistical indicators. The analysis is used to show the change in demand for livestock products and certain subsidiary food crops.

Background

Sri Lanka has a land area of 6.56 million hectares and a population of 17.2 million (1991). There are three distinct physiographic regions in the country, namely, (i) the lowland penepplain within the elevation range of 0 to 305 m above sea level, (ii) a highly dissected middle penepplain rising up to 915 m and, (iii) the upland penepplain above 915 m and rising to over 2,000 meters. The climate is characterized by low variations of temperature and highly variable rainfall. The mean temperature ranges from 70° to 90° F. The annual rainfall follows a distinctly bimodal distribution with major and minor monsoonal rainy seasons, locally called the maha and yala seasons. The maha season or the major season, is the result of north-east monsoon, occurring during November to January. The yala season, or the minor season is the April to August period, receiving rains from the south-west monsoon.

Variations in the distribution of rainfall due to topography of the country create three distinct agro-climatic zones. The wet zone comprising about 1.53 million ha, or approximately 25 percent of the land area, receives an annual rainfall of 190 to 500 cm. The rest of the country, approximately 75 percent of the land area, is divided into dry and intermediate zones. The dry zone covers 4.17 million ha and receives about 89 to 190 cm of annual rainfall. The intermediate zone is the transition area between the dry and wet zones, and covers 0.85 million ha. Since 75 percent of the country falls within the dry and intermediate zones, the need for surface water storage for irrigation was recognized from the earliest times. There exists in this zone a large number of reservoirs for surface irrigation, almost all of which were constructed during historical periods and rehabilitated in the recent past. Lately, several large scale river diversification schemes were also initiated by the government.

Economic performance

Sri Lanka is primarily an agricultural country with 31 percent of total land area and 43 percent of total employment involved in the agricultural sector. Total agricultural production contributes 22.4 percent of the GDP (1991). Paddy production contributes 24 percent of the agricultural sector GDP, while tea, rubber and coconut, the major plantation crops, contribute about 21 percent.

The Sri Lankan economy of the 1950s and 1960s depended primarily on export-oriented commercial plantations of tea, rubber and coconut. In the rural subsistence sector, cultivation of paddy and subsidiary food crops was the major occupation. No significant manufacturing existed prior to 1950. Due to the Korean War rubber boom and subsequent good prices for tea, the Sri Lankan economy had a surplus balance of payments. However in subsequent years, the balance of payments deteriorated. To help overcome economic problems, the government established several agricultural projects and various industrial ventures under its direct patronage and supervision. New public corporations took over production of steel, cement, sugar, fertilizer, refined petroleum, plywood, leather, minerals and paper. Public sector economic intervention continued until 1977.

Transition to economic liberalization commenced in 1977. The government established many market oriented policies, some of which were the setting of realistic exchange rates, reducing foreign exchange controls, liberalizing trade, and privatizing industries.

From 1965 to 1977, the economy grew at an average annual rate of 4.0 percent. Aided by the open economic policies, it improved in 1978 to about 8 percent. During the early 1980s, the country managed to maintain favourable economic growth. However, due to ethnic conflicts in the north, civil disturbances elsewhere, and bad weather for three consecutive years, very low growth rates were recorded in the 1987-89 period. During 1987 and 1988 the per capita growth rate was negative (Table 1). However, as indicated by high GNP, the economy has recovered in recent years.

Table 1 Composition and growth rates of GNP, 1982-1991.

	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
GNP (Current SRs Billion)	92.7	110.6	136.6	144.9	159.8	173.3	198.2	223.3	284.5	331.7
Growth rate	19.4	19.3	23.5	6.0	10.3	8.5	14.3	12.1	27.9	16.9
GNP (Constant SRs Billion)	92.7	96.4	101.4	106.7	114.2	115.9	116.2	118.8	126.7	132.1
Growth rate	4.9	4.0	5.1	5.2	7.0	1.5	0.3	2.3	6.6	4.7
Per Capita GNP (Current '000 SRs)	6.1	7.2	8.7	9.2	10.0	10.6	12.0	13.2	16.7	19.2
Growth rate	17.9	17.6	22.0	4.5	8.4	6.9	12.8	10.7	26.5	15.2
Per Capita GNP (Constant '000 SRs)	6.1	6.2	6.5	6.7	7.09	7.08	7.0	7.7	7.4	7.7
Growth rate	3.5	2.5	3.9	3.7	5.2	-0.05	-1.1	0.9	5.4	3.2

