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## **Labour Employment and Income Generation in Maize Production, Marketing and Processing in Pakistan**

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### **Introduction**

The national agriculture research, education, and extension education system in India is one of the largest in the world, both in terms of its size and the complexity of activities undertaken. The system has basically two components, viz the Indian Council of Agricultural Research (ICAR) and the state agricultural universities (SAUs). ICAR, as an apex body at the national level, is mainly responsible for promoting and co-ordinating agricultural research, education, and extension education activities in various branches of agricultural and allied sciences including crops, horticulture, animal science, fisheries, and agroforestry. It also undertakes research, both basic as well as applied, on diverse problems of national importance concerning various aspects of agriculture through its own research network. The research network of ICAR is rather extensive, consisting of 45 institutes, 4 national bureaux, 9 project directorates, 21 national research centres, 71 all India co-ordinated research projects, and over 700 ad hoc research schemes. About 6,500 scientists are employed in the ICAR system. The state agricultural university system has 28 SAUs, with each province in India having at least one

Food legumes and coarse grains (FLCG) constitute a significant part of the crop subsector, sharing about 15 percent of the total cropped area in the country during 1990/91. Maize, sorghum, millet, mungbean, mash, chickpea, lentil and peanut are the main crops belonging to FLCG group in Pakistan. Thus FLCGs, as a group, contribute substantially to the GDP generated in the crop sector. The total production of FLCGs accounted for 12% of the total production of food grains in 1990/91.

In the FLCG group, maize is the most important coarse grain of the country occupying about 4% of the total cropped area. During 1990/91 maize was grown on 845 thousand hectares which is about 26% of the total area under FLCG crops in Pakistan. Total maize production was more than 50% of the total production of FLCG crops during the same year.

In addition to employment opportunities in production, maize processing and poultry feed industries have also emerged, absorbing labour in rural and urban areas. There was no maize processing industry prior to 1952 and all

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\* Pakistan Agricultural Research Council, Islamabad, Tarnab and Faisalabad, Pakistan. This paper was presented at a regional workshop on Marketing and Processing of Food Legumes and Coarse Grains: Their Effect on Expanding Rural Employment in Asia, Serdang, Malaysia, May 24-27, 1993.

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requirements were met by imports. The major maize processing units such as Rafhan and Fauji Cereals were established during the early fifties, and Glaxo and Sethi during the mid and late sixties. The poultry feed sector has experienced phenomenal growth during the last decade, especially after the mid 1980s. As a result, there are now eight maize processing firms and over 70 poultry feed mills in the country.

The growth in maize processing is subsequent to changes in maize consumption patterns. Although wheat is the staple food of the population, maize grain is consumed to supplement wheat supplies. Therefore, a major portion (75%) of all maize grown in the country is traditionally consumed as human food. However, a steady shift in the pattern of maize consumption as direct human food has been observed and maize is being consumed more in processed forms such as corn oil, starch, glucose, sweetener for soft drinks and as a component of poultry feed. The establishment of a large number of feed mills during 1986/87 and increases in installed capacity of processing units is a fair reflection of the change in the maize consumption pattern. Consequently, the demand for maize as food has declined in the recent past while demand in the processing and poultry feed sectors has risen sharply. Therefore, future demand for maize in the commercial market will mainly be for industrial uses and manufacturing poultry feed. The demand for maize as a poultry feed is expected to increase rapidly in the future as it is growing at a rate of 7% per year compared with a 2% rate of growth in demand as human food during the period 1985-2000. Further investments to increase plant size indicate that there is a great demand for industrial maize byproducts and with the increase in population and rural to urban migration, industrial demand for maize will accelerate.

Considerable research, both biological and socio-economic, on maize and other FLCG crops has been under way at national and provincial levels. The socio-economic research has been deficient on aspects of production, marketing and processing of these crops. In particular, little information is available on the extent of opportunities for employment and income generation in production, marketing and processing of these crops.

The available studies at best present a partial description of maize processing and marketing without treatment of labour absorption in this area. The major purpose of the present exercise is to

assess the employment opportunities and the extent of income generation in maize production, marketing and processing through study of a sample of farmers and the poultry feed industry.

### **Objectives**

The objectives of this endeavor are:

1. To study the production, marketing and processing of maize in Pakistan;
2. To identify the labour employment and income generating opportunities in production, marketing and processing of maize; and
3. To estimate the extent of labour employment and income generated in production, marketing and processing of maize.

### **Methodology**

This study is based on primary data collected from three major sources: maize growers, maize processors, and poultry feed millers.

The provinces of Punjab and North West Frontier (NWFP) are the principal maize producing areas. Statistics show that area and production of maize in NWFP is greater than that of Punjab and that home consumption of maize in NWFP is higher. Consequently the maize marketable surplus available for the processing industry is greater in Punjab. In addition, the spring maize mainly grown in Punjab is used for processing purposes, while the summer crop is consumed as food. Therefore, almost all the major maize processing and other maize utilizing industries such as poultry feed mills are located in the Punjab, except for a few in other provinces, eg. NWFP and Sindh. Therefore, this study was conducted in Punjab province and maize growers of the two major spring maize producing districts (Okara and Toba Tek Singh), eight maize processing firms, and 68 feed manufacturing firms in the Punjab were included in the study.

Comprehensive questionnaires were designed for maize growers, processors and feed millers. These questionnaires were pre-tested and the survey was undertaken after finalizing the questionnaires. For the formal survey, a sample of 50 maize growers was interviewed. Characteristics of the sample farmers are given in Table 1.

# Editorial

## Expanding Rural Employment Through Marketing and Processing CGPRT crops

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Unemployment and under-employment are the most crucial problems facing many developing countries in the region. While rates of increase of total populations have generally been declining, the number of entrants born in the earlier birth wave into the labour force is still increasing. In the 1990s, the average annual growth of regional labour forces is estimated to range from 3.8% in Pakistan to 1.0% in Singapore. Labour force growth of this magnitude can be handled by a nation whose economic growth is in the range of 5 to 9% annually.

The likely outcomes of the high rate of increase in the labour force are high unemployment and under-employment, heavy rural to urban migration, excessive exploitation of land including forests, and

inequity between the rural agricultural sector and the urban sector led by manufacturing and service industries. In Indonesia, for example, the number of jobless people, mostly in rural areas, is currently estimated at 29 million or 38% of the total work force. The employment problem could become socially and politically explosive if it is not properly resolved.

It becomes more important to create remunerative employment opportunities particularly in rural areas, since the urban sector is unable to absorb all new-entrants to the labour market. Under circumstances of minuscule farm size with little possibility of enlargement, rural employment opportunities should be sought by generating additional employment sources in both on-farm and off-farm activities.

