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Sweet Potato in Central Viet Nam: A Survey of Farmers' Practices and Constraints*

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Introduction

South Viet Nam includes four agro-economic zones: the Central Coast (Region V), the Central Highlands (Region VI), the South East (Region VII), and the Mekong River Delta (Region VIII). The total cultivated area for sweet potato in 1987 was 100,400 ha; about 30% of the total sweet potato area of Viet Nam.

The region with the greatest sweet potato production is the Central Coast, with 52,000 ha. The objectives of this study were to determine: the background on the production situation; processing and utilization; the major problems confronting sweet potato development and; potential for increased production, processing and utilization.

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Methodology

A survey programme concerning the overall situation of the production and utilization of sweet potato in the Central Coast zone, was carried out by the Institute of Agricultural Sciences of South Viet Nam (IAS), within the framework of the National Root Crops Programme, coded 02A-04. The survey was based on questionnaires prepared in collaboration with CIP and the CGPRT Centre.

Three co-operatives and 55 farmers were selected in 9 villages: Binh Dao; Binh Phuc; Binh Giang; Binh. Duong of the Thang Binh district in Quang Nam-Danang province; Binh Thanh of the Binh Son district in Quang Ngai, province; Cat Khanh and Cat Tai of the Phu Cat district in Binh Dinh province; Ham Kiem of the Ham Thuan Nam district in Thuan Hai province and Van May of the Ham Tan district in Thuan Hai province.

This paper presents the analyzed data from the most recent formal survey. Additional data from 3 informal surveys focusing on varieties and cultural practices in sweet potato production carried out by the authors for IAS in 1979, 1983 and 1986, are also included.

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Provincial statistics, natural resources, agro-ecological and actual maps and plans for agricultural development to the year 2000, have been collected and analyzed. (Source: Institute of Agricultural Planning; Institute of Economics and Provincial Agriculture Services).

Results

Background on Sweet Potato Production Processing and Utilization in the Central Coast Region

Agro-ecological conditions of sweet potato growing areas. The Central Coast zone consists of the provinces: Quang Nam Da Nang; Quang Ngai; Binh Dinh; Phu Yen; Khanh Hoa and Thuan Haig covering 4.5 million hectares. The total of agricultural land is 546 thousand hectares, with rice taking up 295 thousand hectares. The area set aside for field crops and annual industrial crops makes up 200 thousand hectares (Table 1).

This region consists of a mountainous chain of 1000 km which runs parallel to the sea, with the narrowest width between the mountains and the sea being only 50 km. The rainfall variation is extreme when compared with the rest of the country. The highest annual rainfall is 4000-5000 mm at Bana Pagoda and the lowest is 700 mm at Phan Rang. There is also a large difference in monthly temperature. The region experiences typhoons and heavy floods. Most of the soils are sandy and infertile with high erosion.

The Central Coast has a mixed economy with fisheries taking the leading role, followed by tourism. Food production is enough for local consumption. There are excellent examples of ricelands, which are used with high efficiency when compared with those in the rest of the country. Up to 22 tons of paddy rice/year per ha. have been produced (at Dai Phuoc Co-operative of Dailoc district; Quang Nam Da Nang province). The Central Coast zone is also the largest sweet potato production area in South Viet Nam.

Table 1 Detailed description of land utilization in the Central Coast region.

Land Use	Total Central Coast Viet Nam	Province			
		Quang Nam-Danang	Quang Ngai Binh Dinh**	Phu Yen Khanh Hoa**	Thuan Mai
Total land area ('000 ha)	4500	1198	1189	980	1,137
Total Agric. land ('000 ha)	546	116	179	119	129
I. Annual crops ('000 ha)	498	106	167	110	113
a. Total of riceland ('000 ha)	295	65	109	61	59
Rice-Rice-Rice (ha)	21,494	13,641	7,098	459	296
Rice-Rice-CSPM* (ha)	2,483	1,965	518		
Rice-CSPM-CSPM (ha)	49	44	5		
Rice-Rice ('000 ha)	150	26	72	33	17
Rice-CSPM ('000 ha)	17.8	7.6	2.8	5.0	2.4
Upland rice-CSPM (ha)	677	677			
Rice ('000 ha)	95.8	11.2	23.4	22.0	39.1
b. Field crops (CSPM) and annual industrial crops ('000 ha)	200	40	57	47	54
c. Vegetable (ha)	795	118	65	511	101
II. Perennial crops (ha)	259,320	3,800	6,197	5,904	10,031
III. Pasture (ha)	8,914	1,783	2,082	2,067	2,982
IV. New agric (ha)	2,410	24	664	31	1,691
Sweet potato (ha)	50,000	20,000	14,000	4,000	12,000

(Source: Institute of Agricultural Planning 1989)

* CSPM is cassava, sweet potato, groundnut and maize.

** These were formerly one province, but were split into 2 provinces in 1989.

Editorial

Environment and Development

Seiji Shindo,
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Many development fora, institutions and NGOs, are increasingly focusing on "sustainable development"; a pattern of economic growth that meets the present material needs without compromising the ability of future generations to satisfy their material and environmental aspirations. In brief, the current development effort should not jeopardize the future capacity and potential for development, by imposing negative impacts on the existing, often limited physical resources.

Environmental problems have various dimensions. For instance, the problem of global warming has worldwide implications which are considered to be most threatening. Regional problems result from the

geophysical linkage among a group of countries. A typical example of this kind is found in the rapid forest depletion in those developing countries which export timber and its products to developed countries.

Direct relevance to the Centre's activities, however, rests on local problems confined within national boundaries or even within a province, village or individual farm. It is predominantly small farmers who are engaged in CGPRT-based farming. They are often located in rainfed areas with unfavourable physical conditions, or in remote and less developed areas. This combination of factors evokes environmental problems. Even a casual review of these farming areas raises the common environmental issues of soil erosion and inappropriate farming systems, as represented by excessive cropping of a single field crop.

Environmental problems arising in this dimension are largely caused by the socio-economic conditions that individual farmers face. Poverty is blamed as the major factor for the inability to prevent environmental

deterioration of this nature, although negative aspects of economic development at large, cannot be ignored.

Alleviation or removal of these root causes should be translated into concrete actions. The benefits of research and development need to be transferred to small farmers as appropriate farming technology. Concurrently, infrastructure such as transportation and communication systems, should be established or upgraded. As well, remunerative pricing policies are essential to ensure a healthy and balanced family existence. The CGPRT Centre is expected to play a significant role in these areas by providing precise and meaningful information and recommendations, through its research and development activities.

The leading provinces for sweet potato production are, in order of importance: Quang Nam-Da Nang; Thuan Hai and Quang Ngai. In the Central Coast area, sweet potato is grown largely in the following districts: Thang Binh, Hoa Vang, Tam Ky; Nui Thanh, Que Son and Dien Ban (Quang Ngai) Phu Cat and Tay Son (Binh Dinh) Tuy Hoa (Phu Yen) Cam Ranh and Ninh Hoa (Khan Hoa) Ham Tan; Ham Thuann Nam; Ham Thuan Bac and Phan Thiet (Thuan Hai). The five districts having the largest sweet potato growing area are Thang Binh, Ham Tan, Hoa Vang, Binh Son and Tam Ky.

Representative villages where sweet potato is a major crop-are: Binh Quang, Binh Sa, Binh Trieu and Binh Dao - the well known "TRA DOA" sweet potato belt (Thang Binh district; Quang Nam Da Nang province) - Binh Thanh (Binh Son district; Quang Ngai province), Binh Tu (Phan Thiet district. Thuan Hai province), Ham Kiem

(Ham Thuan Nam district; Thuan Hai province) and Cat Hai, Cat Khanh, Cat Tai (Phu Cat district; Binh Thanh province).

