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The Current Status of Soybean Production in South Viet Nam

Tu-Bich-Thuy

Soybean producing areas in South Viet Nam

In South Viet Nam the two main soybean producing areas lie in Dong Nai Province (eastern South Viet Nam) and the Mekong River delta.

Dong Nai Province

This area supplies one quarter of the national soybean crop. Tan Phu district, the highest producing region has the largest area under soybean followed by Thong Nhat and Xuan Loc districts. In 1988 the area planted to soybean was 16,092 ha. producing an average yield of 7.85 kg/ha. and a total production of approximately 12,642 tons (Table 1).

Table 1. Planted area production and yield of soybean in Tan Phu district

Year	Planted area (1000 ha)	Yield (Picul*/ha)	Production (1000 tons)
76	4,661	10,0	4,6
80	8,370	7,4	6,2
81	10,660	6,6	7,1
82	12,381	8,4	10,4
83	13,212	3,4	4,5
84	14,497	9,3	13,5
85	14,097	8,0	11,4
86	14,800	5,5	8,1
87	14,125	6,5	9,2
88	16,092	7,8	12,6
89	15,550	4,8	7,4
90	16,000	8,0	12,8

Source: Agricultural Statistics of Tan Phu District, Dong Nai Province

*1 Picul = 60 Kg.

Most soybean is grown in Yellow-Brown Basalt-derived Feralite soil with a fine topsoil and many surface rocks. There is a deep water-table which has an average pH value of 5. The wet season extends from May to November with an average annual rainfall of 1,500 mm. The rainfall is heavy in June, August and September decreasing quickly in October and November. Soybean farming is not mechanized.

The Mekong River Delta

The total area under soybean is about 20,000 ha and includes Tien Gian, Hau Giang, Dong Thap and Minh Hai provinces. This region produces about one third of the national crop.

Table 2. Planted area production and yield of soybean

Year		Viet Nam	Eastern South Viet Nam	Mekong river Delta
1986	Area	106,5	34,2	20,2
	Yield	8,0	6,7	14,7
	Production	84,7	22,9	29,7
1987	Area	117,2	28,1	21,2
	Yield	8,2	7,5	14,5
	Production	95,7	21,1	30,8
1988	Area	103,0	36,2	20,2
	Yield	8,3	5,5	11,3
	Production	85,3	20,2	22,6

Source: Agricultural Statistics of Food Crops Research Institute.

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The cultivated area in the Meking River delta uses two land types, upland and ricefield land. Ricefield land is usually farmed in a rice-rice-soybean rotation system (Table 2).

Technical aspects of soybean production

Tan Phu District: Dong Nai Province

The first crop is the April to late July summer-autumn crop and this is when the farmers, who depend entirely on rainfall, experience difficulties during sowing. A long period of drought following early rain can damage newly sown seed, necessitating resowing of the whole cultivation area as often as two or three times. Heavy rain during the harvest can reduce productivity as it promotes seed germination on the plants.

The second crop is the August to November autumn-winter crop. This is the main soybean crop of the year. Production is usually stable but a short wet season can decrease seed size.

Land preparation

The soil is generally not tilled because of the difficulties imposed by the presence of surface rocks. Weeds, rubbish and the remains of the preceding crop are removed before the farmers plant by inserting, 7 to 8 seeds in each hole which they pick in the surface. This process also loosens the soil. It often takes two man days to sow a hectare of land.

Fertilizer use

Few farmers in this district apply fertilizer to their soybean. The crop may obtain small amounts remaining unconsumed in the soil from that applied to the previous tobacco or maize crops. Inoculation with Rhizobium increased productivity to a limited extent (Table 3).

Table 3. Result of inoculation of soybean Nam Vang variety

Nam Vang variety	Yield (kg/ha)
- With inoculation	800
- Without inoculation	815

(Based on the scientific research material of University of Agriculture and Forestry – 1985)

Varieties

Only Nam Vang, a low yielding local variety with a low resistance to pests and diseases, is used.

Weeds

Weeds proliferate quickly, producing conditions suitable for the growth and concealment of pests and disease. Weeding is generally carried out two or three times during a cropping season.

Pests and disease

Few farmers practice pest and disease control. Chemical prevention is not used because of its high cost.

Cropping patterns

The following cropping patterns have long been established (Figure 1).

Mixed cropping with maize

Farmers alternate a few rows of soybean with a row of maize. The maize proportion is higher in the first crop than in the second.

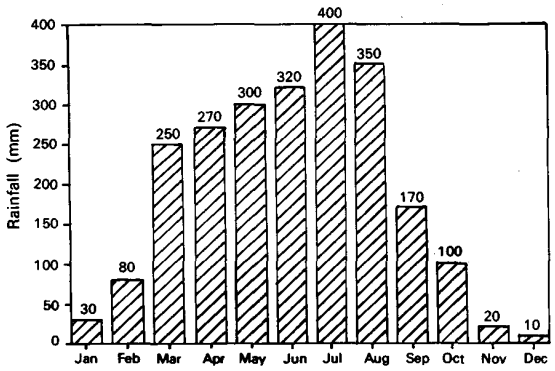
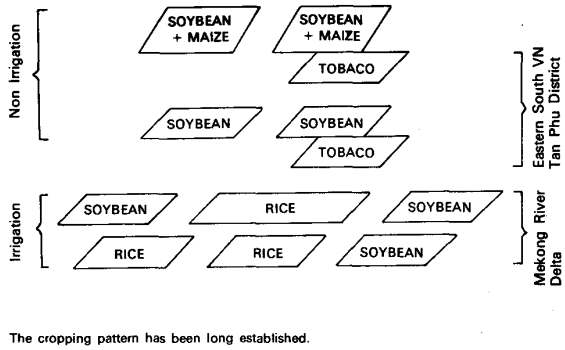


Figure 1a. Rainfall Distribution



The cropping pattern has been long established.