The programme of the CGPRT Centre, emphasizing agricultural diversification, post-harvest activities and market development of new products, has been conceived to generate more employment and consequently more income for rural populations. In fact, clarifying and specifying the employment and income

generation effect of CGPRT crops was one of the main objectives of the Centre's programme in recent years.

The latest undertaking of this sort is a series of studies regarding rural employment effects of marketing and processing of food legumes and coarse grain crops. A workshop jointly organized with the Malaysian Agricultural Research and Development Institute identified the issues and areas for improvement in the development of marketing, processing and utilization of CGPRT crops in this regard. Indeed, it is recognized that the employment generation effect of CGPRT crops is significant, particularly in the marketing and processing stages, in view of their high ratios of commercialization and high degrees of transformation.

Case studies from a number of Asian countries were presented at the workshop. In this edition of Palawija News, cases from Malaysia and Pakistan are presented. They, together with other studies, indicate a direction of rural development which could contribute to equitable and sustainable development of the entire economy.

**Table 1 Characteristics of the sample farmers.**

Item	District		
	Toba	Task Singh	Okara
<b>PERSONAL</b>			
Average Age (yr)	41	40	41
Farming Experience (yr)	23	18	21
Education (%)			
Illiterate	31	29	30
Up to 10 yr of schooling	66	47	52
> 10 years of schooling	13	24	18
Family Size (no)	12.9	11.9	12.5
<b>FARM RELATED</b>			
Farm/Cultivated Area (ha)	15.9	31.2	22.3
Power Source	(Percent Farmers)		
Own bullock	3		2
Own tractor	79	86	82
Rented tractor	7	14	10
Bullock + rented tractor	10		6
Tenancy			
Owner	41	38	40
Tenant	35	48	40
Owner/tenant	24	14	20
Irrigation Source			
Own tubewell		24	10
Canal + own tubewell	76	76	76
Canal + rented tubewell	24		14

Of the total of six operational maize processing firms/units, four were studied. These processors were M/s. Rafhan Maize Products, M/s. Fauji Cereals, M/s. Sethi Maize Products and M/s. Glaxo Laboratories. In the poultry feed sector 68 poultry feed mills of different installed capacities are operating in the study area. To select an adequate representative sample, the feed mills were classified on the basis of their manufacturing capacity and a sample of 21 poultry feed mills of different categories was selected for the formal survey. Over 61% of the sample mills had an installed capacity of up to 10 metric tons per hour.

The study is mainly concentrated on analysis of the maize production system with emphasis on labour employment and income generation opportunities at three levels: firstly, at the farm level to see labour participation in maize production and marketing; secondly, in maize processing with reference to the size of maize processing industry and its capacity to absorb rural/urban labour; and thirdly, labour participation in the poultry feed industry.

Maize marketing has been described with respect to farmers' marketing channels and their labour inputs. The maize market situation has been discussed with reference to the number of mills, their operational capacity, the nature of competition and . thereby market performance in maize processing and the feed industry to understand the possibilities of expansion in the industry. The market description, however, does not present an in-depth analysis of the theoretical compatibility. The study is, therefore, mainly descriptive and the results should be interpreted in view of this limitation.

At the time of the study, 1 US\$ was equivalent to about 25 PRs.

### Maize production scenario

Despite increased domestic and commercial uses of maize, area and production remained stagnant over the last decade. Area and production grew at average annual rates of 2.1 and 2.9% from 1947 to 1988. However, yield per hectare increased considerably (11.2%) in 1977/78 over the yield in 1970/71. Similarly, yield per hectare has not improved much in the last decades.

Examination of the cropping systems of the sample maize growers revealed that spring maize, after potato and wheat, was the most important crop occupying 21.4% of the total cropped area. The normal summer crop was cultivated on about 6.5% of the cropped area.

The cropping intensity was over 190% in the study area with little variation between the two study districts. Cropping intensity on farm size and tenure basis was comparable.

### Labour employment

Employment of labour in maize production was estimated for various operations (Table 2). It was noted that harvesting and threshing of maize were the most important operations providing maximum (about 505 man-hours per hectare, mh/ha) employment to farm labour. Harvesting and threshing operations consist of several activities, of which picking of cobs and removal of sheaths from cobs are the major ones. The next important operation was application of irrigation consuming about 232 mh/ha, followed by thinning (53.3 mh/ha) and tillage (11.5 mh/ha), respectively.

**Table 2 Labour employment for various operations of spring maize by tenancy status.**

Operations	Owners	Owner-cum Tenants	Tenants	All
	- Tenant			
	(Man-hours/ha)			
Tillage	11.02	11.81	10.77	11.47
Disc ploughing	4.69	6.05	4.45	5.46
Tractor ploughing	4.55	4.18	4.57	4.35
Tractor planking	1.78	1.58	1.75	.66
Sowing and Bund	5.73	3.95	5.56	4.74
Drill sowing	3.11	2.55	3.48	2.87
Bund making	2.62	1.41	2.08	1.88
Interculture	14.01	10.38	8.25	10.03
Bullocks	10.01	5.14	4.94	5.51
Tractor	4.00	5.24	3.31	4.52
Fertilizer Application	7.98	7.24	7.54	7.39
Transport	2.57	2.69	2.35	2.62
Spreading - DAP	2.20	1.83	2.30	1.88
- Urea	3.21	2.72	2.89	2.89
Thinning	39.86	63.68	42.80	53.74
Irrigation	193.58	243.39	187.57	231.58
Canal	40.62	47.05	73.61	48.33
Tubewell	74.11	115.62	33.36	103.19
Canal + tubewell	74.50	74.01	74.13	74.11
W. course cleaning	4.35	6.72	6.47	5.96
Pesticide Application	21.74	29.73	25.50	27.01
Dusting	11.27	15.89	13.52	14.43
Spraying	10.48	13.84	11.98	12.58
Harvesting &	457.1	534.63	509.99	505.39
Picking cobs	52.51	175.84	187.25	170.92
Collect. of cobs	31.70	45.89	28.39	38.70
Trp. to dry field	21.65	29.16	24.29	26.07
Removal of covers	64.62	194.22	185.70	184.58
Drying of cobs	17.87	18.56	23.40	19.30
Threshing/shelling	38.55	29.70	35.98	32.84
Bagging	30.29	39.78	24.98	32.99

Labour employment on a tenure basis indicates that owner-cum-tenants were putting in more labour on harvesting and threshing (about 535 mh/ha), irrigation (243.4 mh/ha) and thinning (63.7 mh/ha) compared to other tenurial categories. A similar situation emerged for labour use on a farm size basis.