Socio-economic conditions of sweet potato growing areas. Sweet potato production in Viet Nam is organized by households, farmers' groups and co-operatives. In addition, it is also grown on some state farms and by private enterprises on small areas.

In the Central Coast zone there are 60 districts and towns, 1,139 co-operatives and 906 farmers' groups. Till 1987, co-operatives and farmers groups managed collective farms under the 10th State Decision of the Viet Namese Government, in which co-operatives and production brigades supplied fertilizers, pesticides and irrigation water. At harvesting time, produce was deducted for input expenses, with the rest being distributed on the basis of working days.

Since 1988, the product-contract system has been carried out under the 10th State Decision. Productivity is determined by soil grades (yielding potential), with farmers directly purchasing all inputs with their own money. Hence, they now keep all the produce after paying the land tax.

Sweet potato farmers in Cat Khanh co-operative - a typical co-operative on the Central Coast - and 9 villages from 5 districts, were surveyed using questionnaires. The farmers have many children, with 5.5, as an average (4.4-6.0 persons/household) (Table 2).

Farm size is limited, with 0.46 ha/family (0.290-0.93 ha/family) (Table 3). As there is a lack of draught - animal power, a majority of the farmwork

is done manually (0.5-2.4 buffalo/cattle per family). Most of farmers have chickens (10.9 chickens/family) and pigs (3.6 pigs/family). The majority are poor with low incomes (87% of farmers have farm assets worth less than US\$ 1000).

The farmers are mainly at subsistence level. The majority of the agricultural produce is sold fresh and processed products are not significant. *Sweet potato in the food systems of the Central Coast zone.* In the Central Coast zone, because of their popularity (economic importance), irrigated rice and groundnuts are gaining in importance. The sweet potato area

Table 2 Background information of the 55 respondents in the sweet potato survey.

Item	Total	Village								
		Binh Dao	Binh Phuc	Binh Quang	Binh Duong	Binh Thanh	Cat Khanh	Cat Tai	Van My	Ham Kiem
No. of respondents	55	10	9	5	5	4	6	6	5	5
Total number of inhabitants	304	57	51	30	22	22	32	35	30	25
Avg. size of household	5.5	5.7	5.7	6.0	4.4	5.5	5.3	5.8	6.0	5.0
Male	150	28	26	15	12	10	14	17	15	13
%	49.3	49.1	51.0	50.0	54.5	45.5	43.7	48.6	50.0	52.0
Female	154	29	25	15	10	12	10	18	15	12
%	50.7	50.9	49.0	50.0	45.5	54.5	56.3	51.4	50.0	48.0
Main labourers	143	27	25	15	12	10	16	17	9	12
%	47.0	47.4	49.0	50	54.5	45.5	50.0	48.6	30.0	48.0
Auxiliary labourers	110	19	15	12	8	10	10	12	16	8
%	36.2	33.3	29.4	40	36.4	45.5	31.3	34.3	53.3	22.9
Outside labourers	51	11	11	3	2	2	6	6	5	5
%	16.8	19.3	21.6	10	0.01	0.01	18.7	17.1	16.7	20.0

Table 3 Assets of the farmers surveyed in the Central Coast area of Viet Nam.

Item	Total	Village								
		Binh Dao	Binh Phuc	Binh Quang	Binh Duong	Binh Thanh	Cat Khanh	Cat Tai	Van My	Ham Kiem
No. of respondents	55	10	9	5	5	4	6	6	5	5
Cultivated land (ha)	25.28	29.2	4.23	1.95	1.80	1.44	2.22	2.42	3.65	4.65
Avg. land/household (ha)	0.46	9.29	0.47	0.39	0.36	0.36	0.37	0.40	0.73	0.93
Cattle	65	5	18	7	8	2	3	4	12	6
average	1.2	0.5	2.0	1.2	1.6	0.5	0.5	0.7	2.4	1.2
Pigs	198	78	31	10	11	11	17	17	12	11
average	3.6	7.8	3.4	2.0	2.2	2.8	2.8	2.8	2.4	2.2
Chickens	600	157	103	67	63	28	42	65	29	46
average	10.9	15.7	11.4	13.4	12.6	7.0	7.0	10.8	5.8	9.2
Bicycles	60	11	10	8	6	3	3	10	4	6
average	1.1	1.1	1.1	1.3	1.2	0.8	0.5	1.7	0.8	1.2
Threshing machines (#)	4	1	1	1						
average	0.07	0.1	0.1	0.2	0.2					
Total prodn. value (gold)	1.97	1.59	1.94	1.26	1.62	1.65	1.50	2.29	2.08	4.14
(USD)	985	795	970	630	810	825	750	1145	1040	2020

has decreased to approximately 52,000 hectares (about 50% of the total area occupied by sweet potato in South Viet Nam). The average yield reaches only 5 tons of fresh tubers per hectare, and the yield has not changed over the past 10 years (Table 4).

There are also many difficulties in transportation and storage (Table 5).

Insufficient inputs. Ninety one percent of farmers confirmed that the low productivity of sweet potato is due to insufficient inputs. Sweet potato is grown on marginal land with inadequate

Table 4 Area, yield and production of rice, cassava, sweet potato and groundnut in the Central Coast zone. (Area: '000 ha; yield t/ha; prod. '000 MT/ha)

Year	Area	Rice		Cassava			Sweet Potato			Groundnut		
		Yield	Prod.	Area	Yield	Prod.	Area	Yield	Prod.	Area	Yield	Prod.
1981	465	2.37	1104	85	8.17	698	67	5.41	363	14	0.78	11
1982	469	2.64	1235	77	7.26	563	62	3.24	202	14	0.77	11
1983	462	2.69	1244	72	8.65	630	65	4.68	307	15	0.68	10
1984	480	2.99	1437	76	8.43	627	66	4.86	323	15	0.68	10
1985	496	3.24	1609	71	8.92	641	63	5.07	320	19	0.75	14
1986	493	3.05	1505	65	9.01	592	56	4.53	255	22	0.70	15
1987	489	3.07	1503	65	8.68	571	51	4.82	249	21	0.78	17

Source: Information office, computer centre, Ministry of Agriculture and Food Industry; 1988.

Major Constraints Confronting the Development of Sweet Potato in the Central Coast

Lack of processing. In Quang Nam-Da Nang and Thuan Hai, sweet potato has mainly been used in the daily diet, in the form of dried chips. It is also cooked with rice, or boiled with ground nuts, black gram or red gram, plus sugar. Fresh roots are mainly consumed after boiling. They are also made into dried pellets or half-boiled and made into various cakes.

In Quang Ngai, Binh Dinh, Phu Yen, and Khanh Hoa provinces, sweet potato is rarely used in the diet, except in some districts where there is a shortage of rice. Rice paper and noodles are made from rice and cassava flour with a small percentage of sweet potato flour.

In production, only a small amount of sweet potato vines (about 20% of the total), are used as cuttings and the remainder is used to feed pigs and cattle. Sweet potato leaves and vines are used mainly as fresh feed with only a very small amount dried and stored for later use.

Vine tops and leaves are consumed as a vegetable (boiled or fried). In the Central Coast zone, boiled vine tops eaten with fish sauce is a traditional dish. This dish also acts as a laxative medicine.