Production and consumption trends

One of the objectives of this paper is to examine the trends of production and consumption of upland crops. Trends of consumption of livestock products are also considered to get a composite picture of the economic growth indicators and the pattern of food consumption. However, such an analysis faces a fundamental difficulty of obtaining reliable data. Past development of the agricultural sector in Sri Lanka was heavily oriented towards increasing rice production. As noted earlier, rice is a major contributor to agricultural GDP. Consequently, the historical data collection system was geared more to obtaining accurate data on rice production. Livestock production, comprising the rearing of cattle, swine and poultry, is not the major occupation of farmers, nor is cultivation of subsidiary food crops. In addition, unlike the case of paddy, the extent, location and intensity of cultivation of subsidiary food crops vary considerably and continuously.

The Central Bank Report (1991) states: "The majority of the minor food crops are cultivated in home gardens and in small scattered plots under rainfed conditions. As a result, the production of these crops is highly dependent on the vagaries of weather. Therefore, the collection of reliable data on the extent and the production of these crops is difficult. Hence the performance of minor food crops is based on highly tentative estimates."

Livestock sector

It is commonly believed that there is an increase in consumption of livestock products with increase in income. This section analyzes the present situation with respect to livestock production and consumption, within the constraint of limited data.

Table 2 Livestock populations (million), 1981-1990.

	1981	1983	1985	1987	1989	1990
Cattle	1.72	1.69	1.78	1.80	1.82	1.77
Poultry	6.29	6.57	7.12	8.61	8.83	8.79

Source: Department of Census and Statistics.

Table 2 shows the population trends of cattle and poultry for recent years. It is clear that cattle numbers have remained more or less unchanged. In contrast, the poultry industry in Sri Lanka has been expanding. Data on livestock feed production (Table 3) indicate that the livestock sector is moving towards more scientific feeding principles. Table 3 also indicates the demand for feed raw materials, including maize. The data show a growth in livestock feed production; however, annual production does not show a smooth trend.

Table 3 Livestock feed production ('000 t), 1982-1990.

	1982	1983	1984	1987	1989	1990
Livestock feed	67.7	68.2	56.6	86.8	52.8	156.3

Source: Department of Census and Statistics.

Per capita availability of livestock products shows an increase in consumption of meat and eggs (Table 4). The per capita meat consumption of 1.18 kg/yr in the early 1980s has increased to over 2 kg in the early 1990s. For the same period, per capita egg consumption increased from 2 kg to over 3.5 kg. Liquid milk consumption data are not quite complete for later years. In addition, much of the milk production is not handled by state agencies so accurate estimates are not available. Nevertheless, available data suggest that milk consumption is increasing.

Consumption vs time regression analysis shows that per capita meat consumption increases by about 0.14 kg per year ($R^2 = 0.7$), and egg consumption by 0.15 kg ($R^2 = 0.78$). Solid milk consumption also increases by 0.16 kg ($R^2 = 0.64$).

Table 4 Per capita availability of livestock products (kg/yr), 1981-1990.

Product	1981	1983	1985	1987	1989	1990
Meat	1.18	1.19	1.57	2.37	2.32	2.20
Eggs	2.08	2.05	2.21	2.77	2.82	3.59
Liquid milk	15.32	15.40	17.25	12.34	9.28	12.03
Solid milk	1.37	2.22	1.86	2.58	3.22	2.26

Source: Department of Census and Statistics.

To investigate the relationship between rising per capita income and consumption of livestock products, simple correlation coefficients were estimated (Table 5). Increases in consumption of meat and eggs show very high positive correlation ($r = 0.9$ and 0.8) with the increase in income. Solid milk consumption also shows a high positive correlation ($r = 0.69$).

Table 5 Correlation between rising per capita income and food consumption, 1981 to 1990.

Item	Correlation Coefficient
Meat	0.9
Eggs	0.83
Milk*	0.69
Potatoes	0.35
Mungbean	0.90
Other Pulses	-0.06
Cassava	-0.77
Other Yams	-0.93

* For solid milk powder only.

Table 6 shows the income elasticities of demand for three selected income classes. Of the livestock products, elasticities for only poultry could be included. It shows that poultry is a 'normal' commodity and income inelastic. When income increases, the demand for poultry increases. The rate of change in demand due to change in income increases as one moves up from one income class to another, up to about the middle of the population income distribution. At high income classes, the 'income effect' on food consumption is less, a typical food - income relationship.