In general, three types of labour were employed in maize production, i.e. family labour, permanently hired and temporarily/casually hired labour. The family labour consisted of both male and female labour while permanently hired labour always comprised of males only. The study reveals that family labour was employed in almost all operations. However, irrigation and harvesting/threshing operations consumed a larger number of family labour hours. Tillage operations were mainly carried out by permanent hired labour, while this

labour also participated in application of irrigation (81.7 mh/ha), harvesting and threshing (42.1 mh/ha) and pesticide application (13.2 mh/ha). Temporary hired labour was mainly employed in harvesting/threshing operations, in which case female labour was employed for 389.5 mh/ha but male labour only for 23.1 mh/ha. Studies on female participation in maize production operations showed that 70-80% of the female respondents took part in harvesting and removal of sheaths from maize cobs. During peak periods of labour use, demand for labour exceeds that of supply and wage rates paid are higher than the average for the whole year.

Temporarily hired female labour also performed the thinning operation (37 mh/ha). This shows that employment opportunities were available to varying degrees for all types of labour. Temporarily hired labour, including female labour, was more attracted by the one-time operations of harvesting and threshing.

### Maize marketing

In the study area, spring maize growers retained a negligible portion of maize for fodder and virtually all the maize produced was marketed. It was also found that area under *kharif* (normal summer) maize was on the decline in Punjab province and was being shifted mostly to sugarcane production, whereas area under the spring crop was increasing mainly due to crop rotation (best fit after winter potato crop) and relatively low returns from wheat production. The curl leaf virus problem in cotton crop, if not controlled in the near future, is likely to induce changes in cropping patterns of the affected areas causing an increase in area under *kharif* maize in future.

A recent study reported that home consumption of maize was declining rapidly in NWFP. Since NWFP is the major home consumer of maize, a larger marketable surplus may become available from that province. At present, it is difficult to predict the net result of the above mentioned forces affecting the availability of maize.

Maize marketing was well organized in the study area, especially amongst the contract growers of Rafhan Maize Products. This company procures 35 percent of its total requirements from spring crop contract growers, while the remaining portion is procured from the open market. The main marketing channel of maize consisted of direct

purchase by Rafhan from the farms of its contract growers. Contract growers of maize were satisfied with the present procurement procedures and prices received from Rafhan, their extension services and production campaign. However, as the spring maize was mainly grown by large farmers, only they benefited from contract-farmer approach to maize production. Other companies buy maize through the village dealers.

Non-contract growers usually sell their maize surplus to commission agents directly or through village *beoparies*. In addition, these farmers also sell their surplus maize to Rafhan's authorized agents located in the grain market if market prices are lower than Rafhan's prices, otherwise they sell to other commission agents in the market.

### Labour employment in production and marketing

Total time for various types of labour employed (man-hours/ha) in production and marketing and its wage rates are presented in Table 3. The table shows that maximum hours of family labour (45.2) were utilized in maize production, while permanent hired labour was also mainly employed in this operation spending 161.6 mh/ha. Both male and female (temporary hired) labour was used primarily in maize production, female 658 mh/ha, and male 52 mh/ha. Wage rates are also given in Table 3.

**Table 3 Labour employment in maize production and marketing and their wage rates.**

Item	Type of Labour			
	Family Male	Permanent Hired	Temporary* Male	Hired Female
Labour employed for maize production (man-hours/ha)	45.2	161.6	52.1	658.0
Labour employed for maize marketing (man-hours/ha)	1.95	2.33	5.45	
Average Wage Driver* (PRs/hr)		6.16		
Labourer (PRs/hr)		4.58	4.58	2.73

\* Wage rates for permanent labourers calculated by considering 24 working days per month and 8 hours of daily work.

Income generated from different activities for all categories of labour is given in Table 4. Returns to family labour were PRs 222 per hectare while permanent hired labour earned PRs 782 per hectare or maize cultivation. Female temporarily

hired labour, however, got the highest return since women were involved in the most labour-intensive activity of harvesting/threshing and thinning. Overall, all types of labour received reasonable remuneration from all operations involved in production and marketing of maize.

**Table 4 Income by different categories of labour from spring maize production and marketing.**

Item	Type of Labour			
	Family Male	Permanent Hired	Temporary Male	Unemployed Female
Labour employed for maize production (man-hours/ha)	210	768	253	1,164
Labour employed for maize marketing (man-hours/ha)	12	14	25	
Total Labour Income (PRs/ha)	222	782	278	1,164

### Maize processing market

By now six major maize processing firms are fully functional. Of the six processing mills, four are located in the study area and have been studied. Capacity-wise, Rafhan, Faisalabad was the major processor followed by Glaxo, Lahore. Rafhan enjoyed the strongest position in the market as indicated by its present concentration ratio (a measure of market power) of 0.8. This market power has grown over time from 0.7. Thus, Rafhan Maize Products had captured 80% of the market, while the remaining three held only 20% of the market.

The above market structure shows that one major firm was dominating the whole market on both supply and demand sides. The concentration ratio of the major maize processors resulted in squeezing the business of two processing establishments in another province of Pakistan (not in the study area). This is a fair reflection of the conduct of the maize processing market. However, despite dominance of one major firm it was observed that the maize processing market was performing quite satisfactorily in terms of supply of a variety of quality processed items, though at relatively high prices compared to consumer incomes.

### Employment

Overall, Rafhan Maize Products provided more job opportunities than Sethi and Glaxo, respectively. Table 5 shows that Rafhan had the largest annual capacity, employing 773 man-years of labour. The number of employees at Glaxo was comparable with that at Sethi. Various processing units had three major operational divisions, namely, production, utility and engineering, and general administration and sales. Annual labour employment by divisions of labour in the main maize processors revealed that overall, more labour was engaged in the production division compared to the utility and engineering and general administration and sales divisions.

Labour was categorized into three types i.e. skilled, semi-skilled and unskilled. Management was categorized separately. Labour employment by skill revealed that unskilled labour utilization was approximately three times greater than that of semi-skilled and skilled labour (Table 5).

**Table 5 Annual labour employment (man-years) by skill in processing units in Pakistan.**

Mill	Unskilled	Semi-skilled	Skilled	Management
Rafhan Maize	510	190	59	14
Glaxo	81	34	12	3
Sethi	85	20	16	4
Fauji Cereals	67	25	7	2

The major operation in maize processing is grinding. The capacities of various sample units showed that overall, 7.1 man-years were consumed for grinding one thousand metric tons of maize. Labour utilization for maize grinding per thousand metric tons ranged 6.1 to 15.5 man-years.

The utilization of various types of man-power in different processing units per thousand metric tons is presented in Table 6. Overall, the man-years of labour employed to process one thousand metric tons of maize were the highest in the case of unskilled followed by semi-skilled and skilled labour.