Ninety six percent of farmers (53/55 of respondents) said that the principal factor limiting the development of sweet potato production was the lack of processing: a major part of the sweet potato crop is consumed directly or prepared as dried chips, therefore, it has low economic value.

irrigation. Storage roots are commonly harvested early, as plants suffer from drought during the late growth stage. Fertilizer, particularly potassium and phosphorous, and pesticides, are rarely applied (Table 6).

In the Central Coast area, sweet potato is grown mainly on sandy soils and grey podzolic soils which are considered marginal with inadequate irrigation. On fertile soils, sweet potato has gradually been replaced by groundnuts and multiple rice crops.

In Quang Nam-Da Nang province, sweet potato can be grown in all four seasons of the year, namely; winter-spring (Dong Xuan), spring-summer (Xuan He), summer-autumn (He Thu) and autumn-winter (Tru Dong). It is mainly grown in the winter-spring crop season, taking up 78% of the total sweet potato area per year (Table 7).

In Binh Son (Quang Ngai) and Phu Cat (Binh Dinh), sweet potato is grown mainly in the winter-spring season. In Ham Tan and Ham Thuan Nam (Thuan Hai), sweet potato is planted both in summer-autumn and autumn-winter on upland soils and in the winter-spring season, in rotation with rice.

Sweet potato matures between 90-120 days. Roots are commonly harvested early, as plants suffer from drought during the later growing stage. The major insect pests in the Central Coast zone are weevil (*Cylas formicarius*) and vine borer (*Omphisia anastomosalis*), causing losses of 10-35% and 5-20%, respectively. Diseases caused by viruses: black rot (*Ceratocytis*

fimbriata), vine rot (*Fusarium oxysporum*), scurf (*Monilochaetes infuscans*) and leaf spot (*Sclerotium rolfsii*), have been observed but are of minor importance.

Varieties. Ninety one percent of farmers confirmed that one of the limiting factors is varietal degeneration, as varietal screening and selection has not been carried out. Some varieties have been grown for 15-20 years and some even up to 30 years.

Major varieties are Trui Sa (Can Sa) Da Nang, Chiem Dau, Vo Huong, Hoang Long;

Khoai Bi; Khoai Dau; Khoai Huynh; Khoai Mam; Khoai Dalat va My Trang; My Den and My Do.

In the Central Coast zone, farmers prefer varieties having a high starch content with high yield, a short growth duration (90-100 days), and tolerance to drought, weevil and vine borer. The amount of planting materials is still far below the demand, and less attention has been paid to sweet potato, when compared with the attention given to rice. Only a few farmers in Thang Binh and Binh Son have experience in the propagation of planting materials using storage

Table 5 Major constraints as perceived by the 55 farmers surveyed in the Central Coast zone.

Major constraints	Village										%
	Total	Binh Dao	Binh Phuc	Binh Quang	Binh Duong	Binh Thanh	Cat Khanh	Cat Tai	Van My	Ham Kiem	
No. of respondents	55	10	9	5	5	4	6	6	5	5	100
1. Lack of processing	53	10	9	5	5	4	6	5	5	4	96
2. Insufficient input	50	7	8	5	5	3	6	6	5	5	91
2.1 Marginal lands	24	5	4	2	2	1	3	2	3	2	44
2.2 Inadequate irrigation	4				1		1		1	1	7
2.3 Root is harvested early and/or plants suffer drought at late growth from stage	3						1		1	1	5
2.4 Lack of fertilizer applied (weevil and vine borer)	9		2	2	1	1	1	1	1	1	16
3. Varietal degradation, contamination while varietal screening and selection have not been carried out	10	8	8	4	5	3	6	6	5	5	91
4. Lack of incentives (government policies)	49	9	9	5	5	4	6	4	5	3	89
5. Lack of experience in intensive production	35	3	4	2	4	2	6	6	4	4	64

Table 6 Use of fertilizers and pesticides by farmers growing sweet potato in the Central Coast zone (values are the mean for the respondents from each village)

Item	Village										Total
	Binh Dap	Binh Phuc	Binh Quang	Binh Duong	Binh Thanh	Cat Khanh	Cat Tai	Van My	Ham Kiem		
No. of respondents	10	9	5	5	4	6	6	5	5	55	
Chemical fertilizers											
N (kg/ha)	30-35	25-35	30-35	25-35	25-30	20-25	20-25	20-25	20-25	20-35	
P ₂ O ₅ (kg/ha)	0	0	0	0	0	0	0	0	0	0	
K ₂ O (kg/ha)	0	0	0	0	0-10	0	0	0-10	0-15	0-15	
Green manure (t/ha)	4-6	4-6	3-6	2-4	0-6	0-4	0	0-6	0-6	0-6	
Animal manure (t/ha)	6-12	6-12	4-12	4-10	4-12	0-5	0-5	4-8	0-6	0-12	
Insecticides (l/ha)	0-2	0-2	0-1	0-1	0-2	0	0	0	0	0-2	
Fungicides (l/ha)	0	0	0	0	0	0	0	0	0	0	

Table 7 Sweet potato production during winter-spring season in Quang Nam-Da Nang (Area: in ha and yielding t/ha).

Year	Sweet Potato		Sweet Potato		Sweet Potato production in 6 districts					
	Total		winter-spring		Thang	Kam	Moa	Dien	Nui	Quc
1980	32.223	5.0	25.141	5.1	6.017	4.823	3.416	2.900		2.896
1981	29.738	6.1	24.784	5.4	6.410	4.803	3.777	2.564		2.630
1980	32.223	5.0	25.141	5.1	6.017	4.823	3.416	2.900		2.896
1982	28.363	5.5	22.534	5.5	5.613	4.769	3.214	2.398		2.230
1983	28.163	5.1	22.140	5.0	5.600	4.572	3.200	2.000		2.502
1984	26.689	5.2	20.904	5.2	5.411	2.367	2.800	2.368	1.746	2.534
1985	25.563	5.7	20.301	5.9	5.374	2.299	2.700	2.232	1.856	2.517
1986	23.934	4.8	18.847	5.1	4.776	2.310	2.692	1.708	1.720	2.040
1987	19.974	5.2	13.791	5.4	3.700	2.360	2.625	1.560	1.520	1.293

roots, while farmers in most other areas buy cuttings from local markets. Only a few farmers retain their own planting material, most using storage roots from nurseries.

Lack of incentives and government policies. Eighty nine percent of farmers stated that there was a lack of incentives for production and no expansion of markets due to lack of government support and policies. Chemical fertilizers and pesticides are costly while the price of sweet potato is low, therefore the economic benefit from sweet potato production is low. There is no export market for sweet potato.

Sweet potato is stored in closed vases or in jars for a duration of 3 to 5 months in districts where it contributes a large proportion to the daily diet. Many respondents (40%) reported that their stored sweet potato is infested by weevil and pests with an incidence of 10-30%.

Weevils often cause damage to fresh storage roots, which are buried in sand. A large part of the sweet potatoes are consumed directly without storage. Therefore, it is necessary to do the marketing soon after harvest (1 to 5 days).

The price of sweet potato fluctuates seasonally and varies from one region to the other. In 1989, prices were about one third to one fourth those of rice* (price of sweet potato is VN dong 150-180/kg and rice price is VN dong 520-580/kg). In 1988 the sweet potato price was lower, 5-6 kg of sweet potato equalled 1 kg of rice (VN dong 7090/kg of sweet potato and VN dong 480-520/kg of rice)*. Table 8 shows the importance of sweet potato as a significant source of income in several districts/co-operatives. During 1988-1989, one ton of fresh roots cost about US\$ 25-50.