Figure 1b. General cropping patterns in South Viet Nam.

The soybean maize ratio is approximately 350,000-400,000: 30,000 plants/ha.

Editorial

Changing Food Consumption Patterns

Seiji Shindo,
Director
CGPRT Centre

In this issue of the Palawija News, there is an article reporting on the outcome of the seminar on "Changing Food Consumption: Its Effect on Production and Use of Upland Crops", recently conducted by the Centre in Sri Lanka.

Leaving the details to the article, I would try to draw a picture of my own by referring to relevant parts of the present reports.

Everywhere throughout the region, changes are taking place in food consumption. In some countries, "though the general food consumption patterns remained static, maize consumption has been changing steadily. Maize, once the staple food in upland areas, has been part of a continued shift out of inferior staples such as maize and root crops towards rice and wheat".

Livestock products represent an important feature of changes in some countries. For instance, in Sri Lanka, per capita meat consumption has increased from 1.18 kg in the early 80s to over 2 kg in the early 90s, eggs from 2 kg to 3.5 kg. The same trend has taken place in Thailand and the Republic of Korea, which has caused a decline of grain exports in Thailand and an increase in maize imports from about 2 million tons in the early 80s to 6 million tons in the early 90s in Korea.

If I am allowed to draw a bold conclusion, it could be summarized by saying that in the initial stages, the process of change starts with food grains considered inferior, such as maize and millet, moving to superior foods, such as rice and wheat. Rice has been and still in the food most favoured by the ordinary people. However as more superior foods like meat and eggs, oil, vegetables, fruits and processed foods are consumed, per capita direct food grain consumption starts to decline as observed in rice in the early 70s in Korea and more recently in Malaysia. This process has had a profound effect in Sri Lanka, that "increase in demand for livestock products creates a derived demand for subsidiary food crops that acan be used as raw materials for feed manufacture.

The process however, does not occur uniformly, but selectively among various foods and CGPRT crops. It is an evolutional process affected by various factors, not only by income growth but also by culture, tradition and preferences. The question then will raised-how can the production of CGPRT crops respond to these changes? If the outright promotion of non-rice crops does not work, how can the production of CGPRT crops, selectively and in a responsive manner, be encouraged? I envisage here a great role for government policies, fine-tuned on the basis of meaningful projections for individual crops and commodities.

Soybean before tobacco

Tobacco is planted in July-August before the end of the preceding crop. The seedlings are transplanted between the soybean rows in October and November.

Economic efficiency

For the experimental sites in Dong Nai province in 1990, the investment expenditure per hectare of soybean was VNd 1,149,000, the gross return was VNd 1,950,000 and the nett return was VNd 800,000 (Table 4).

The average per hectare production costs for farmers for the same year were VNd 540,000. The gross return was VNd 1,050,000 and the nett return was VNd 510,000 (Table 5).

Table 4. Cost of and Net return from soybean production by experimental results in Dong Nal Province.

- Seed 60 kgs x 1,500d/kg	= VNd	90,000
- Labour 110 man/day x 5,000d/man/day	= VNd	550,000
- Chemical 14 bottles x 12,000d/bottle	= VNd	168,000
- Gasoline 5 liter x 800d/liter	= VNd	4,000
- Fertilizer:		
N (Urea) 60 kgs x 1,000d/kg	= VNd	60,000
P (Super P) 15 kgs x 350d/kg	= VNd	52,000
K (Kcl) 70 kgs x 350d/kg	= VNd	24,500
$CaCo_3$ 400 kgs x 500d/kg	= VNd	200,000
Total	VNd	1,149,000
The total turnover from one hectare of Soybean (Yield) 1,300 kg x 1,500d/kg	= VNd	1,950,000
Net Return: 1,950,000 – 1,149,000	= VNd	800,000

* US$ 1 = VNd 55,000 (1990)

Table 5. Cost of and Net return from soybean production by farmers in Dong Nal Province.

- Seed 60 kgs x 1,500d/kg	= VNd	90,000
- Labour 90 man/day x 5,000d/man/day	= VNd	450,000
Total	VNd	540,000
The total turnover from one hectare of Soybean		
(Yield) 700 kg x 1,500d/kg	= VNd	1,050,000
Net Return: 1,050,000 – 540,000	= VNd	510,000
(Market price of the year 1990)		

The Mekong River Delta

Crops

The spring-summer rice-rice-soybean crop is the major crop of the year. Planting extends from February 15th to March 15th and the harvest from May 15th to June 15th.

Land preparation

The land is lightly tilled before simple drainage and irrigation ditches are constructed. Water is then applied to the fields to soften the soil before the seed is dibbled in rows. Every fifth or sixth row is left unplanted as a passage.

Fertilizer use

The farmers usually apply N at a rate of about 120 kgs/ha.

Varieties

As high-yielding varieties are preferred, farmers are prepared to try such new varieties as MTD 10, MTD 13, Al, A5 and B6.