Table 6 Income elasticities for selected food groups.

Income Class (in 1987 SRs*)	Rice	Wheat	Pulses	Cassava	Poultry
Lowest (SRs <2,499)	0.314	0.546	0.302	0.557	0.368
Middle (SRs 5,000-7,399)	0.406	0.534	0.463	0.198	0.426
Highest (SRs >8,600)	0.160	0.33	0.289	0.117	0.364

Source: Ranaweera and Samarasinghe, 1991. Incomes were divided into 5 classes, of which only 3 are included in this table. US\$ 1 = 29.5 SRs (1987).

Food crop sector

The area and production statistics of selected subsidiary food crops are given Tables 7 and 8. The area and production of high value crops, such as potato and mungbean, have increased over time. In the roots and tuber group, potato is the most profitable crop, with no close competitor. Mungbean is also one of the favorite crops in the pulse group. Per capita availability of potato and mungbean is shown in Table 9. Both these crops depict trends of increasing per capita availability.

A simple relationship between change in income and consumption was estimated using correlation coefficients, which show a positive correlation between increasing per capita incomes and consumption of potato and mungbeans (Table 5).

Income elasticities for pulses are presented in Table 6. Pulses show an income elasticity pattern similar to poultry consumption. Pulses are income inelastic, and the demand changes with change in income. The rate of change increases up to about the middle income class of the population.

Table 7 Production statistics of potato and mungbean, 1980-1990.

Year	Potato			Mungbean		
	Area ('000 ha)	Production ('000 t)	Yield (t/ha)	Area ('000 ha)	Production ('000 t)	Yield (t/ha)
1980	5.2	76.8	14.7	14.2	12.9	0.91
1982	5.5	64.7	11.8	20.6	18.4	0.89
1984	7.9	98.4	12.4	29.5	17.5	0.59
1986	7.9	108.1	13.7	24.4	17.3	0.71
1988	6.6	78.2	11.8	33.4	23.1	0.61
1990	7.7	86.3	11.2	38.1	30.7	0.81

The area and production statistics for maize, cassava and sweet potato show varying situations. The production of sweet potatoes is on the decline. Cassava production fluctuates, with a decline in recent years, while maize production shows an increase over time. It should be noted that the data are more reliable for potatoes and mungbean than for other crops, due to the distinctive nature of their cultivation. Cassava and sweet potato are often grown in small fields in home gardens and maize in remote areas, limiting the accuracy of estimates of area and production.

The income - per capita consumption correlations of cassava and yams show a strong negative correlation ($r = -0.77, -0.93$), indicating that the consumption of these food items declines as population income rises. However it should be noted that there is potential for industrial use of cassava as raw material for livestock feed and other products. The income elasticities for cassava, shown in Table 6, confirm this observation. The income elasticities decline with increasing level of

population income class. The rate of change in demand is considerably smaller in the upper income classes of the population.

Economic aspects of production of subsidiary food crops show very distinctive characteristics. In coarse grains production, the largest factor contributing to the cost, often over 75 percent, is labour. These crops are not necessarily labour intensive; the high percentage is often simply due to very low expenditure on other production costs such as fertilizers and agro-chemicals. Of total labour use, the majority is family labour. If the cost of family labour is not included, the cost of production of coarse grains is much lower. There are many factors contributing to this low input - low yield situation, the most important among them being low market price. Low market price results from difficulty of collecting small amounts of produce from many scattered places, heterogeneous quality, high transport costs, etc. However, in the case of production of pulses and potatoes, the situation is different as they command a better price.

Table 9 Per capita availability of subsidiary foods (kg/yr), 1981-1990.

Item	1981	1983	1985	1987	1989	1990
Potato	3.18	4.24	3.98	3.45	3.50	4.44
Mungbean	0.59	0.97	1.05	0.98	1.15	1.52
Other Pulses	3.39	5.01	4.19	4.36	4.03	4.21
Cassava	24.57	32.79	25.62	18.29	17.35	15.51
Other Yams	7.41	5.33	5.19	3.44	3.58	3.15

Source: Department of Census and Statistics.

Table 8 Production statistics of maize, cassava and sweet potato, 1980-1990.