**Table 6 Labour utilization for maize grinding (man-years/1000 mt) by type of labour in different processing units.**

Mill	Unskilled	Semi-skilled	Skilled	Management
Rafhan Maize	4.0	1.5	0.5	0.1
Glaxo	4.4	2.1	0.8	0.2
Sethi	9.4	2.2	1.8	0.4
Fauji Cereals	10.3	3.8	1.1	0.3
All Punjab	4.6	1.7	0.6	0.1

### Income generation

Questions about the monthly wages offered to labour of various skills by these processing units were observed to be very sensitive and complex cause of high variation in the technology involved for maize processing by various units. However, to present a fair assessment of income earned by the labour employed in maize processing, the information was computed on the basis of broad categories of labour, i.e. skilled, unskilled, semiskilled and management (which ranges from a highly specialized management level down to ordinary worker). Accordingly, minimum and maximum monthly salaries of labour of different skills engaged are presented. Salaries ranged from PRs 1,425 to PRs 2,000 for unskilled, from PRs 2,000 to PRs 2,500 for semi-skilled, from PRs 2,500 to PRs 10,000 for skilled labour. Management was getting from PRs 10,000 to PRs 40,000 per month in the sample feed mills.

### Poultry feed industry market description

The establishment of the majority of poultry feed units took place during mid 1980s. Out of the total of over 68 units in the country, 21 have been studied for the present analysis. The feed units have been categorized according to the installed capacity and annual maize and gluten requirements. The four major categories consist of capacity up to 5 mt/hour, 6 to 10 mt/hour, 11 to 15 mt/hour and 16 mt/hour or above. According to this classification it was observed that feed units falling in the installed capacity categories of up to 10 mt/hour captured about 62% of business volume in the sample market, followed by the category with capacity between 11 and 16 or above. The distribution shows that more than three-fifths of the sample feed mills had the installed capacity up to 10 mt/hour.

The operational area of a majority of sample feed mills was within their district of location. However, five large feed mills were also operating in other provinces. The poultry feed market structure shows that the feed industry was fairly competitive with regard to price setting and other market functioning. Because of this competitive structure, the industry was still growing, showing ease of entry of new feed units, especially those meeting feed requirements of their own poultry farms. Furthermore, the performance of the market was reasonably satisfactory with regard to supply of quality feed at fairly competitive prices. Although small feed units did not have a formal feedback mechanism for the products marketed, acceptance of their products by poultry farmers and lack of complaints about quality served as a satisfactory indicator of market performance. The feed units thus continued to produce and expand their capacity.

Feed selling agencies and poultry farmers reported that maize was the preferred cereal for use in poultry feed. Therefore, demand for maize in this sector is virtually unlimited. However, due to increases in the price of maize relative to other cereals such as wheat, barley and sorghum, feed producers have sharply reduced the total use of maize in feed preparations. The poultry sector is passing through a critical period of adjustment due to increased prices of feed, seasonal demand fluctuations, and reduced profits as a result of unplanned rapid expansion.

### Typical feed formula

Poultry feed ration formulae have been developed by the Poultry Research Institute, Rawalpindi, Pakistan separately for layers and broilers. Cereals like maize, wheat, rice, jowar and bajra constitute the major portion, 52% and 49% of the ration, respectively, of which maize is the major ingredient followed by wheat. Broken rice is another important component of the feed ration.

Feed manufacturers, however, try to use damaged cereals usually unfit for human consumption. Among these cereals, wheat serves as a cheap substitute for maize due to the high price of maize. This practice affects efforts to achieve self sufficiency in food, of which wheat is the staple, and quite often wheat imported for human consumption as a food security measure goes into feed manufacturing. It is, therefore, quite pertinent

to expand maize production to increase the supply to the feed industry at a 'cheaper, or at least, competitive price to avoid the use of wheat which could have been used for human consumption.

### Labour employment

Labour use has again been analysed with reference to various divisions of the firms to see their employment capacity and labour needs. The distribution of labour among different divisions in the sampled feed mills shows that the largest manpower group was engaged in production, followed by sales and management divisions. The sales division included more veterinary professionals to promote feed sales (Table 7).

**Table 7 Labour employment in various divisions of the sampled feed mills.**

Capacity	Management		Production		Sales			
	Sk	Unsk	Sk	Unsk	VD	VAC	OP	OSO
Up to 5 mt/hour	17	4	7	28	7	9	8	-
6 to 10 mt/hr	22	7	22	12	2	19	21	-
11 to 15 mt/hr	15	14	33	70	21	42	3	-
16 mt/hr and above	20	3	80	77	40	110	31	2
<b>Total Labour</b>	<b>74</b>	<b>28</b>	<b>142</b>	<b>297</b>	<b>87</b>	<b>182</b>	<b>42</b>	<b>2</b>

SK = Skilled      Unsk = Unskilled      VD = Veterinary Doctor  
VAC = Vaccinator      PO = Promotion Officer      OSO = Sales Officer

### Income generation

The question of the monthly wages paid to the labour of various skills employed in different divisions by the feed mills was again observed to be very sensitive and complex because of large variation in the technology used by various mills. So, the wages were computed with reference to the broad categories of labour, i.e. skilled, semi-skilled and unskilled, and minimum and maximum monthly salaries are presented (Table 8).

**Table 8 Monthly wage rates of labour of various skills in feed mills.**

Division/skill	Minimum (PRs)	Maximum (PRs)
<b>General</b>		
Skilled	5,000	15,000
Semi-skilled	1,200	2,500
Unskilled	1,000	2,000
<b>Production</b>		
Skilled	3,000	25,000
Semi-skilled	1,000	7,000
Unskilled	1,000	3,000
<b>Sales</b>		
Skilled	3,000	25,000
Semi-skilled	1,400	10,000

### Conclusions

The study, carried out in Punjab province of Pakistan on a sample of 50 maize growers, 4 processing firms and 21 poultry feed manufacturers, shows that maize served as a source of labour employment both in the farm and industrial sectors with great potential of expansion.

The contribution of maize as an employment generator has been less than satisfactory due to stagnant growth of area and production, although great potential exists for increasing production and yield. In view of the low yield of maize and consequent high prices, the food industry is using wheat as a substitute for maize, which is affecting the wheat supply for human consumption. By increasing maize production, we could improve the wheat supply and also reduce import bills for wheat.

Maize production, processing and feed sectors also provide opportunity to female labour which could help improve family income. In addition, the maize industrial sector provides jobs to professionals, such as veterinarians, especially in poultry feed manufacture and sales promotion, thus reducing unemployment of educated people in the country.

When framing policies and taking corrective measures to improve maize production, the whole sector, including production, processing and the feed industry needs to be kept in view. To do so, it would be appropriate to:

1. Improve production and management practices by adoption of packages of technology, increasing farmers' access to new knowledge and technology and input/output markets. The cumulative effect of absence of these 'factors keeps yields low.
2. Appropriate policy support is needed regarding prices, marketing, imports and improvements in the feed sector.