Soybean management

Water is supplied to the fields by bailer or pump and then drained off.

Chemical pesticides and disease treatments (Sumicidine, D6, Azodine) are used when necessary.

Cropping pattern

A rotation of rice-rice-soybean is used whereby, following two crops of rice, some fields are sown with soybean.

Economic efficiency

The total investment expenditure per hectare of soybean for experimental sites in 1990 was VNd 1,836,500, the gross return was VNd 3,600,000 and the net return was VNd1,763,000 (Table 6).

Table 6. Cost of and Net return from soybean production by experimental results in the Mekong Delta.

- Seed: 60 kgs x 1,500d/kg	= VNd	90,000
- Tillage	= VNd	115,000
- Labour: 160 manday x 5,000d/manday	= VNd	800,000
- Chemicals: 22 bottles x 12,000d/bottle	= VNd	267,000
- Fertilizer:		
N (Urea) 100 kgs x 1,000d	= VNd	100,000
P (Super P) 200 kgs x 350d	= VNd	70,000
K (Kcl) 50 kgs x 350d/kg	= VNd	17,500
$CaCo_3$ 500 kgs x 500d/kg	= VNd	250,000
- Stable manure, husk ash 2 tons x 25,000d	= VNd	50,000
- Straw	= VNd	70,000
- Gasoline: 10 liters x 900d/liter	= VNd	9,000
Total	VNd	1,836,500
The total turnover from one hectare of Soybean		
(Yield) 5,500 kg x 1,500d/kg	= VNd	3,600,000
Net Return: 3,600,000 – 1,836,000	= VNd	1,763,000

The total per hectare costs for farmers in the same year were VNd 1,184,000. Their gross return was VNd 2,100,000 and their nett return VNd 916,000 (Table 7).

Table 6. Cost of and Net return from soybean production by experimental results in the Mekong Delta.

- Tillage	= VNd	115,000
- Seed: 100 kgs x 1,500d/kg	= VNd	150,000
- Labour: 100 manday x 5,000d/manday	= VNd	500,000
- Chemicals: 12 bottles x 12,000d/bottle	= VNd	144,000
- Fertilizer:		
N (Urea) 100 kgs x 1,000d	= VNd	100,000
P (Super P) 200 kgs x 350d	= VNd	70,000
K (Kcl) 300 kgs x 350d/kg	= VNd	105,000
Total	VNd	1,184,000
The total turnover from one hectare of Soybean		
(Yield) 1,400 kg x 1,500d/kg	= VNd	2,100,000
Net Return: 2,100,000 – 1,184,000	= VNd	916,000
(Market price 1990)		

The Mekong delta farmers received higher profits than their counterparts in eastern South Viet Nam because of their greater commitment to fertilizer use and pest and disease control and their generally superior cultivation techniques.

Soybean utilization in Viet Nam

Utilization as food

In Viet Nam 80% of the soybean crop is used to produce soybean curd, fermented soybean curd, soybean milk, soybean meal and small quantities of soybean oil. Although many factories in Ho Chi Minh City produce sesame, groundnut and coconut oils, soybean oil remains uncommon.

Utilization as food

Soybean glue is insoluble and is used in plywood manufacture. However it is not commonly used in Viet Nam.

Utilization as stock feed

The 20% of the soybean remaining after milk and oil extraction is used as highly nutritious stock feed.

Utilization as fertilizer

All parts of the soybean plant contain more protein, phosphorus and potassium than other organic fertilizers. However only about 20% of farmers use the harvested plant remnants for soil improvement.

Policies Necessary for the Development of Soybean Production in South Viet Nam

In 1990 the export price of a ton of soybean was US$ 240 (VNd 1,320,000) compared with a farm price of VNd 1,500,000. If the costs of transportation, storage and taxes are added, the export companies will incur large losses.

The price per kg of soybean at the market was VNd 2,000 (recorded on August 12th, 1990) (Table 4,5,6,7).

The Government's role in soybean production

From 1975 until 1983 the Government of Viet Nam encouraged soybean production on a national scale. A number of initiatives were employed.

As an extension exercise, new varieties were grown at some experimental sites using good cultivation procedures and improved technology, before their widespread distribution.

Farmers were supplied with fertilizer, pesticides and seed varieties free of charge, if they voluntarily agreed to employ recommended farming techniques.

Farmers were provided with seed, fertilizer and pesticide on the undertaking that they return a proportion of their harvest to the Government. The number of participants in this scheme was low.

Since 1984 the competitiveness of such crops as tea and coffee has increased at the expense of soybean. At present, farmers can buy fertilizer and pesticides easily. Some districts have their own teams for pest and disease control or crop protection.

Policies considered necessary for the development of soybean production in South Viet Nam include:

i. A reasonable farm-gate price (Figure 1).

ii. Government loans to allow farmers to invest in soybean production.

iii. Government policies and measures to protect farmers from world price fluctuations and to impose price stabilization by means of contract farming.

iv. Appropriate pest and disease management to reduce production costs.

v. The establishment of a national scale network of soybean varieties to ensure a stable supply of high quality seed, because it is on the basis of varieties that rapid productivity improvements can be made.