Year	Maize			Cassava			Sweet Potato		
	Area ('000 ha)	Production ('000 t)	Yield (t/ha)	Area ('000 ha)	Production ('000 t)	Yield (t/ha)	Area ('000 ha)	Production ('000 t)	Yield (t/ha)
1980	24.4	31.4	1.29	28.4	370.3	13.0	6.5	66.8	10.5
1982	34.1	38.6	1.13	50.9	520.5	9.8	9.5	91.8	9.6
1984	45.4	39.1	0.86	38.3	476.7	12.4	9.5	102.0	10.6
1986	36.3	40.6	1.12	27.6	503.1	18.2	6.3	61.7	0.7
1988	50.4	70.5	1.40	31.8	489.2	15.3	7.4	62.1	8.3
1990	47.9	54.7	1.41	20.9	251.3	11.9	6.2	51.8	8.3

Summary

Over the past years, the Sri Lankan economy has shown an increase in per capita income. During this period, there has also been an increase in per capita consumption of meat, eggs, and milk. Simple correlation statistics, time trends and income elasticities, all indicate a relationship between increasing income and increase in consumption of livestock products. The increase in demand for livestock products creates a derived demand for

those subsidiary food crops that can be used as raw materials for feed manufacture, especially maize and other pulses. The subsidiary foods are also used for direct human consumption. The statistical indicators mentioned above suggest that there is a positive relationship between increasing incomes and consumption of the better value pulses and yams, such as mungbean and potatoes. The per capita consumption of these crops has also increased over the years.

CGPRT Centre News and Activities

Eleventh Annual Meeting of the Technical Advisory Committee

November 30 - December 2, 1993

In late 1993 the members of the Technical Advisory Committee (TAC), Dr. Euan Fleming, Dr. Jean Chataigner, Dr. Ibrahim Manwan, Dr. Kunio Takase, Dr. W.G. Wolters, Dr. Boonjit Titapiwatanakun, Dr. Moeljono Partosoedarso, and Mr. J.B. Orsini met to discuss the Centre's activities in 1993 and its planned activities for 1994. Dr. Kunio Takase, the Chairman of the tenth TAC opened the meeting and observed that the Centre has reached a crucial moment in its existence and that opportunity exists for the Centre to respond to rapid developments in world trade and agriculture. Dr. Jean Chataigner and Dr. Boonjit Titapiwatanakun were elected as Chairmen, Dr. Euan Fleming was elected as Rapporteur.

The TAC discussed various topics including sustainability in agriculture and socio-economic issues specific to upland agriculture. It was noted that a vast amount of information is already available in Asia but inter-disciplinary work is needed to effectively use the available information in specific settings, while searching for possibilities of generalizing conclusions and findings.

The TAC deliberated on the changes taking place in global attention and priorities. Environment and sustainability have become major concerns. In previous decades investment in agriculture was usually seen as having favourable distribution effects; however, the "traditional" notion of equitable development has lost much of its attraction to

donors. In Asia the relative importance of the agriculture sector is decreasing, but agriculture will remain the major employer in the foreseeable future. The TAC concluded that the role of CGPRT crops will also remain important. Both equity and sustainability are strongly connected in agriculture. Together with the new options in international trade, sufficient avenues are available to generate project activities.

Twelfth Session of the Governing Board

December 8-10, 1993

The twelfth session of the Governing Board of the Centre took place in Bogor from 8 to 10 December 1993. The meeting was attended by the representatives of Bangladesh, France, Indonesia, Japan, Myanmar, Papua New Guinea, Philippines, Republic of Korea, Sri Lanka, Thailand and Viet Nam as members of the Board. The Executive Secretary of the Economic and Social Commission for Asia and the Pacific attended the opening of the Session. Representatives from United Nations Development Programme (UN DP), the Asian Development Bank (ADB), the Commission of the European Union, and the Center for International Forestry Research (CIFOR) attended the opening session. Representatives from the Centre de Cooperation Internationale en Recherche Agronomique pour le Développement (CIRAD), and the Food and Agriculture Organization (FAO) attended as observers. A representative of ESCAP also attended.

The Chairman of the eleventh session welcomed the Executive Secretary and the distinguished members and observers. He noted that in parts of the Asia Pacific region dynamic economic growth has induced a process of agricultural adjustment. He observed that the role of CGPRT crops in this process is important because these crops offer opportunities for income expansion based on growing feed, industrial and food demand. The Chairman expressed his pleasure with the finalization of the Centre's strategic plan and expressed his confidence that the resource constraints of the Centre would be overcome as the benefit of regional co-operation is being recognized by the national partners and international agencies.