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# Processing and Marketing of Fresh Soybean Milk for Income and Employment Generation in the Klang Valley, Malaysia

T. Y. Tunku Mahmud and A. Abu Kasim\*

## Introduction

The food processing industry in Malaysia has been identified as one of the priority sectors for industrial development under the Industrial Master Plan of 1985. It is important to note that the food processing industry is still heavily reliant on imported raw materials such as maize for animal feed, raw sugar for sugar confectioneries, wheat for flour mills and milk powder for milk products. The food legumes and coarse grains (FLCG) contribution in this sector includes the manufacturing of sauces, essences, flavours, products from soybean, maize, sorghum and barley, traditional cakes and other products that cannot be classified elsewhere. A large proportion of this sector is made up of small-scale industries. In 1987, the number of people employed in this sector was 68,620 and the salaries and wages paid amounted to M\$ 478.1 million (US \$148 million). In 1990, the number of people employed increased to 75,088 and the salaries and wages paid amounted to M\$ 582.8 million (US \$224 million).

An interesting development taking place in the food processing industry is the increase in number of fresh soybean milk retailers in night and farmers' markets. Entry into this business is relatively easy because it requires low initial capital outlay and the raw materials are readily available. It appears that Malaysian consumers are acquiring a taste for this relatively new product. This is very encouraging and, if the demand continues to increase, the market will expand and thus generate more employment and income.

Malaysia imports substantial amounts of soybean for use in the food and animal feed industries. In 1991, the total import of soybean and soybean products (including soybean meal, soybean oil, soysauce and soybean flour) was

M\$ 551.1 million (US \$212 million) compared to only M\$ 15.1 million (US \$6 million) in 1970. The import of soybean alone amounted to 512,209 tons valued at M\$ 334 million (US \$128 million).

In the food industry, soybean is used to produce fermented and non-fermented products. The fermented products include soysauce, soybean paste and tempeh. Non-fermented products include soybean oil, soybean milk, various types of soybean curd (hard, soft, firm, and fried), taufu fah, yuba products (fucok), soybean sprouts and yong tau foo products.

Large companies produce soybean milk in tetrapaks or bottles that are generally available at most retail outlets. However, they are not generally found in night and farmers' markets. This study looks at the fresh soybean milk retailers at these markets in Kuala Lumpur and Petaling Jaya and assesses their background and performance.

## Objectives

There are three main objectives of this study:

1. To determine the number of establishments involved in the processing and marketing of fresh soybean milk and the employment generated in the Klang Valley.
2. To determine the income and expenditure of processors and retailers of fresh soybean milk in the Klang Valley.
3. To estimate the market size of fresh soybean milk in the Klang Valley.

## Data and Methodology

Primary data are required for the study. The targeted respondents are the fresh soybean milk retailers at night and farmers' markets. In order to make a random selection of the respondents, a listing of the fresh soybean milk retailers was requested from three government agencies responsible for issuing permits or licenses for these businesses. The Federal Agricultural Marketing Authority, the agency responsible for farmers' markets, listed twelve fresh soybean milk retailers at the various locations. City Hall, the agency responsible for issuing licenses to businesses at night markets in Kuala Lumpur, did not have a listing of fresh soybean milk retailers because most of these businesses were registered as beverage businesses. Nevertheless, City Hall was able to provide a schedule of night markets for 86 locations in Kuala Lumpur. Similar to the Petaling Jaya

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\* Malaysian Agricultural Research and Development Institute (MARDI), Malaysia. This paper was presented at a regional workshop on Marketing and Processing of Food Legumes and Coarse Grains: Their Effect on Expanding Rural Employment in Asia, Serdang, Malaysia, May 24-27, 1993.

municipality, there was no listing for the fresh soybean milk retailers. A schedule or timetable of the night markets for 16 locations was provided.

The study sample was selected by taking all twelve fresh soybean milk retailers from the farmers markets and two at each location of the night markets in Petaling Jaya and Kuala Lumpur. Cross-checking between the enumerators was necessary to avoid surveying the same retailer twice. All together, the total number of respondents was 79.

Prior to the survey proper, structured questionnaires were prepared and pretested. The questionnaires were modified and adjusted to suit the understanding of the retailers. The survey was conducted between the months of August and October 1992. At the time of the study, US\$ 1 was equivalent to about 26 M\$.

### Results of the analysis: background of respondents

The respondents surveyed can be classified into three groups. The first group (6%) is classified as processor cum wholesaler cum retailer. The second group (60%) is the processor cum retailer. The third group (34%) consists solely of retailers.

About 60% of the respondents started their businesses in 1988 and later. The earliest reported business started was in 1972, and the latest was 1992 (Table 1). Sixty-seven percent of the respondents are full-time fresh soybean milk businessman and 33% are part-timers. Among the part-timers, about 40% are conducting other business, 21% are government agency staff and the rest include labourers in construction or manufacturing and housewives.

**Table 1 Year business on soybean products started.**

Year	Percentage	Cumulative Percentage
1972	1.3	1.3
1977	1.3	2.6
1980	1.3	3.9
1981	2.5	6.4
1982	2.5	8.9
1983	2.5	11.4
1984	5.1	16.5
1985	6.3	22.8
1986	12.6	35.4
1987	5.1	40.5
1988	15.2	55.7
1989	7.6	63.3
1990	8.9	72.2
1991	13.9	86.1
1992	13.9	100.0

About 58% of the respondents started their business by trading in multiple products, i.e. fresh soybean milk, *taufu fah* and other beverages. Nineteen percent reported starting off with fresh soybean milk and other beverages, 15% with various soybean products and only 8% reported starting off with fresh soybean milk alone. Currently about 65% of the respondents are trading in multiple products and only 4% specialize in trading fresh soybean milk only.

Most of the processors (72%) initially learnt their processing techniques from friends. Thirteen percent reported they initially learnt the technique by themselves, 11% claimed from MARDI and 4% through other means. Although 72% of the respondents acquired the processing technique directly from friends, it is also possible that their friends acquired the processing technique from MARDI.

The average age of the respondents is 36. The youngest respondent was aged 17 and the oldest 66. About 58% of the respondents have gone through secondary education and the rest have finished primary education only. Most of the respondents are males (81%) and Malays (72%). The average number of family members staying with the respondents is 5.

### The number of establishments involved in processing and marketing of fresh soybean milk and the employment generated

The study revealed that the average number of fresh soybean milk retailers in each location of night and farmers' market is 3. At the bigger night markets, fresh soybean milk retailers number about 10, and at the smaller night markets, there is at least one (Table 2). Given that there are about 114 locations of night and farmers' markets in the Klang Valley, the estimated total number of fresh soybean milk retailers operating in these markets is 361. If we include the number of other fresh soybean milk hawkers operating during the day at public places such as shopping malls, the busy streets of Kuala Lumpur and Petaling Jaya, and also at hawker stalls that sprout every night around these places, the number could increase to about 500.