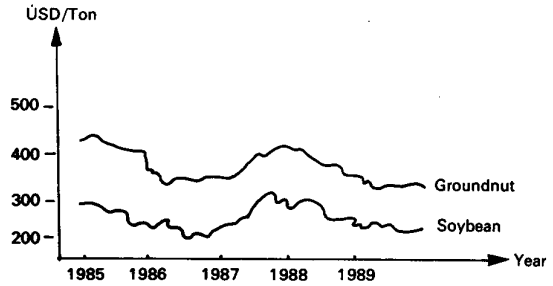


Figure 1. Graph of monthly average soybean and groundnut price in Viet Nam (1985-1989)
Source: From Agricultural Statistic of Food Crops Research Istitute.

Production constraints

During recent years soybean productivity has decreased because of:

i. An unattractive farm-gate price. Production costs have been high compared with the farm-gate price (Figure 1).

ii. Inaccurate identification of planting time for the first crop in Dong Nai. A difference of about two weeks in commencement times for planting may influence productivity by up to 50% (Table 8).

iii. Lack of fertilizer (Tables 9,10,11).

iv. Poor pest and disease control. Pest and disease levels are high. Control costs are increasing as resistance to control measures increases (Table 9,10).

v. Competition among crops in the production system which meant priority for labour and management was given to the main crops. In Dong Nai priority was given to tobacco and in the Mekong River delta to rice. Soybean was overlooked.

vi. The dependence of most soybean farmers on local merchants to provide production inputs at interest rates higher than those of Government credit institutions.

vii. Ineffective Government monitoring in intensive cultivation areas.

Research activities conducted to date by U.A.F. **(Based on scientific research results obtained by a group of professors of U.A.F. from 1978-1988).**

Experimental results show that:

1. The optimum planting density for the local varieties Nam Vang and HNLD is 400,000 plants/ha with an inter-row distance of 50 cm, an inter-hole distance of 20 cm and 4 plants per hole.

2. The recommended planting procedure for the first crop in Dong Nai is

   i. Fertilizer formula: 20 N – 60 $P_2 0_5$ – 60 $K_2 0$

   ii. Planting procedures: The first planting should be conducted in six stages from May 20th to August 1st, with between stage intervals of 15 days. This system applies to the 2 varieties, DH4 and Palmetto, used in this area.

Concluding remarks

The most suitable planting time for both DH4 and MTD 10 is between July 15th and August 1st. This results in low pest infestation levels and good yields.

Planting of DH4 and Palmetto from May 20th to June 15th resulted in immature plants producing a reduced or non-yield (Table 8).

The application of Rhizobium increases productivity by 20%.

The Application of Furadan 3G by 25 kg/ha on the 8th day after planting can destroy bean flies. The application of Sumicidine from the 45th day to the 55th day after planting can control the attack of pod borers (Tables 9,10).

New varieties can be produced and selected by mutation and crossing methods. Use of varieties Al and A5, mutants of the variety Santamaria (Brazilian origin), increased productivity to 2-3 tons/ha. These varieties have strong stems supporting tall (70 cm) plants with many branches. They produce yellow seeds with black seed scars, and have a low rate of infection. They are suitable for the second crop in Dong Nai having a growing period of between 85 and 90 days.

Varieties B5, B6, and B7 are crosses between A1 and such rapid maturing varieties as DH4, Nhat 17a and Tau Xi. They are characterized by high productivity, a low infection rate and a short growing period.

Varieties Al and A5 have been trial grown on 10-20 ha plots (Tables 9,10).

Table 8. The influence of planting date for the first crop on DH4 and Palmetto planted on the Red-Brown Basalt of Eastern South Viet Nam.

Planting date	Variety	Maturity (days)	Plant height (cm)	Grain yield (kg/ha)
20-5	Palmetto	-	58,7	-
	DH4	-	57,2	-
02-6	Palmetto	105	27,9	28
	DH4	-	25,9	-
15-6	Palmetto	-	22,4	-
	DH4	95	17,5	217
02-7	Palmetto	96	24,7	417
	DH4	90	18,8	450
15-7	Palmetto	90	37,7	1050
	DH4	85	27,6	1192
01-8	Palmetto	85	43,1	1200
	DH4	80	31,2	1400

Table 9. With correct rate of fertilizer, irrigation and careful control of pests and diseases in the Mekong River Delta (10 ha).

Treatment Variety	No. of full pods per plant	No. of full seeds per plant	Weight of 100 seeds (gr)	Yield obtained (kg/ha)	Yield Rank
Al	53.5	122	14.3	2,760	1
A5	40.5	92	14.0	2,100	2

Table 10. Yield and the constituents of yield in Eastern South Viet Nam

Technology Variety	Treatment	No. of full pods per plant	No. of full seeds per plant	Weight of 100 seeds (gr)	Yield obtained (kg/ha)	Yield Rank
	1	59,8	109,3	10,2	1784	1
Al	2	44.8	83,5	10.0	1510	3
	1	29,6	67,5	10,9	1596	2
A5	2	28,5	62,3	10.7	1404	4

1). Farming in accordance with the procedure: fertilizing and spraying pesticides periodically.

2). Farming in the usual manner of farmer: no fertilizer use and spraying pesticides only once at the beginning of the pod forming stage.

Future research activities of the U.A.F. (Table 11)

Observations indicate that the most appropriate study site for increasing soybean production in South Viet Nam is Tan Phu district, Dong Nai province (Eastern South Viet Nam) as it is the main soybean producing region of Viet Nam and has the basic advantages of:

i. climate and soil conditions suitable for soybean production.

ii. farmers experienced in growing soybean.

iii. low labour, fertilizer and pesticide requirements for soybean cultivation in this area.