The representative of Indonesia, the host country, expressed his pleasure in attending the twelfth session of the Board. He noted that economic growth is still accompanied by large income inequality and widespread poverty in rural areas. He pointed out that socio-economics as a discipline remains of vital importance in composing and directing agricultural planning, research planning and development programmes.

The Executive Secretary of the Economic and Social Commission of Asia and the Pacific (ESCAP) expressed his pleasure in addressing the twelfth session of the Board. He expressed his profound gratitude to the Government of Indonesia for continuing and expanding its support to the Centre. He conveyed his thanks for support received by the Centre from developing member countries, and various donors including the Netherlands, France, Republic of Korea and Japan. Their support enable the Centre to successfully accomplish its tasks. The Executive Secretary observed that the role of CGPRT crops is shifting from subsistence farming to commercial farming. He noted that limited land, increasing populations and marginal bio-physical conditions increasingly put pressure on resources used in the rural upland economies, and that CGPRT crops offer opportunities for income increase in rural areas.

The representatives of the Philippines and Thailand, Dr. William D. Dar and Dr. Supote Dechates, were elected as Chairman and Vice Chairman respectively. The Representative of Myanmar, Mr. Soe Lynn Han was elected as Rapporteur.

The Board expressed its appreciation for the expanding contributions from an increasing number

of countries. The Board approved the progress report of programme activities in 1993, the programme of work for 1994 and the budget for 1994.

Staff

At the turn of 1993/1994, 5 new staff joined the CGPRT Centre: Dr. Mansur Lande has taken up the position of leader of the Centre's Research and Development Programme. Mrs. Françoise Gerard and Ms. Isabelle Marty joined the Research and Development Programme as researchers. Mr. Chad Osborn and Mr. Terry van Dreumel joined the Centre's Human Resources Development (HRD) Programme and the Regional Statistical Database System (RSDS) project. The arrival of 5 new staff expand the capacity of the Centre's programmes and signify the commitment of donor agencies.

Dr. Mansur Lande has in the course of his career worked as a researcher and research manager/director in Sulawesi and Kalimantan, Indonesia. Dr. Mansur Lande obtained his Master in Agronomy from the University of Philippines, Los Banos and his PhD in Agronomy from the University of Arkansas, USA. The experience and agricultural knowledge of Mr. Mansur Lande are most valuable for the CGPRT Centre's inter-disciplinary programmes.

Mrs. Françoise Gerard obtained a Master in Economic Science at the University of Paris and obtained her PhD with distinction in Economic Science from University of Paris I, Pantheon-Sorbonne in 1991. Mrs. Gerard has extensively researched price formation, price stability and supply regulation.

Ms. Isabelle Marty obtained her degree as Ingenieur Agronome at the National Institute of Agronomy in Paris. Ms. Isabelle Marty has worked with CIRAD on the relation between agriculture and environment in African, Asian and Latin American settings.

Mr. Chad Osborn obtained a Master of Science degree in Agricultural Economics at the University of British Columbia, Canada. Mr. Osborn has experience in farm management and education, primarily in application programmes.

Mr. Terry van Dreumel obtained his Bachelor in Agriculture degree in 1992 at the University of Guelph, Ontario, Canada. Mr. van Dreumel has

experience in training in computer data management and in regional agricultural programmes.

With this substantial strengthening of the Centre's manpower, it can be expected that 1994 will be a busy and productive year for the Centre.

New Publications

CGPRT Crops in Viet Nam: A Statistical Profile, 1976-1990. Vu Ke Toai, Pham Tanh Binh, Maria F. Ferrari. Working Paper No. 14. 1993. 195 p. ISBN 979-8059-52-2. Price: US\$ 25.00; (US\$ 15.00 developing countries).

Priorities for Soybean Development in Asia. Proceedings of a Workshop Held in Bogor, Indonesia, December 3-6. 1991. CGPRT Centre, 1992. 400 p. ISBN 979-8059-51-4. Price US\$ 50.00; (US\$ 30.00 developing countries).

The completion of the statistical profile on Viet Nam proved to be difficult task. Experience gained in the course of data completion has proven that if one searches sufficiently long and deep, a surprising amount of data can be found. Data sets by crop, production and area are complete at national and regional levels. Although, some gaps still exist in district level data, the present volume contains a wealth of useful data.