**Table 2 Number of fresh soybean milk retailers operating in one market.**

Numbe of retailers	Percentage
1	19.2
2	25.6
3	12.8
4	23.1
>5	19.2
Mean= 3.2	

The average number of fresh soybean . milk processors in each location of these markets is 2. In other words out of every three retailers, two are processors cum retailers. The number ranges from one processor to a maximum of 6 in some locations (Table 3). The estimated total number of fresh soybean milk processors in these markets is 242. Using the ratio of 2 processors out of 3 retailers, from the 500 retailers in the Klang Valley, the number of processors is 300.

**Table 3 Number of fresh soybean milk processors operating in one market.**

Number of processors	Percentage
1	51.0
2	16.3
3	12.3
4	12.3
>5	8.1
Mean= 2.1	

Employment generated can be estimated as follows. The average number of processors in each night market is 2, and the average number of workers involved in a processing operation is 2, usually a husband and wife team (Table 4). There are 114 night and farmers' markets in Kuala Lumpur and Petaling Jaya. This will give rise to employment of about 456 people. If we consider 300 fresh soybean milk processors in the Klang Valley, then the number of people involved in processing is 600.

**Table 4 Number of workers for processing soybean products.**

Number of workers	Percentage	
	Year started	1992
1	42.0	36.5
2	42.0	46.2
>3	16.0	17.3

In the case of retailers, the average number of retailers in each night market is 3, and the average number of workers involved in a retailing operation is 1.3 (Table 5). This gives a total employment from retailing fresh soybean milk of 445 people. Taking the estimated figure of 500 retailers in the Klang Valley, the employment generated from retailing is 650 people.

**Table 5 Number of workers for retailing fresh soybean products.**

Number of workers	Percentage	
	Year started	1992
1	72.0	69.2
2	28.0	30.8

### **Income and expenditure of processors and retailers of fresh soybean milk**

The variable costs, the gross revenue and the fixed costs for the three groups of respondents were aggregated and average figures found. Tables 6 to 8 present the average of the variable costs, fixed costs and gross revenues for the three groups.

#### *1. Processor cum wholesaler cum retailer*

The variable cost of this group is M\$ 5,068 per month. About 46% of the variable cost is due to the material cost. Another big component is the labour cost for processing (21%). Other costs, such as those for processing, retailing, and labour for retailing constitute the remaining percentage (Table 6).

**Table 6 Income and expenditure of processor cum wholesaler cum retailer.**

Variable Costs	M\$ per month
Total material costs for processing	2,321
Total other costs for processing	518
Total other costs for retailing	435
Labour cost for processing	1,040
Labour cost for retailing	<u>754</u>
Total variable costs	5,068
Gross Revenue	
Sales of soybean milk from retailing	2,304
Sales of soybean milk from wholesaling	1,061
Sales of other fresh soybean products from retailing	2,744
Sales of other fresh soybean products from wholesaling	<u>1,366</u>
Total Gross Revenue	7,475
Earnings per month M\$ 7,475 - M\$ 5,068	2,407
Fixed Costs	
Depreciation on machines and equipment	4,168
Interest on capital	<u>4,168</u>
Annual Fixed Costs	<u>8,336</u>
Monthly Fixed Costs	695
Net earnings per month M\$ 2,405 - M\$ 695	1,712

The gross revenue for this group is M\$ 7,475 per month. Almost 70% of the gross revenue comes from retailing. The retail value of sales from fresh soybean milk alone is about equal to the retail value of sales from other fresh soybean products. Based on the above figures, the average earnings calculated was M\$ 2,407 per month. Note that no allowance was made for interest payment or depreciation on the equipment used so far.

In terms of investment, the average cost of the processing machine is M\$ 21,301. The amount varies from a small inexpensive machine of M\$ 3,270 to a more sophisticated processing machine costing M\$ 65,150. The initial cost on retailing equipment averaged about M\$ 20,376. This ranges from a low of M\$ 669 to a high of M\$ 32,695. Therefore, the total initial capital outlay for group one averaged about M\$ 41,677. Assuming an average life span of the machine and equipment at 10 years and no salvage value, the straight line depreciation is M\$ 4,168 per year or M\$ 347 per month. This is the amount to be amortized over the ten year period.

Taking the interest payment at 10 per cent of the total initial capital outlay, the yearly interest payment will be similar to the amount for depreciation. Summing these two values gives the fixed cost incurred for the machines, equipment and interest on capital, which amounts to M\$ 8,336 annually or M\$ 695 per month. Subtracting this amount from the average earning of M\$ 2,407 per month, gives the net earning per month for group one of M\$ 1,712.

This group also reported increased sales now than when they first started the business. The average total retail sales, which was M\$ 3,700 in the year started, had risen to M\$ 5,048 per month in 1992. In terms of the average total wholesale sales per month there was a decline. Initially, the average total wholesale sales per month was M\$ 2,625. In 1992, it declined to M\$ 2,153.

## 2. Processor cum retailer

Most respondents (60%) come from this group. The variable cost for group two is M\$ 2,092 per month. About 31% of the cost is due to the materials, 25% due to the labour for retailing, 20% due to the labour for processing, followed by other retailing and processing costs (Table 7).

**Table 7 Income and expenditure of processor cum retailer.**

Variable Costs	M\$ per month
Total material costs for processing	651
Total other costs for processing	168
Total other costs for retailing	328
Labour cost for processing	419
Labour cost for retailing	526
Total variable costs	2,092
Gross Revenue	
Sales of fresh soybean milk	1,336
Sales of other fresh soybean products	<u>1,332</u>
Total Gross Revenue	2,668
Earnings per month M\$ 2,668 - M\$ 2,092	576
Fixed Costs	
Depreciation on machines and equipment	1,675
Interest on capital	<u>1,675</u>
Annual Fixed Costs	<u>3,350</u>
Monthly Fixed Costs	279
Net earnings per month M\$ 576 - M\$ 279	297

The gross revenue from retail sales amounts to M\$ 2,668 per month. The revenue from the sale of fresh soybean milk is equal to the sale of other fresh soybean products.

The average earning generated by this group is about M\$ 576 per month. Considering the labour costs accruing to the operator himself, the returns to him can be M\$ 1,521 per month.

In terms of the initial capital outlay for the processing machines, the average cost was M\$ 3,217. This ranged from a low value of M\$ 200 to a high of M\$ 13,410. About 60% of the respondents in this group spent about M\$ 2,000 and less on the processing machines. In terms of the retailing equipment, the average initial cost incurred was M\$ 13,529. The values ranged from a low of M\$ 214 to a high of M\$ 46,190. About 50% of the respondents spent less than M\$ 10,000 on the retailing equipment.