Lack of experience in intensive production. Sixty three percent of farmers considered that the

low productivity resulted from simple cultivation methods and lack of experiences in intensive production.

Potential of Production, Processing and Utilization of Sweet Potato on the Central Coast

Sweet potato - an important food crop of the Central Coast, has been in cultivation for a long time Ancient literature, "Van Dai Loai Ngu" 1773, by Le Quy Don (1927-1984), shows that sweet potato was introduced into Viet Nam from Luzon Island during the Minh dynasty (16th century), or indirectly introduced from Fujian (China), where sweet potato from Luzon, had been introduced in 1594.

In Central Viet Nam (north and south) including provinces: Thanh Hoa; Nghe An; Ha Tinh Quang Binh; Quang Tri; Thua Thien; Quang Nam-Da Nang; Quang Nga; Binh Dinh, Phu Yen, Khanh Hoa and Thuan Hai, sweet potato is so popular that it has been extolled in folk poems, folk songs and literature.

"Duoc mua cho phy ngo khoai Den
khi that bat lay ai bau cung"

"Toi au khoai ti ngu
sang au ui ti lam
Trua au land tui bua"

(At dinner, we eat sweet potato before going to bed. In the morning, we taste sweet potato tuber and after then go to the field; for lunch, sweet potato constitutes the main dish).

Sweet potato constitutes a high percentage of food and feed

In Region IV and the Central Coast (Region V), sweet potato makes up a high percentage of

* (One US\$ = 4000VD).

he food and feed (Table 9). The average consumption is about 220 - 230 kg paddy rice/person; 60-70 kg fresh roots of sweet potato/person and 70-80 kg fresh roots of cassava/

person. The percentage of root crops in food, is around 1/3 to 1/2 for the poor farmers.

The vine of the sweet potato is especially important as an animal feed, particularly for pigs.

Table 8 Economic Importance of sweet potato and its relative importance compared to rice.

Item	Village									
	Overall evaluation	Binh Dao	Binh Phuc	Binh Quang	Binh Duong	Binh Thanh	Cat Khanh	Cat Tai	Van My	Ham Kiem
No. of respondents	55	10	9	5	5	4	6	6	5	5
Total sweet potato area (ha)	7.07	0.92	1.72	1.25	0.90	0.56	0.36	0.36	0.55	0.45
Average/household (ha)	0.13	0.09	0.19	0.25	0.18	0.14	0.06	0.06	0.11	0.09
Average yield (t/ha)	8.1	11.4	6.6	11.4	69	83	68	71	74	73
Price 1988 (VD/kg)*	83	90	90	90	90	80	80	70	80	80
Gross output per ha ('000 VD/ha)	672	1026	594	1026	621	664	544	497	592	584
Gross output per household ('000 VD/ha)	87	92	113	257	112	93	33	30	65	53
Total Rice area (ha)	19.82	5.48	2.54	175	210	116	180	234	105	160
Average/household (ha)	0.36	0.55	0.28	0.35	0.42	0.29	0.30	0.39	0.21	0.33
Average yield (t/ha)	2.9	3.4	3.3	33	21	31	30	31	26	26
Price 1988 (t/kg paddy rice)	226	230	230	230	230	230	220	220	220	220
Gross output per ha ('000 VD/ha)	655	782	759	759	483	713	660	682	572	572
Gross output per household ('000 t/ha)	236	430	213	2566	203	207	198	266	120	189
Total gross output of rice + sweet potato/household/year (1000 VD)	323	522	326	523	315	399	231	296	185	242
Sweet potato as % of total	26.9	17.6	34.7	49.1	35.6	31.0	14.3	10.1	35.1	21.9

*1USD = 4000 VD (Vietnamese Dong).

Table 9 Per capita consumption (kg) of rice and root crops (3 kg sweet potato or cassava equals/kg rice).

Year	Central Coast						
	Total	Region V*		Sweet potato And cassava change rice**	Total	Region V*	
		Rice	Sweet potato and cassava change rice**			Rice	Sweet potato and cassava
1976	207	170	36	216	175	91	
1977	213	162	51	200	149	51	
1978	257	189	68	206	141	65	
1979	251	180	71	209	150	59	
1980	243	174	69	185	125	60	
1981	250	184	66	230	165	65	
1982	255	202	55	242	182	60	
1983	250	195	55	227	197	47	
1984	281	224	57	246	197	49	
1985	304	247	57	229	183	46	
1986	276	228	48	250	200	50	

• Region V (Quang Nam-Da Nang, Quang Ngai, Binh Dinh, Phu Yen, Khang Hoa and Thuan Hai) and Region IV (Thanh Hoa, Nghe An, Ha Tinh, Quang Binh, Quang Tri and Thua Thren).

** Source: Information office; computer. Ministry of Agriculture and Industry, 1988.

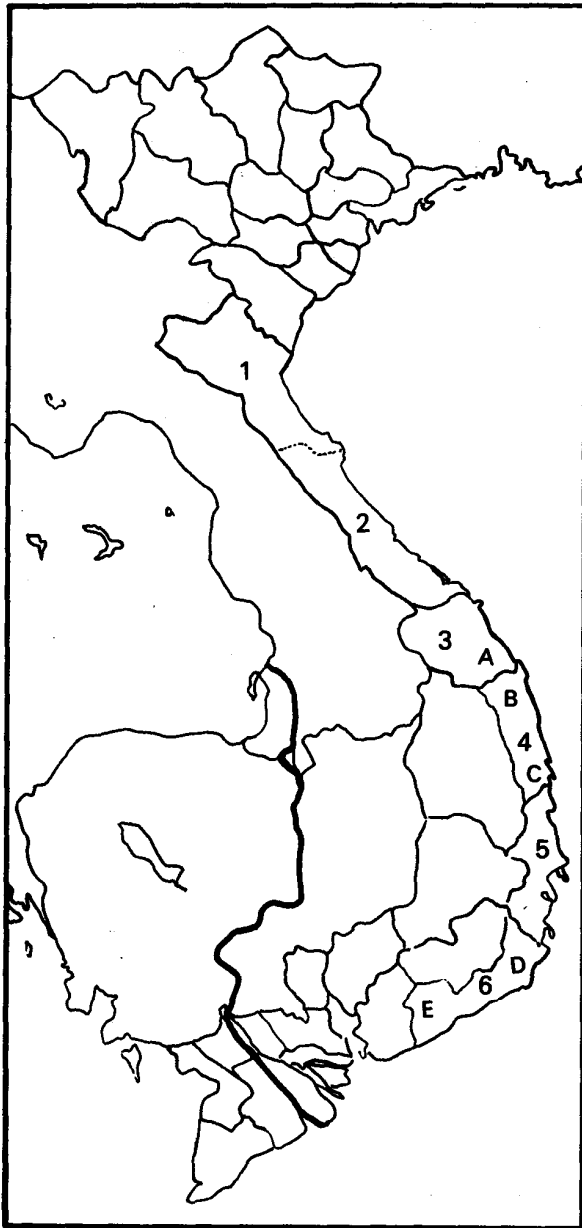


Figure 1 Map of Viet Nam

Provinces:

- 1. Nghe Tinh
- 2. Binh Tri Thien
- 3. Quang Nam Da Nang
- 4. Nghia Binh
- 5. Phu Khanh
- 6. Thuan Hai

Districts:

- A. Theng Binh
- B. Binh Son
- C. Phu Cat
- D. Ham Thuan Nam
- E. Ham Tan

Sweet potato is suitable for poor sandy soils, poor gray soils and poor families.