Given increased Government attention and reasonable farm prices, soybean has the potential to become the major crop of the area.

Future research subjects (based on the variety factor) could be:

The selection and determination of two suitable varieties for the first and second crop in Dong Nai, and their cultivation technologies. Their economic effectiveness as compared to the local variety, Nam Vang could be evaluated over a large cultivation area (Tu Bich Thuy and As sistants).

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The Scientific research material of University of Agriculture and Forestry 1978 - 1985.

Agricultural Statictics of Tan Phu district Dong Nai province - 1990.

Agricultural Statistics of Food Crops Research Institute - 1990.

Table 11. The influence of Urea application on the yield of DH4

Treatment Formula	Seeds (gr/plant)	Biological yield (gr/plant)	Economic Coefficient	Yield		Weight of 100 seeds (gr)	% In Comparison with point of control
				Theoretical (kg/ha)	Actual (kg/ha)		
ON	6,90	27,60	0,25	1,725	1,200	18,7	100,0
ION	8,05	29,32	0,27	2,012	1,600	19,6	116,6
20N	8,05	30,21	0,28	2,125	1,802	20,0	123,1
40N	9,70	30,60	0,32	2,425	2,148	21,0	140,5

(Grown on lant treated with 5 tons of lime and 100 kgs P_2O_5 and 100 kgs K_2O/ha).

Attention is beginning to swing towards the less well-researched crops such as pulses and roots and tubers. ***Palawija News*** would welcome short papers on these crops for the 1993 editions.

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Indonesia

Analysis of the Soybean Yield Gap in Sri Lanka

H.P. Ariyaratne

Introduction

Soybean, introduced to the island in 1947, is a relatively new crop to Sri Lankan farmers. As it is a source of cheap, high quality protein (Table 1) a project was initiated in 1973 to promote its cultivation in Sri Lanka. As a consequence of an intensive research and development programme undertaken by the Department of Agriculture, the area under soybean expanded from 930 hectares in the cropping year 1973/74 to 14,637 hectares in 1982/83 (Table 2). Soybean is grown exclusively in the dry zone of Sri Lanka, a major portion of

the area being in the district of Anuradhapura (Table 3). About 80% of the annual crop is grown in the Maha season (Oct-March) as a rainfed crop on the upland areas of the dry zone. The remaining 20% is produced during the Yala season (April-September) using, in most cases, supplementary irrigation. The soybean cultivation area has decreased since 1982/83 mainly as a result of price reductions exceeding 30 percent in real terms over the period 1982/83-85/86, despite the government floor price scheme (Gleason, et. al., 1988).

Table 1. Price per unit protein of common foods in Sri Lanka.

	Energy (kcal/ 100 grams)	Protein (grams/ 100 grams)	Price Unit (Rs/100g)	Price per Unit Protein (Rs)
Soybean	420	38	1.6	0.04
Black gram	340	23.9	2.8	0.12
Cowpea	342	23.4	1.7	0.07
Greengram	334	24	1.6	0.07
Lentil	346	24.2	3.3	0.14
Groundnut	563	25.6	1.3	0.05
Rice (white. parboiled)	359	7.1	0.775	0.11
Wheat flour	334	12.2	1.55	0.13
Beef, lean	207	19.6	3.2	0.16
Chicken	200	20.2	4.2	0.21
Dried fish (fat poor)	223	46	5	0.11
TVP		50	8	0.16

Source on energy and protein: Food and Diet, Wikramanayaka, T.W. Faculty of medicine, Ruhuna University College. Prices are average prices from Kanda Central Market, Oct 19-25, 1987.

Sri Lanka imports more than 20,000 tons of soybean meal per year, mainly for use in stock feed. Imports have grown rapidly during the last few years with the expansion' of the poultry industry, and further growth is expected (Navarro, 1987). The Ceylon Oils and Fats Corporation has purchased very little local soybean during recent years and in 1987 imported its entire requirement of soybean meal. As soybean is cultivated specifically for commercial purposes and not for direct consumption by farmers, its cultivation in Sri Lanka is largely determined by prevailing market prices, facilities for marketing and product utilization.

Soybean Yield Gap

Improved soybean varieties when tested under experimental conditions in Maha, Illuppallama, have yielded over 4.5 tons/ha (Table 4). An average yield of 2.7 tons/ha has been realized from varieties included in National Co-ordinated Varietal Trials (Table 5). However, the average yield obtained by farmers in the main production district of Anuradhapura over 13 cropping seasons is 1179 kg/ha. This yield gap of approximately 1.5 tons/ha is a consequence of a number of physical, biological and socio-economic factors affecting soybean production in Sri Lanka

Table 2. Extent and Production of soybean in Sri Lanka

MAHA SEASON (OCT-MAR)				YALA SEASONS (APRIL-SEP)			
YEAR	HEC.	(000 MT)	MT/HA	YEAR	HEC.	(000 MT)	MT/HA
1973/74	611	0.55	0.90	1974	697	0.452	0.65
1974/75	821	0.79	0.96	1975	319	0.367	1.15
1975/76	466	0.4	0.89	1976	275	0.3	1.09
1976/77	527	0.5	0.94	1977	487	0.6	1.23
1977/78	1701	2.1	1.23	1978	254	0.2	0.78
1978/79	862	0.9	1.04	1979	359	0.4	1.11
1979/80	913	0.9	0.98	1980	179	0.2	1.11
1980/81	1102	1.3	1.18	1981	1111	1.0	0.90
1981/82	6798	8.3	1.22	1982	858	1.8	2.09
1982/83	12244	7.4	0.60	1983	2393	4.2	1.77
1983/84	11513	7.6	0.66	1984	305	0.4	1.25
1984/85	1858	1.78	0.96	1985	580	0.99	1.71
1985/86	4841	5.24	1.08	1986	1466	2.08	1.42
1986/87	5715	8.52	1.49	1987	970	1.63	1.68
1987/88	7535	8.96	1.19	1988	806	0.93	1.15

Source: Economics and Projects Division, Department of Agriculture.