The total initial capital cost for group two is M\$ 16,746. Assuming again an average life span of 10 years for the equipment and machines, the straight line depreciation gives a value of M\$ 1,675 per year or M\$ 140 per month. Considering interest payment equal to the amount for depreciation, the fixed cost amounts to M\$ 3,350 per year or M\$ 279 per month. Subtracting this amount from the average earning per month of M\$ 576, gives a net earning of M\$ 297 per month.

This group also reported an increase in the total retail sales per month compared to the year they started. Initially, the average total retail sales per month was M\$ 1,441. In 1992, the average total retail sales per month was M\$ 2,206.

### 3. Retailers

The variable cost of the retailers is M\$ 1,165 per month. The material cost accounts for about 52% of the total variable cost, while other costs for retailing account for 21% and labour cost the remaining percentage (Table 8). The gross revenue amounts to M\$ 1,556 per month. The contribution of revenue from fresh soybean milk is about 56% compared to 44% from other fresh soybean products. The average earning per month is M\$ 391.

**Table 8 Income and expenditure of retailers.**

Variable Costs	M\$ per month
Total material costs for retailing	607
Total other costs for retailing	247
Labour cost	<u>311</u>
Total variable costs	1,165
Gross Revenue	
Sales of fresh soybean milk	875
Sales of other fresh soybean products	<u>681</u>
Total Gross Revenue	1,556
Earnings per month M\$ 1,556 - M\$ 1,165	391
Fixed Costs	
Depreciation on equipment	930
Interest on capital	930
Annual Fixed Costs	1,860
Monthly Fixed Costs	155
Net earnings per month M\$ 391 - M\$ 155	<u>236</u>

The initial cost outlay on retailing equipment, was M\$ 9,298. This ranges from a low of M\$ 207 to a high of M\$ 36,280. Assuming an average life span of the equipment at 10 years and no salvage value, the straight line depreciation is M\$ 930 per year or M\$ 78per month.

Adding the interest payment (10% of the total initial capital outlay) to the depreciation gives the fixed cost of M\$ 1,860 per year or M\$ 155 per month. Subtracting this amount from the average earning per month of M\$ 392 gives a net earning of M\$ 236 per month.

This group also reported an increased total retail sales per month now as compared to the initial year, when the average total retail sales was M\$ 1,123. In 1992, the average total retail sales was M\$ 1,401.

### The market size of fresh soybean milk

The average sales per month of fresh soybean milk was M\$ 1,371 (Table 9). If there are 500 fresh soybean milk retailers in the Klang Valley, then the total sales per month is M\$ 685,500.

**Table 9 Overall average sales per month of fresh soybean milk.**

Value (M\$)	Percentage
<1001	55.7
1001 - 2000	25.3
2001 - 3000	12.7
3001 - 4000	2.5
>4000	3.8
Mean = 1371	

On the other hand, if we consider the average number of retailers in each market as 3, and the average sales per month of fresh soybean milk at one location is M\$ 902, then considering 114 locations, the market size is M\$ 308,484 (Table 10). If the number of locations is extended to include other places besides the farmers' and night markets, say by 200 locations, then the market size is M\$ 541,200 per month.

**Table 10 Average sales per month of fresh soybean milk at one location.**

Value (M\$)	Percentage
<501	38.0
501 - 1000	25.3
1001 - 1500	20.3
1501 - 2000	11.4
2001 - 2500	2.5
2500	2.5
Mean = 902	

## Discussion and conclusions

Our findings show that the first group (processor cum wholesaler cum retailer) performs better than groups two and three. The net earning per month from this group is M\$ 1,712 while the monthly net earning from groups two and three are M\$ 297 and M\$ 236, respectively.

The income generated from this business is considered commendable especially for the group one entrepreneurs. The figure compares favourably with the national mean household income of M\$ 1,167 in 1990. Although the monthly net earning of group two is lower than the national average, the labour charges accrue to them, raising their income to M\$ 1,521 per month. However, the monthly income for group three from this activity (M\$ 547) is lower than the national average.

The findings show that 33% of the respondents are part-timers. None of them fall into group one. All of them venture into this business to supplement their household income. The majority of respondents are in group two, i.e. processor cum retailer. This could be due to more retailers moving into processing. The decline in the wholesale value from group one indicates that some of the retailers who were formerly buying from them have graduated into processors themselves, since processing is relatively simple and the technology is easily accessible, especially from MARDI.

Group one uses a higher level of processing technology. For example, 60% use the more advanced cooking technique of steam injection whereas only 9% of the respondents in group two use this technique (Table 11). The average investment of group one on the processing equipment alone amounted to M\$ 21,301 compared to M\$ 3,217 for group two.

**Table 11 Types of stoves used.**

Types of stoves	Processor cum wholesaler cum retailer (%)	
	Processor cum wholesaler (%)	Processor cum retailer (%)
Steam injection	60.0	8.7
Gas	20.0	78.3
Kerosin	20.0	6.7
Firewood	0	4.3

In terms of total fixed capital outlay, group one spent M\$ 41,677 followed by M\$ 16,746 and M\$ 9,298 for groups two and three, respectively. This indicates that group one is more receptive and willing to invest in new technology. They are more committed and determined to succeed in this business.

The majority of the respondents (65%) are trading in multiple products, 14% in multiple fresh soybean products and 4% specializes in fresh soybean milk only. Since the study concentrates on fresh soybean products, the actual income of those involved in trading multiple products is certainly more than that reported in this paper.

The existing market size for fresh soybean milk is estimated to be about half a million Malaysian dollars a month in the Klang Valley. As more people acquire a taste for soybean products, the market will expand, thus generating more income and employment opportunities.

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The case of the emerging market for soybean milk shows that the use of food legumes in Malaysia has extended to the local processing and distribution of beverages. At this point processing and distribution are linked, so that small entrepreneurs have direct control over costs of

processing. It is possible that in the future, with growing consumption, division of labour will emerge between processing and distribution. A condition is that the product would need to have a reasonable distribution shelf life.

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## CGPRT Centre News and Activities

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### ***Regional Training Course: Market Research and Surveys Related to CGPRT Crop Development***

February 7-21, 1994, Bogor

Sixteen participants from Bangladesh, Lao PDR, Indonesia, Malaysia, Nepal, Myanmar, Pakistan, Philippines, Thailand, Sri Lanka and Viet Nam attended the Market Research Course at the CGPRT Centre. The Centre's staff was assisted in the design and execution of the course by Mr. Hoky Siregar and Dr. Bonar Sinaga (Institut Pertanian Bogor).

The course was comprised of case studies completed by working groups, individual assignments, a two-day field study and various presentations from guest speakers. Interspersed among these sessions were plenary sessions in which the ideas and methods from the completed assignments and presentations were discussed.

The case work completed in the first week of the course involved the examination of market participants in a rural market, organizational definition, development of appropriate research questions, and the development of methodologies for undertaking market research. The course tried to emphasize quick, cost effective yet accurate approaches to market research. The cases had been designed to give the participants the knowledge necessary to design and execute a market field study of their own choosing.