The prevailing socio-economic conditions in the agro-ecological zone mentioned in section A, indicate that for many years to come, sweet potato will remain a very important food crop on the central coast of Viet Nam. There is an urgent need to have suitable policies for sweet potato production.

Yield potential of sweet potato

On the central coast, existing varieties are of local origin. They are mostly planted with a low input. It is possible to increase sweet potato yield by using superior varieties and intensive farming methods.

Processing and utilization potential of sweet potato

At present, sweet potato is basically for home consumption. Farmers, traditionally, eat sweet potato and have some experiences in sweet potato processing. There is a need for research on sweet potato processing. It can be processed into noodles, crackers, cake, and alcohol, as farmers have traditionally done.

Supports from international organizations, particularly CIP

Eight percent of the world's sweet potato production is concentrated in the Asian and Pacific region, which includes Viet Nam, where the sweet potato area is second largest in the world. In Viet Nam, the central coast plays an important role in sweet potato production. This region needs to be supported to ensure the improvement of sweet potato production.

The International Conference on Soybean Processing and Utilization

Gongzhuling, Jilin Province, The People's Republic of China, June 25-29, 1990

C.E. van Santen*

The International Conference on Soybean Processing and Utilization was held in China, in the area in which soybeans were first cultivated by mankind, some five thousand years ago.

The conference was held at the Jilin Academy of Agricultural Sciences, in Gongzhuling, Jilin Province, from June 25-29, 1990. It was followed by visits to the Chinese Academy for Agricultural Sciences and the Chinese Scientific Research Institute for Foods and Fermentation Industry, both in Beijing.

The conference was attended by three hundred participants, approximately one-hundred coming from twenty five different countries, with the remainder from China.

The programme included the presentation of nearly ninety papers. Participants also visited the soybean institute of the Jilin Academy of Agricultural Sciences in Gongzhuling, where they were shown over the laboratories and experimental fields.

Demonstrations were made, of small and medium sized machinery for the processing of soybean produce, such as various types of milk, flour, ice cream, artificial-meat-fish and seafood, noodles, sweets, chocolates and cakes. All these products were based on soybean, and samples were shown and available for organoleptic testing.

Reviewing the ninety papers presented during the conference, one notices that on a world-wide basis, many countries are currently involved in extending both the utilization and production of soybean. This drive to increase the utilization of soybean is due to the increasing awareness of its nutritional value and unique characteristics: a high percentage of protein (35-40%), unsaturated fats (20%) vitamins (especially B12) and essential minerals (such as calcium phosphate and iron). Soybean products are either used directly for human consumption, or indirectly through livestock produce. In addition, soybean derivatives are used for many industrial purposes such as

the production of soaps, inks, oil, cloth, glues and fibre materials.

This drive to extend the utilization of soybean produce is supported by a rapid expansion in the area under soybean cultivation; both for countries traditionally producing soybean and countries where soybean has been recently introduced. Striking examples given were: India (1970 less than 10,000 ha, 1989 over 2 millions ha), and Nigeria (1970 none, in 1989 nearly 300,000 ha). It was also indicated that the soybean area in the USA, Brazil, Argentina, China, Thailand and Indonesia, has increased considerably during the last three decades.

The following report was compiled by grouping the papers presented at the conference, into the following categories.

Papers presented on the utilization of soybean covered four main categories:

1. Traditional soybean foods

Reports on traditional soybean foods came mainly from East and Southeast Asia. Presentations were made by representatives from China, Japan, Korea, Indonesia, Thailand, Israel and the USA. Two types of soybean foods were reported on:

- (i) Traditional processed and non-fermented soybean foods:
 - *Tofu* (bean curd)
 - Soybean milk
 - Soybean cheese
 - *Yuba* (a derivative of soybean milk)
 - *Kinako* - a full fat soybean flour
 - Bean sprouts
 - Soybean vegetables: endamame
- (ii) Traditional fermented soybean foods:
 - *Tempe* - soybean fermented with *Rhizopus* bacteria
 - *Miso* and *shoya* - sauces based on soybean flour mixed with wheat or rice flour and fermented with *Aspergillus*
 - *Kecap* - soybean sauce, extracted with brine
 - *Tauco* - roasted and fermented soybean paste, on a brine basis
 - Soy fermented cheese
 - *Oncorn* - soybean cake mixed with starch and fermented

2. Soybean oil and soybean cake

Presentations on this subject were made by participants from Japan, India and the USA. It was indicated that at present in many other countries

* CGPRT Centre, Bogor

of the world, soybean oil is used for cooking and soybean cake for livestock feed.

3. Soybean products used to reinforce conventional and/or traditional foods

Presentations on this subject were made by participants from Brazil, Guatemala, Nigeria, Zambia, Ethiopia, Tanzania, Malawi, Pakistan, Nepal, Bangladesh, India, Sri Lanka and Viet Nam.

In all cases, these papers described projects aimed at increasing the nutritional value of local foods. The problem of possible consumer rejection of these new types of food was bypassed by mixing soybean flour or other soybean derivatives with maize, cassava, wheat or rice flour. This increases the nutritional value of these flours and raises the protein, fat, vitamin and mineral contents of the flour traditionally used. Other programmes focused on mixing cow or buffalo milk with soybean milk. In most reported cases, products reinforced with soybean components were used for baby food, food programmes for school children and programmes for other low income groups with inadequate diets.

4. Soybean products used to substitute conventional foods

Presentations by participants from China, Japan and the USA, explained how soybean products were used to replace conventional foods such as meat, fish, seafood and ice cream. The main purpose of this replacement was to arrive at a cheaper and healthier diet, with cholesterol free food containing unsaturated fats and vegetable protein, rich in minerals and vitamin. This provides an alternative to conversion of soybean through livestock feeding, a methodology which is wasteful and expensive, and does not contribute to sustained agricultural development.

There was wide interest in soybean processing techniques, and the attendant technologies involved. A special focus of the conference was to examine these two aspects, in conjunction with users requirements:

a). On the principles of processing and preserving soybean

A number of presentations, mainly by participants from Japan, P.R. China and the USA, discussed principles of preserving and increasing protein levels in soybean derivatives. This included defatting soybean cake and related chemical issues such as deflavouring soybean products.

b). On the development of technologies and machinery to process soybean

A number of presentations, mainly by participants from P.R. China, Japan, India, Guatemala and the USA, discussed technologies and predominantly small-scale machineries to process soybean into products such as: soybean flour, soybean milk, and imitation meat, fish, seafood, noodles, ice cream, chocolate, sweets and cakes. Most of these presentations were made by representatives of private industries involved in this work.

Breeding of soybean varieties with specific characteristics to meet the users requirements

Presentations by participants from China, Japan, Nigeria, Taiwan, Korea and the USA, explained how soybean breeders are including specific characteristics when breeding new soybean varieties. These have been requested by various groups of users, mainly soybean processing industries.

The arrangements made for the conference by the host organization, the Jilin Academy for Agricultural Sciences, were very good. All participants were grateful for the efforts made by Dr. Sun Huan, the Vice President of the Jilin Academy, and his staff.

Market Channels, Quality Incentives and Contract Harvesting: The Case of Maize, and Groundnut

Taco Bottema*
Klaus Altemeier**

Background

In the last ten years significant changes have occurred in the production and marketing of secondary crops, especially in Java. During *Repelita III*, rice yields in Java increased at an annual rate of 5.5% and maize, 4.2%.