Table 3. Extent, production and yield of soybean in the Anuradhapura district.

Year	Maha			Yala		
	Area (ha)	Production (mt)	Yield (kg/ha)	Area (ha)	Production (mt)	Yield (kg/ha)
1975/76	42	50	1171	80	72	904
1976/77	101	138	1362	139	146	1044
1977/78	1112	1620	1451	76	58	764
1978/79	656	670	1018	36	29	789
1979/80	464	413	891	21	32	1527
1980/81	628	879	1400	619	507	815
1981/82	5816	7402	1273	383	662	1731
1982/83	12987	4759	509	1515	2764	1820
1983/84	8227	5590	675	58	94	1616
1984/85	712	722	1018	90	146	1629
1985/86	2802	2983	1069	762	1081	1413
1986/87	4428	6736	1515	417	687	1642
1987/88	6156	7491	1222	458	371	815
Average	3152	2818	1041	332	475	1179
Maximum	12987	7491	1515	1515	2764	1820
Minimum	42	50	509	21	29	764

Table 4. Performance of soybean cultivars at the agricultural Research Station, Maha Illupallama, Sri Lanka.

Cultivar	Country of origin	Grain yield (kg/ha)
Hardee	U.S.A.	4877
Bossier	U.S.A.	4627
Pb 1	India	3606

Source: V. Arulandhy, Agricultural Research Station Maha Illupallama

Table 5. Performance of some soybean varieties tested in co-ordinated varietal trials.

Variety	1985/85 M	1986 Yala	1986/87 M	1987 Yala
PM 78 6 5 13	2002	2690	2686	3446
F 73 14 18 3	2648	1969	2726	2067
PM 78 2 5 25	2018	2729	2672	2519
BOSSIER	3069	2346	3009	3122
pb 1	2268	2921	2660	3152
Fitzroy	2827	1875	2603	2022
50228 2 7 6 6	955	1956		
DUOCROP	3340	2671	3287	3338
BM 2	3069	2261	2676	3185

Source: Seasonal reports of Agric. Research Station, Maha Illuppallama.

Causes of the Yield Gap

Of the large number of factors that contribute to the soybean yield gap in Sri Lanka, the following are considered the most important.

Moisture stress

As most soybean is grown under rainfed conditions in the dry zone of Sri Lanka during the Maha season and the crop is frequently subjected to varying periods of drought, potential yields are seldom realized. Planting of the crop with the first rains in October can minimize the effects of moisture stress.

Poor stand establishment

Poor stand establishment resulting from low seed viability is an important factor contributing to low yields. High ambient temperature coupled with high relative humidity leads to rapid deterioration of seed viability because of physiological changes in the seed as well as deterioration caused by pathogens.

Low investment in improved technology

Because most soybean cultivation is relegated to the rainfed uplands of the dry zone, farmers are reluctant to invest in improved technology. Soybean is an ideal field crop for the farming systems of the dry zone of Sri Lanka in that its production competes minimally with other crops. A survey of soybean farmers has shown that the cost per unit output can be significantly reduced with increased use of technology and that therefore domestic soybean production can compete with imports (Gleason, 1987).

Poor nodulation

The almost complete lack of *Rhizobium japonicum* in the soils of the dry zone of Sri Lanka makes it mandatory to inoculate the soil to realize effective nodulation in soybean. Facilities for obtaining inoculants and their storage are inadequate in soybean production areas. Promising lines of soybean which are able to nodulate effectively with indigenous (cowpea type) Rhizobia are not commercially available and, as a result, yields are reduced because of nitrogen deficiency

Poor facilities for marketing and low farm-gate prices

Although the demand for soybean in Sri Lanka far exceeds present production, poor marketing facilities have prevented farmers from realizing potential prices. Co-operatives are the main source of soybean for the Ceylon Oils and Fats corporation (COFC), a government corporation which produces animal feed. The co-operatives supply the Paddy Marketing Board (PMB) which in turn supplies the Ceylon Tobacco Company Services (CTC). The latter is engaged in the production of "Thriposha" food supplement which is given free to the poor. Although the co-operatives are entrusted with the task of purchasing produce from farmers, over 76 per cent of farmers in Anuradhapura sold their soybeans to private traders during 1987, while slightly fewer than 20% sold to PMB or co-operatives. Private marketing agents are preferred, in spite of the lower prices they offer, because they provide certain economic services.

The government supports a floor price scheme for soybean which is currently Rs. 12/kg. In the past this market intervention program has not been effective because of the low levels of cash assets at the disposal of farmers. The elimination of liquidity constraints will allow farmers to benefit from the added value gained from the elementary processing which is presently being developed by marketing agents. In the absence of forward contracting, farmers in Sri Lanka have few marketing options.