The groups conducted their market research study in the first two days-of the second week of the course and presented their results on day three. Given the time limitations under which the field studies were completed, the groups' results were quite outstanding.

The balance of the second week was devoted to individual presentations, plenary discussion and presentations from guest speakers. The speakers included Mr. Djidji Surjadi (Sub-Directorate of Farm Economics and Processing), Dr. Rantetana (ESCAP), Dr. Napitupulu (ESCAP), Dr. Fredrick Lancon (CIRAD), Dr. Roger Montgomery, and Bungaran Saragih (Director of IPB Centre for Development Studies).

The participants in their evaluation of the course made it clear that the goal of imparting knowledge of agricultural marketing systems was achieved. The course also provided an opportunity for the participants from many countries in Asia to exchange ideas and experiences. Undoubtedly the majority of the participants returned to their countries with new ideas about market research.

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### **The 3<sup>rd</sup> International Symposium on Integrated Land Use Management for Tropical Agriculture**

To be conducted in Indonesia from 5 to 16 September 1994

The symposium provides opportunities through a series of keynote addresses, field tours and workshops for land use managers to discuss the real and practical issues that need to be considered in planning and implementing sustainable land management strategies for tropical environments. The theme for the 1994 symposium, People in Agriculture, focuses attention on the role of the community, and in particular women, in the development of successful and effective land use systems. It highlights the progress made by Indonesia in harnessing the country's most valuable resource, its people, in developing programs to achieve sustainable agricultural production.

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Papers that address issues related to land management, land use planning and sustainable development from the perspective of land users are welcomed. Papers therefore should deal with technical, environmental, sociological, economic and political issues that influence the development and implementation of effective land use programs.

The cost of the symposium, US\$ 1950 per participant, includes accommodation, airfares to Yogyakarta/Denpasar, field tours, and registration.

For further information, contact:

The International Land Use Management Secretariat,

C/- INI ANSREDEF

PO Box 1093, Bogor Boo 16010, INDONESIA

Tel: 62 251 332 750 Fax: 62 251 333018

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### **Training Program on Computer Simulation of Crop Growth and Management Responses**

August 8-19, 1994, Florida

The program describes practical approaches to simulating the effects of soil, climatic, and management factors and their interactions with the nutrient needs in crops. Key topics of the course include:

- \* Demonstrating how the processes of crop development and growth, water use, uptake of nutrients and response to fertilizer can be simulated. Extensive hands on practical sessions on micro-computers will be used for applying simulation models to cropping systems worldwide.
- Applying methods to assess the economic risk associated with resource use in real world problems.
- \* Organizing procedures for managing soil, crop, and weather data. Techniques for simulation of synthetic weather sequences will also be described.
- \* Extensive use of CERES (maize, wheat, rice, sorghum, cassava) and CROPGRO (peanut, soybean and dry bean) models for crop growth, development, and response to water and nutrients. All models are integrated into the DSSAT V3.3. software package which is provided to each participant.

Participants will learn how a comprehensive simulation model of crop growth and nutrient dynamics is constructed and how this can be applied to real world problems.

For information contact:

University of Florida

International Training Division

Academic Programs, IFAS

PO Box 110480

Gainesville, FL, USA 32611-0480

Tel: 904-392-3166 Fax: 904-392-3165

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### **International Soyfoods Fair and the Third Asian Symposium on Non-Salted Soybean Fermentation**

June 4 - 6, 1994, Akita City, Japan

This event, a scientific and cultural forum with food exhibition and cooking demonstration, is being held in order to deepen understanding about the use of soy products and review the value of soybeans in Japan as well as world-wide. At the International Fair, the possibility of introducing soybean use in various African countries to help deal with the current food crisis will be examined, based on the overall results from the latest research. Moreover, in the future, through international exchange the organizers hope to pursue the cooperation of various Asian countries with established soybean dietary habits.

For further information contact:

Symposium Executive Committee Director,  
Seihan Yamada, do Akita International  
Association Aidex Bldg, 8F, 2-1-60 Sanno, Akita,  
JAPAN 010

**Attention Readers:**

If you wish further information about any event announced here, contact the responsible party. Further information is not available from the CGPRT Centre.

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## **PROSEA: Plant Resources of South-East Asia Second International Workshop**

7-9 November 1994, Cisarua, Bogor, Indonesia

PROSEA is:

- \* an international programme, focused on South-East Asia;
- \* interdisciplinary, covering the fields of agriculture, forestry, horticulture and botany;
- \* a research project making existing knowledge available for education and extension;
- \* ecologically focused on promoting plant resources for sustainable tropical land use systems;
- \* committed to rural development through diversification of resources and application of farmers' knowledge.

The Second Workshop is a forum for scientists, policy-makers and donor agencies in order:

- \* to highlight the importance of the plant resources of South-East Asia;
- \* to review the progress made in the Phase 1991-1995 towards international cooperation, the documentation and information system, and publication of the Handbook;
- \* to make recommendations for the Second Implementation Phase 1996-2000 on all aspects of the programme, but with special attention to dissemination.

For further information contact:

Secretariat  
Second PROSEA INTERNATIONAL WORKSHOP  
P.O. Box 234, Bogor 16122, INDONESIA  
Tel: (0251) 322859 Fax: (62) (251) 322859

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## **Second International Conference on Asia Pacific Economic Modelling with symposium on Productivity and training course about Productivity Measurement**

August 22-24 and August 24-26, 1994, Sydney, Australia

In 1993, the IVth Australasian Economic Modelling Conference was specifically on modelling the Asia-Pacific Economy. Given the success of last year's conference, we have decided to run a conference annually on this topic and we thus name the 1994 conference, the IInd Asia-Pacific Economic Modelling Conference. The conference aims at enhancing Asia-Pacific economic cooperation through the interaction of economic researchers and modellers in the region. In addition to a range of contributed papers, there will be a special symposium on Productivity.

Contributed papers are invited on all aspects of general equilibrium and macro and micro econometric modelling. Applied papers on the Asia-Pacific region and on productivity issues in particular would be very welcome.

Training Course on Productivity Measurement: over the three days before the conference, we will present a series of lectures showing the state-of-the-art in production function estimation and productivity measurement at the macro and micro levels. The course will provide an invaluable opportunity to listen to these speakers and discuss with them the major issues in productivity measurement today. A range of micro computers will be available for students to assess various statistical packages and to practice the techniques discussed.

For further information contact:

Director  
Economic Modelling Bureau of Australia Inc,  
GPO Box 1363, Canberra, ACT 2601,  
AUSTRALIA Tel: (06) 249 0430 Fax: (06)  
249 5570 Email: cph413@cscgpo.anu.oz.au

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### CGPRT Centre

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

### Objectives

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

### Programmes

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

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

### Palawija News

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

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

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