In *Repelita IV*, with self-sufficiency in rice achieved, more explicit attention was given to policies which promoted diversification in food crop production. Rice yields grew in *Repelita IV*

* CGPRT Centre, Bogor.

** Secondary Food Crops Development Project, Academy for Educational Development, Jakarta.

by only 1.5% per annum, while maize yields grew at 4.7%. Groundnut yields remained stable.

Both production and demand for maize and groundnut expanded considerably, primarily driven in the case of maize, by increases in human consumption and use for animal feed. (Tabor and Gijsbers 1987). Maize production increased from 4,029,000 tonnes in 1978, to 5,931,000 tonnes in 1986. The proportion used for animal feed increased from approximately 30% to 40% in the period 1981-1986 (Departemen Pertanian 1988). Groundnut is primarily used for snacks, and consumption remained steady at 2.5 kg per capita per year (Departemen Pertanian 1988).

Since the mid-1980s, the animal feed industry has developed rapidly in Java, with a strong tendency in recent years towards large-scale feed mills. Institutionally, the use, processing and distribution of groundnut products, are strongly connected with the rural and urban informal sector in Indonesia (Hayami *et al.* 1987). Hayami, in a case study conducted in West Java, found a most intricate pattern of producers, village collectors, assembly traders, small and larger scale cottage industries and co-operatives.

A relatively recent but major component in the diversification of food crops, is quality development. Studies on maize by various government agencies indicate that farmers have few incentives for quality improvement. Two government surveys on groundnut reported that domestic production often fails to meet market requirements. Although the government employs a floor price linked to quality standards for maize, the system has rarely been used.

Contract Harvesting In Non-rice Crops

A careful study of the harvesting system employed by villagers and traders, is crucial in identifying the beneficiaries of post-harvest activities which increase the value of harvested grain. Contract harvesting is widespread in both rice and non-rice crops. In cases where farmers choose to sell a standing crop, contract harvesters should be included among beneficiaries of postharvest research.

Literature on contract harvesting of secondary crops is less rich. Dorosh and Mink (Timmer 1987, p. 207-8), noted the importance of contract harvesting in maize, and explained it by the lack of a premium for drying and storage at farm level. Pasaribu (1985), concluded that the *tebasan* system in East Java was beneficial to cassava smallholders because it allowed them more time for other activities. The use of contract harvesting in

cassava in West Java was confirmed by Hayami *et al.* (1987), who observed that its value lay in speed of harvesting and sale of the perishable crop.

Market Rewards: New Findings

In 1987 the Directorate of Food Crop Economics in the Department of Agriculture undertook an examination of the role of grain quality in price formation and marketing practices for maize, and groundnut. The study, carried out in 1987 and 1988, used data from two different sources. Farm level information regarding farm-gate price and grain quality was generated by a survey conducted by the Central Bureau of Statistics in 1986. For each price observation, samples of the products were analyzed according to specific quality indicators. These data were collected in the main production area, East Java. A second set of data was collected by staff of the Directorate of Food Crop Economics in April-May 1987, in East Java, Lampung and Jakarta. This survey also covered, maize and groundnut. Table 1 summarizes the number of respondents at the various market levels and the size of the samples.

Table 1 Number of Respondents and Sample Size, Price and Quality Survey, 1987a

Market Level	Maize		Groundnut	
	Respondents	Sample	Respondents	Sample
Farm/Field traders	269	269	19	13
Area wholesalers	15	21	5	
Provincial wholesalers	6	8	7	19
Feed industry	13	27		
<i>Tahu</i> processors	-	-	-	-
<i>Tempe</i> processors	-	-	-	-

Source: Altemeier, Bottema and Adinugroho (1989).
 a A technical report is available (Altemeier, Bottema and Adinugroho 1989). b For maize from Central Bureau of Statistics.

The Market System. Figure 1 outlines the marketing system for maize, and estimates the relative importance of different marketing channels. The marketed surplus is around 60% of total production. After subtraction of waste and use for seed, total production is estimated at just below 5 million metric tons per year. The main production area for maize, East Java, produces 50% of the total Indonesian output.

The marketed surplus in East Java is channelled from farmers through contract harvesters (25%) and field collectors (*pedagang pe-*

ngumpul) (75%), to area wholesale traders (*pedagang tingkat kecamatan*), who play a key role in the Indonesian maize trade. Approximately 70% (2 million metric tons) of the marketed surplus of maize finds its way to feed mills and the feed industry. Another 20% is sold to other industrial users, mainly for human consumption (for example, the coffee industry). The remaining 10% is channeled through interregional traders (*pedagang borongan*) in Surabaya to the outer islands, or exported.

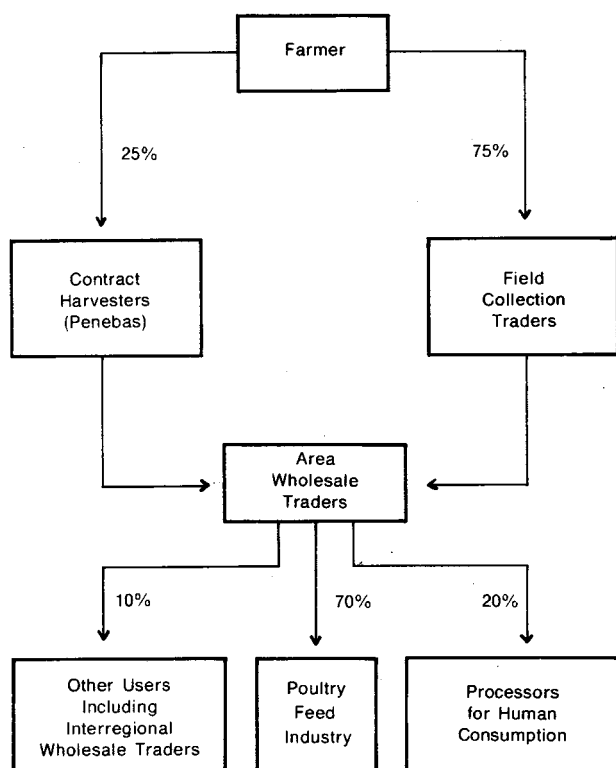


Figure 1 Marketing Channels for Maize in East Java

Source: Surveys conducted by the Department of Agriculture (1984, 1985, 1987 and 1988).

Maize is usually harvested on the cob and then dried. The kernels are removed from the cob by hand or with small implements, further dried, and packed in bags. The main harvesting period starts in December and ends in February. Since these are the months with the heaviest rainfall in East Java, sun-drying is very risky. In the absence of dry storage facilities, the best way to avoid losses is to sell the harvest quickly. This is then stored at the district wholesale trader's (*pedagang tingkat kabupaten*).

Virtually all animal feed processors buy maize on contract; only a small proportion, less

than 10%, buy directly, without contracts. 50% of area wholesale traders work on short-term contracts with farmers, and 30% of interregional traders work on short-term contracts with district traders. Interregional traders often act only as brokers between the production area and buyers from deficit areas. Contracts normally relate to a fixed period of two to four weeks.

Quality Standards

Primary data show that only one indicator, namely moisture content, is carefully checked by all market participants. 50% of feed factories scrutinised other characteristics, such as aflatoxin, foreign matter content and damaged and diseased grain content. Only 20% of area wholesale traders checked indicators other than moisture. Implicit prices for quality characteristics at various market levels are summarized in Table 2. It should be noted that moisture content of maize must not exceed 13% if it is to be in storage for some time at an average temperature of 27°C. Almost none of the samples taken conform to this requirement. However, almost all produce fell well within the range of the government standards for moisture content: 14%, 16%, and 18% for the various quality classes.