Competition from weeds

Soybean yields are reduced through ineffective weed control. The crop is usually weeded manually with a hoe and weedicides are seldom used.

Crop loss due to insect pests and diseases

There are no serious insect pests apart from leaf eating caterpillars. Bacterial pustule disease has assumed some degree of importance in reducing yields.

Breakdown of extension services

Prospects for reducing the soybean yield gap in Sri Lanka.

It is possible to reduce the existing soybean yield gap in Sri Lanka if steps are taken to overcome some of the constraints mentioned. Planting of the crop to coincide with the first rains of the Maha season will help to overcome the effects of soil moisture stress. Improvements in seed storage and the development of varieties with improved seed longevity will help overcome the problem of poor stand development. The development of effective *Rhizobial* inoculants and their widespread use will help alleviate nitrogen deficiencies which are common in rainfed farming situations. The breeding of promising lines of soybean which nodulate with indigenous *Rhizobia* will dispense with the need for regular soil inoculation with imported *Rhizobial* strains. Losses due to weeds, insect pests and pathogens could be minimized through a more effective extension network. Above all, provision for an efficient marketing system and easily available credit will help farmers overcome liquidity constraints.

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Seminar on Changes in Food Consumption: Its Effect on Production and Use of Upland Crops in Asia

October 6-9, 1992
Kandy, Sri Lanka

The seminar: "Changes in Food Consumption: Its Effect on Production and Use of Upland Crops in Asia", took place from 6-9 October 1992 in Kandy, Sri Lanka. The workshop was organized in partnership with the Ministry of Agriculture of Sri Lanka and was attended by 25 participants, from Indonesia, Republic of Korea, Malaysia, Myanmar, Philippines, Sri Lanka, Thailand and Viet Nam. Also present were representatives of the Food and Agriculture Organization, Rome, Italy; SEAMEO-TROPMED/GTZ Project, Universitas Indonesia; UN/FAO RAS/89/040: Regional Co-operative Programme for Improvement of Food Legumes and Coarse Grains in Asia, Bogor, Indonesia; Centre de Cooperation Internationale en Recherche Agronomique pour le Development (CIRAD), Montpellier, France; and the USAID Agricultural Diversification Project, Sri Lanka.

The objectives of the seminar were:

i) To review recent changes in food consumption and use in Asia and the resulting development in upland crops including production and use.

ii) To identify implications and draw recommendations for development, policy and research, of CGPRT crops within a market perspective.

The Director of the Department of Agriculture, Ministry of Agriculture Sri Lanka, Dr. S.P.R. Weerasinghe welcomed the participants to Sri Lanka and underlined the relevance of the regional effort in identifying opportunities for agricultural development. He commended the Centre for its holistic effort in looking at demand as well as production. In his opening address, the Director of the CGPRT Centre, Dr. Seiji Shindo, pointed out that development of CGPRT crops usually takes place in a process of diversification and commercialization which means that next to their role in food security, CGPRT crops are an important vehicle for local development. He stressed that identifying medium and long term shifts in demand is an important component in adjustment of priorities in national agriculture planning and allocation of resources to research and development.

In accordance with the programme the participants presented their papers and highlights regarding income growth and shifts in consumption and demand of relevant CGPRT crops. The presentations showed commendable homogenity, facilitating to a certain degree comparison of the various country situations. Ac-cording to expectation, growth in utilization, which includes direct human consumption, industrial use and use for animal feed and exports, has grown substantially over the last decade in the higher income countries such as Korea, Malaysia and Thailand. In Korea and Malaysia imports of not only maize and soybean but also wheat expanded significantly with economic growth. In Thailand utilization of maize and cassava was primarily driven by export and growth of the feed industry. In Korea and Malaysia the feed industry was the major source of growth in utilization.

Indonesia also registered expanded utilization of CGPRT crops over the last decade in which the animal feed industry since 1980s provided the main impetus, In Pakistan and Sri Lanka utilization of CGPRT crops was reported to be stagnant and in fact negative in the case of several commodities. Lack of data prevented strong conclusive evidence regarding prevailing trends in Myanmar and Viet Nam. However, it was indicated that exports of food legumes and oil crops expanded significantly in recent years in Myanmar while industrial processing of cassava shows an increase in recent years in Viet Nam.

It was concluded that average national figures on rural and urban consumption actually mask significant differences in income and food intake within a country. It was noted that in areas with a cereal shortage CGPRT crops provide major staple food. Cash income and food availability were seen as the main determinant in food expenditures.

In the general discussion the country representatives underlined the importance of analyzing the sources of demand shifts over the medium and long term, as being highly relevant to agricultural planning and national research and development efforts. It was pointed out that a great deal of work has been devoted to the analysis of long-term trends in demand and consumption of rice and wheat, but that national expenditure surveys rarely include items of less proportional importance, which however, are still

quite important if taken as a group. Evidence on local consumption of CGPRT crops in Pakistan and Indonesia underlined that up to 90% of the sources of staple food can be made up by CGPRT produce, pointing at area-specific development of food expenditures in close relationship with local production.

In virtually all countries efforts have been made and are being made to expand production of selected CGPRT crops to satisfy a national demand. In Indonesia, a national programme for soybean expansion is underway; in Thailand, the Philippines and Sri Lanka similar efforts have been made to promote soybean production, maize production has been stimulated in the Philippines, Thailand and Indonesia and both have been exhaustively researched in Malaysia and the Republic of Korea. In Pakistan research effort has also been devoted to pulses and maize. In Viet Nam a national programme on root crops research and development is being established. In Myanmar selected food legumes and oil crops receive R & D attention. However, these efforts do not compare with the massive resources devoted to cereals over the past decade in the region.