The volume *Priorities for Soybean Development in Asia* contains a large fund of information from researchers throughout Asia on many aspects of soybean production and use. The volume reflects Indonesian and Thailand experience in detail. It contains multi-year on-farm research, multi-location trials and socio-economic work conducted in the framework of the Soybean Yield Gap Analysis Project (SYGAP) sponsored by the EC and CIRAD. It is well known that production and use of soybean have constituted a growth market in Asia since the early 1980s. This volume reflects the substantial progress made in economic and agronomic research on soybean in the early 1990s.

INTERNATIONAL COURSES ON FOOD PROCESSING

The International Agricultural Centre offers two international in-service training courses on food processing:

1. Quality Assurance and Marketing in Food Processing Enterprises,
2. Food Fortification for the Elimination of Micronutrient Malnutrition.

The two programs are partly integrated. Both joint and separate sessions are offered.

Quality Assurance and Marketing in Food Processing Enterprises

(Aug. 14 - Nov. 19, 1994)

The program is organized in collaboration with the Wageningen Agricultural University, the University of Utrecht, institutes for Higher Agricultural Education and Applied Scientific Research, the International Institute for Management and various food processing industries.

The program is intended for professionals from business advisory, training and support institutions and those who establish and operate small and medium scale enterprises.

The program will assist participants to identify and solve problems in food processing by focusing on selection of technology, quality assurance and marketing.

Food Fortification for the Elimination of Micronutrient Malnutrition

(Aug. 14 - Nov. 12, 1994)

This program is organized in co-operation with the Program Against Micronutrient Malnutrition (PAMM), Atlanta, USA. PAMM is a global network that is working towards the elimination of micronutrient malnutrition by the year 2000.

The program is open to government employees and consultants with an advisory role to the food fortification industry and employees in charge of food fortification processing.

The program provides information on fortification technology and processes, appropriate food vehicles that may be fortified, and fortificants that convey micronutrients.

Deadline for application is May 1, 1994

For more information please contact the Director

International Agricultural Centre
P.O. Box 88, 6700 AB Wageningen,
the Netherlands

Telegram : INTAS
Telephone : (0)8370 - 90111
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Second International Scientific Meeting of the Cassava Biotechnology Network CBN II

22-26 August 1994, Bogor, Indonesia. Organized by CBN, with assistance of from the Agency for Agricultural Research and Development/Central Research Institute for Food Crops, Indonesia, and Centro Internacional de Agricultura Tropical (CIAT), Colombia. Participants: scientists involved in cassava biotechnology and related research from developed and developing countries, international agricultural research centers, and national programs in Latin America, Africa, and Asia. Sessions on biotechnological tools for cassava research (molecular markers, regeneration and genetic transformation), and applications of biotechnology to solve biotic and abiotic constraints on cassava and develop new processes for adding value via new products and uses for this high-yielding crop.

Abstracts must reach CBN by 1 May 1994.

Contact: Dr. A.M. Thro, CBN Coordinator,
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Agriculture In Vanuatu: A Historical Review by Barry Weightman, published by The British Friends of Vanuatu

Agriculture in Vanuatu deals with the evolution of agriculture in Vanuatu, formerly the British-French Condominium of the New Hebrides, from the period of pre- European contact to the present time. It describes how agriculture has been changed and fashioned by the progressive introduction of new crops and livestock, by the politics and settlement policies of the colonial powers, by the shifting fortunes of export crops, and by the increasing participation of former subsistence farmers in cash crop production. Successive chapters cover in a wealth of detail farming systems and food production, traditional and other subsistence crops (including yam, taro, sweet potato, manioc) coconut, other cash crops (including coffee and cocoa), cattle, pigs and poultry. **Agriculture in Vanuatu** provides perceptive judgements and a definitive source of technical information for all those concerned with agriculture and its development in Vanuatu, whether as agriculturalists, development planners and administrators, or academics. But more than this, because of its historical perspective and the extent to which it draws both on current experience and on the records of the early missionaries and planters, the book should appeal to all those with an interest in the culture and the economic and social development of Melanesia. Barry Weightman served in a number of senior agricultural posts in Vanuatu between 1968 and 1986 and has a unique knowledge of his subject; he writes with authority and with a lively sense of humour. The British Friends of Vanuatu gratefully acknowledge the support given by the Overseas Development Administration (ODA) of the British Government in the preparation and production of this book.

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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

In pursuit of its objectives, the Centre has three programmes which are mutually supportive:

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. Submissions should be limited to two to four double-spaced typewritten text. Two figures (graphs or tables) may accompany the article. Include only references cited. All articles are subject to editing to meet space limitations.

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

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