Table 2 Quality Incentives for Maize by Market Level
(increment in Rp per kg for each indicator)

Indicators	Market Level		
	Farmer	Wholesale Trader	Animal Feed Industry
Moisture content (1% reduction)	1.467 (0.359)*	1.250 (0.588)*	
Damaged grain (1% reduction)	0.375 (0.337)		0.342 (0.102)'
Other colour (1% reduction)	0.014 (0.25)	0.021 (0.17)	0.325 (0.247)
Freedom from infestations or diseases		0.563 (1.49)	7.650 (2.379)'
Density (reduction of 1 g per litre)		0.28 (0.033)	
Weight (reduction of 1 g per 100 grains)			1.064 (0.374)*
Arjuna variety		3.246 (1.43)'	

Note: Standard errors in parenthesis.

* Significant at a 95% level.

Source: Department of Agriculture, Price and Quality Survey, April 1987, Departemen Pertanian 1988.

Study results indicate that incentives to reduce moisture content for grain to 20% or less, are minimal. However for maize with over 20% moisture content, the incentive for sun-drying is significant, exceeding drying costs and the loss from weight reduction. The break-even point for mechanical drying (which costs Rp 2-4 per kg) seems to be very close to that for sun-drying, at a moisture level of 21%. Incentives to dry maize close to the farm gate thus have a 20% limit. The benefits are enjoyed either by farmers, contract harvesters or field traders.

The absence of damaged and diseased grain is rewarded only by the animal feed industry. This may reflect a premium for sorting maize at the wholesale level. The vigilance of animal feed industry buyers is likely to be determined by the intended storing time, which at present appears to be around three months. No distinction at feed industry level was made between domestic and imported grain.

Groundnut

The Market System. Figure 2 shows the market system for groundnut in Tuban, East Java. Groundnut is harvested by farmers and by contract harvesters. The product is channelled through area wholesale traders to interregional wholesale traders, who play the key role in the national trading of groundnut. Interregional wholesale traders also handle imported groundnut. The major harvesting occurs in May and June, which is also the dry season. In the survey area, 40% of groundnut was harvested by the farmer and 60% by contract harvesters using the *tebasan* system. At the village level, all groundnut is sold in unshelled form. The area wholesale traders play a key role in linking the small traders with the wider groundnut trading system. They often provide short-term credit to contract harvesters and field collection traders. As in the case of maize, contract harvesters and field collection traders often act as mere commissioners. Interregional traders may store groundnut for several months.

Because of substantial imports of groundnut, the price for domestic groundnut at the interregional wholesale trade level is influenced by the price of imported groundnut. This ensures good national and interregional integration of the groundnut market. The consequence of this structure is that national producers and operators have to work within the limits of the price of imported groundnut.

Quality Standards. The main indicators used by traders at area wholesale and

interregional wholesale levels are grain size, foreign matter content and damaged or shrivelled grain content. Moisture content seems to be checked by a larger proportion of traders at the interregional wholesale level.

It is interesting to note that most wholesalers in different regions use the same quality grading system, which is based mainly on grain size (diameter):

- I. 8 mm (diamter 8-9 mm)
- II. 7 mm (diameter 6-7mm)
- III. OB (diameter < 6 mm)
(Onbeschadigd - undamaged)
- IV. BS (all sizes) (Beschadigd
- damaged).

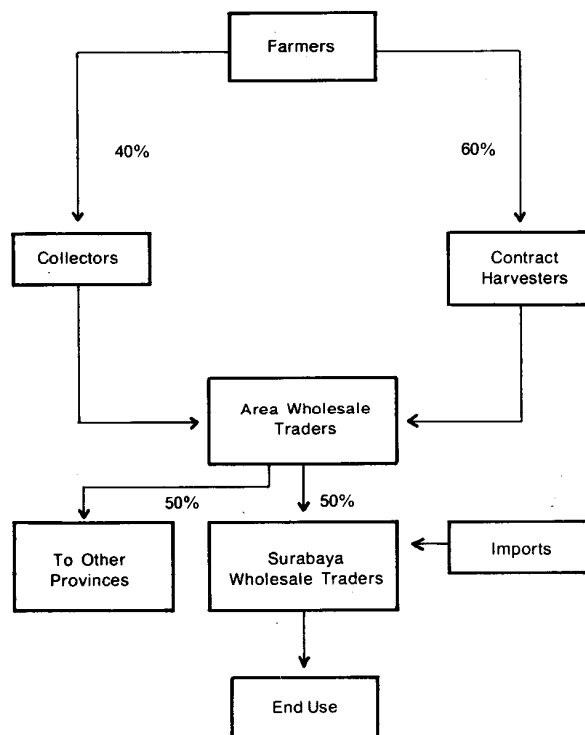


Figure 2 Marketing Channels for Groundnut in East Java

Source: Surveys conducted by the Department of Agriculture (1987 and 1988).

Foreign matter and damaged grain are rather important. Area wholesale traders pay more attention to these characteristics than do interregional wholesalers. This suggests that cleaning and sorting take place on the area wholesale level. At all market levels, grain size, foreign matter content, moisture content and damaged or shrivelled grain content are checked. The similari-

ty between the major quality indicators for groundnut and those used in the case of maize is evident.

Quality and Price Formation. Sorting is done to distinguish the various quality characteristics. At the area wholesale trade level, moisture content seems to be lower (8.3%) in the largest grain class than in the smallest grain class (9.3%). For both area wholesale and provincial wholesale levels, a similar pattern is visible regarding damaged grain. At the provincial level, moisture content falls from 8.3% in the 6-7 mm class to 7.4% in the over 7 mm class. At both levels the foreign matter content is extremely small. Most of the cleaning is conducted at the district level.

A major difference between domestic and imported groundnut is colour; 71% of imported nut has a dark colour whilst only 31% of domestic is dark. The price level of imported groundnut shows less variance than the domestic groundnut. Surprisingly, the maximum price of domestic groundnut was found to be higher than the maximum price of imported groundnut.

Implicit prices for various quality characteristics at different market levels are summarized in Table 4. At the farm level, the most important quality indicator was identified as foreign matter content. At the district trade level, premia are paid for reductions in colour variation, damaged grain and split grain. Provincial wholesalers make strong price differentiations with respect to diameter.

Conclusions

Market Incentives and Imports. Incentives at trade and factory level in the case of groundnut, indicate differences between the domestic and imported product and diversity of end uses. Domestic grain of a quality comparable with imported grain, is sold for similar a price, indicating that there is no discrimination against domestic grain. It is very interesting to note that there is no market reward for quality improvement in maize which might result in commercially viable activities for market participants. At farm level, no pay-off could be identified for any quality improvement activity in respect to present varieties of maize and groundnut.

In their response to present market requirements and rewards, the marketing systems for maize and groundnut are efficient. The absence of quality premia in maize is perhaps best explained by seasonal imports, which reduce the need for well-dried grain for the larger indus-

tries. Maize is also an important source of food, and lower quality maize may be consumed in the household.

Table 4 Quality Incentives for Groundnut by Market Level , (increment in Rp per kg for each indicator)

Indicators	Market Level		
	Village	District	Province
Foreign matter (1% reduction)	35.188 (9.544)'		
Single seed pod (1% reduction)	2.416 (1.416)		
Other colour (1% reduction)		34.356 (22.454)	
Damaged grain (1% reduction)		7.062 (3.266)'	
Split grain (1% reduction)		2.446 (1.561)	
Moisture current (1% reduction)			18.093 (12.538)
Diameter (1 mm increase)			59.570 (24.284)*

Note: Standard errors in parenthesis.