A number of recommendations for follow-up action were formulated.

Recommendation 1

Steps need to be taken to more comprehensively recognize the dual role of CGPRT crops in commerce and food security.

Recommendation 2

The production of selected CGPRT crops should be effectively promoted in programmes aiming to stop environmental degradation and soil depletion in combination with agro-forestry/livestock systems.

Recommendation 3

In countries with local food security problems, area specific food security programmes may be established, promoting utilization, distribution and commercialization of local produce.

Recommendation 4

In CGPRT focused development programmes special attention needs to be paid to quality characteristics, regularity of supply and market information.

Recommendation 5

Collaboration between the public and private sector in breeding, seed distribution, post-harvest practices and processing is of increasing importance. The inclusion of CGPRT commodities in feed formulae will contribute to commercialization and rural incomes as well as to increased national self reliance on raw material for the growing feed industry. Post-harvest practices, preprocessing techniques and cooking recipes should be included in agricultural extension programmes and other programmes. Private sector research and development of new consumer products will contribute to business expansion and in general expanded utilization of CGPRT produce.

Recommendation 6

In the case of small millet and soybean, integrated regional networks have not been established. This matter needs to be considered by interested countries as of matter of urgency.

Recommendation 7

More information is necessary to identify the area specific role of CGPRT crops in income, nutrition, food security and employment. Research on production and demand commodity linkages should promote multi commodity planning at national level in agricultural sector planning.■

New Publications

Local Soybean Economies and Government
Policies in Thailand and Indonesia
Pattana, Jierwiriyapant; Hermanto; Roche, Frederic and Bottema, J.W.T. 1992. 203 p.
ISBN 979-8059-49-2
Price: Rp. 47.500/US$ 17.50
US$ 13.50 (Developing Countries)

Newly Available Publications from CIAT

Cassava Breeding, Agronomy and Utilization Research in Asia
(Proceedings of the Third Regional Workshop held in Malang, Indonesia, October 22 – 27, 1990)
Editor: Howeler, R.H. 438 p. 1992
Price: Rp 47.500

Proceedings of the Eight Symposium of the International Society for Tropical Root Crops.
Editor: Howeler, **R.H.** 712 p. 1990.
Price: Rp. 60.000

CGPRT Centre News and Activities

Technical Advisory Committee Meeting

From 2 to 4 December 1992 the Centres TAC will meet in Bogor, Indonesia.

Governing Board Meeting

From 12 to 14 January 1993 the Centres GB will meet in Bogor, Indonesia.

International Potato Center's Books Available from CGPRT Centre

Potatoes: Production, Marketing and Programs for Developing Countries
Horton, Douglas E. 1987. 243 p. Rp 30.000

This book has two major goals. The first is to inform readers about the essential aspects of potatoes in the food systems of developing countries. This includes recent trends in potato production and use, biology of the crop, the policy environment, production zones and systems, supply and demand, marketing problems, consumption patterns, and nutritional value. The second goal is to outline the major issues that need to be considered in setting priorities and for implementing and assesing the impact of potato programs. Although the subject of this book is potatoes, the approach used, the topics covered, and many of the issues raised apply to other food crops as well.

True Potato Seeds: Past and Present Uses
Malagamba, P.; Monares, A. 1988. 40 p. Rp 9.000

By outlining the history of TPS use, and by analyzing the specific conditions which determine the appropriateness of its adoption, this report aims to provide information and guidelines to agricultural researchers and policymakers for determining conditions in which the various forms of TPS use presently available can be best applied. It also sets forth the current limitations to TPS use, and the topics which will continue to demand research attention.

Simple Processing of Dehydrated Potatoes and Potato Starch
Shaw, R.L.; Booth, R.H. 1982. 32 p. Rp 9.000

This publication is for those who wish to construct and operate a simple plant to process dehydrated potatoes and potato starch. It discusses social and economic factors to be considered prior to construction of a processing plant. It also discusses important physiological components of the tuber and general arrangement and operation of the necessary equipment. Much of the information in this book is based on the experience of developing a pilot plant for processing dehidrated potato and potato starch at the International Potato Center's Highland Research Station, Huancayo, Peru. Although this plant was developed according to needs in the Peruvian highlands, the knowledge obtained is presented in sufficient detail for use in any region of the world by persons interested in simple potato processing. •

Underground Crops; Long-term Trends In Production of Roots and Tubers
Horton, Douglas E. 1988. 130 p. Rp 21.000

This publication was prepared to improve information on root crops in developing countries. Socio-economic information on five root crops is presented in tables and figures: cassava, aroids, potatoes, sweetpotatoes and yams. For each crop it gives statistics on area, production, yield, trade, and domestic uses for every producing country from 1961 through 1965. The tables are based on previously unpublished data from FAO.

Planting Potatoes
Cortbaoui, R. Technical Information Bulletin 11. Reprint 1988. 17 p. Rp 3.000

The study of this bulletin enables you to:
- explain the importance of correct planting
- describe potato emergence
- describe the conditions for emergence
- demonstrate soil preparation
- discuss planting depth
- discuss planting distance
- demonstrate planting procedures

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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