• Significant at a 95% level.

Source: Department of Agriculture, Price and Quality Survey, April 1987.

Price formation for both crops is influenced by imports during the off-season. The effects of these imports, though, are different. They have reduced incentives for the animal feed industry to invest in storage facilities for maize, but may have improved continuity for small-scale and cottage industry processors of groundnut. This is significant for the maintenance and expansion of employment in agriculture-based industries and informal sector activities. The relatively liberal import policies for maize and groundnut are useful in maintaining some price linkage with the world market and applying pressure on domestic maize and groundnut producers to sustain and expand efficiency.

Quality Differences: Maize and Groundnut.

The significant difference in moisture content between maize (16.5%) and groundnut (9%) throws an interesting light on the comparative efficiency of the informal and formal sectors. It may safely be assumed that the major proportion of groundnut is purchased, processed and distributed in the informal sector, which consists of traders, small-scale processors and peddlers. In contrast, maize plays a bigger role in large-scale industries. The feed industry buys a major proportion of domestic maize. One would expect, on the basis of comparison with the performance of large-scale industries

overseas, a relatively higher quality standard of maize stocks than our study found. Our findings suggest the hypothesis that, in the case of the primary indicator of moisture content, the informal sector realizes higher quality standards in grain stocks than the larger industries which buy maize.

Observations regarding traders' practices in grading and assessing quality standards, clearly reveal that government quality standards for groundnut lag behind accepted market practices. Government standards could be upgraded without being unrealistic. Traders in fact explicitly reward grain size, while market moisture content is significantly lower than government standards. In the case of maize, government standards seem to be more in line with established practices, which, especially with regard to moisture content and infested grain, leave much to be desired.

Contract Harvesting: A Farmer's Option. In comparing harvest practices for both crops, it is interesting to observe that an estimated 25% of maize production is contract harvested, while for groundnut the figure is 60%. Usually one can observe a large proportion of contract harvesting in a major production centre of a commodity. Contract harvesters work with small margins under heavy competition. Since they frequently work on contract with wholesale traders, they cannot permit unused space in their vehicles or afford waiting periods. To confirm this, data on production centres with more scattered production are necessary.

The place of the commodity in the cropping sequence, and its effect on sun-drying opportunities and availability of labour, are important. In the case of the second crop, to be harvested at the onset of the dry season, the *penebas* may have strong incentives to engage in contracting because of the ease of drying. Farmers in that period may be inclined to contract their crop if they can obtain off-farm income and if they have

other agricultural commitments after the second crop. Wage levels are of importance.

The variations in significance of contract harvesting in maize and groundnut, support the observation of Hayami and Kikuchi that local factors are of primary importance. Additional research covering different production systems and crops is necessary, to clarify important issues such as the influence of area specialization and perishability of produce.

Possible Interventions and Developments. With respect to external policy interventions, only the introduction of large grain size varieties of groundnut, might increase farm income slightly. Conclusions regarding a change in the cropping sequence of groundnut, cannot be drawn. In the medium term, the setting of nutritional standards in the animal feed industry might have beneficial effects for the crop and livestock production system as a whole. However, it may be difficult to enforce adherence to such standards. Economic pay-offs should be sufficient to motivate market participants, but information sector nutritional standards might be difficult to realize.

A change in trade policy could have far-reaching' effects. Increased imports, in a situation where world market prices are significantly lower than domestic prices, would put more pressure on domestic producers and processors. On the other hand, reduced imports would result in more investment in storage and higher consumer prices. The present import system seems to hold the middle ground between these two extremes.

A longer term spontaneous development, which might shape market structure and rewards, is a trend towards distinct regional specialization in a limited range of commodities. The continued thrust of diversification in agriculture is likely to result in increased area specialization, and harvest and production systems as well as the market system, will probably adapt gradually.

CGPRT Centre News and Activities

Centre to Distribute IDRC, and APO, Publications in Indonesia

Publications produced by the International Development Research Centre in Canada, and the Asian Productivity Organization in Japan, are now being distributed in Indonesia by the CGPRT Centre. This service allow individuals living

in Indonesia to obtain IDRC, and APO publications more conveniently and at less cost due to lower postage rates. A price list is available from the Publications Section. Other international agricultural organizations wishing to improve their distribution in Indonesia, are invited to contact the Publications Section for more information.

New Publications

Plant Resources of South-East Asia I: PULSES

Recently, the Centre and PUDOC, which is based in the Netherlands, have co-published a low-cost edition of "Plant Resources of South-East Asia 1: PULSES". This is for distribution only in South-East Asia and the Pacific. This publication deals with pulses currently being used and those that could be expanded in South-East Asia. Pulses are defined here as the dry edible seeds of legumes, which are members of the family Leguminosae. Among the crops included are: groundnut, pigeon pea, chickpea, soybean, lablab, grass pea, lentil, horse gram, tepary bean, runner bean, lima bean, common bean, pea, faba bean, moth bean, adzuki bean, are, black gram, mungbean, bambara groundnut, rice bean and cowpea. A glossary explains the terms used.

L.J.G. van der Maesen and Sadikin Somaatmadja (eds.). 1990. 105 p. ISBN 979-8059-336. Price Rp 7.500/US\$ 4.00.

The Centre distributes "The Corn Economy of Indonesia"

This book is published by Cornell University Press, and the Centre has the rights of distribution in Southeast Asia and the Pacific. It is based on extensive fieldwork by a team of seven economists from Stanford and Harvard University, in collaboration with several Indonesian institutions. It integrates three approaches: (1) the commodity system approach, (2) the macro-trade approach, and (3) the food policy approach. This book will be valuable to policy analysts and planners interested in the Indonesian agricultural economy; in corn as a commodity, and, in intercommodity linkages in dynamic food systems.

C. Peter Timmer (chief contributor). 1987. 302 p. ISBN 0-8014-1961-1. Rp 55.000/US\$ 25.00.

New Journals in Region

It is most heartening to note the increasing availability of scientific information in Asia. It is especially noteworthy that the number of scientific periodicals is increasing, to fulfill the need for up-to-date information on the various trends and research activities currently taking place.

One such publication is the Indonesian Food Journal published by the Badan Urusan Logistik

(BULOG). The purpose of this journal is to present material on food policy issues or related aspects. The current issue is devoted to food diversification with contributions by Indonesian and foreign experts, covering a wide spectrum of topics. For information on this publication contact:

BULOG (National Logistic Agency) Food Information Centre
Jl. Jend. Gatot Subroto 49, 1st fl.
Jakarta
Indonesia.

Another new publication is the Asian Potato Journal. This publication is a timely response to the rapidly growing potato industry in Asia. Its objective is to promote the exchange of scientific and general information relating to all phases of the potato industry among Asian countries. As well, it seeks to assist international co-operation in the study of problems of common interest. For further information contact:

Asian Potato Journal
The Asian Potato Association (APA)
c/- The International Potato Centre (CIP)
Box 933,
Manila
Philippines.

New Staff

The CGPRT Centre has recently received a new research associate, Dr. M.F. Lancon from France. He has been provided under the UN associate expert scheme and funded by the French Government.

Dr Lancon holds a Ph. D. in Economic Science from the University of Paris. He has had previous overseas experience working on research projects in the Ivory Coast and Togo. We are pleased to welcome him to the Centre and look forward to a close and mutually productive collaboration.

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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