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Seed Quality of Secondary Food Crops in Indonesia

Udin S. Nugraha, H. Smolders and Nassir Saleh[*]

Background

Seed certification is generally considered the perfect vehicle to ensure the genetic integrity of new breeding products between seed production and farm production. Standard certification procedures and labeling guarantee the genetic and physical quality of seed. Through its label, certification represents an added value of seed. Certified seed is generally expected to increase income and welfare of farmers, and at the same time to increase national production. Based on these considerations and principles, seed quality control and certification have become integral parts of national seed policies and programs worldwide.

In Indonesia, seed certification was initiated by exercising some seed quality control in rice up to 1971 in Java and Bali. With the presidential decree on seed policy in 1971 and in the years that followed (Seed I project, 1971-1979), a start was made to develop a more modern seed program. Seed related agencies were established i.e. the National Seed Board, Sukamandi Research Institute for Food Crops (SURIF), the Seed Control and Certification Services (SCCS) and the National Seed Corporation (NSC, Sang Hyang Seri) to give structure to the new system. ISTA's international rules for seed testing were adopted for seed certification. Up to 1979, the testing and certification was limited to Java and to rice only. Since that year, small quantities of secondary food crops were tested and labeled. During the period 1978 - 1987 (Seed II project), SCCS received various equipment and incremental operational expenses, and expanded to 13 provinces; it established sub-units in the remaining 14 provinces. At the same time, new seed production centers and a seed training centre were established in Bogor. Existing seed farms were strengthened and many training courses were conducted.

Nowadays, all SCCS laboratories have the skills and capability to conduct standard tests for seed quality analysis and many can conduct additional tests such as seed health analysis (Table 1). Mini laboratories have recently been established in several provinces to minimize the distance from the laboratory to the farmers' seed fields. Besides staple food crops, commodities tested include seeds of vegetable crops and fruit trees.

[*] Seed Technologist, Research Institute for Rice, Sukamandi, West Java; Seed System Adviser, Palawija Seed Production and Marketing Project; and Virologist, RILET, Malang, Indonesia, respectively. This paper is taken from Integrating Seed Systems for Annual Food Crops, Proceedings of a Workshop Held in Malang, Indonesia, October 24-27, 1995. Monograph No. 32, Bogor: CGPRT Centre.

IN THIS ISSUE

Seed Quality of Secondary Food Crops in Indonesia
Udin S. Nugraha, H. Smolders and Nassir Saleh 1

Message from the Director 3

The Role of Chinese Rural Women in the Development of Agriculture
Tong Yu-e 11

CGPRT Centre News and Activities 16

International Courses and Meetings 16

In seed production, the following multiplication stages in Indonesia are distinguished: breeder seed (BS), foundation seed (FS), stock seed (SS), and extension seed (ES) (Table 2). Current seed regulations in Indonesia allow each seed stage to be multiplied up to five times, in order to guarantee sufficient source seed. One more seed class (pink-label or regulated seed) has been adopted with standards below that of ISTA, primarily to simplify and boost (government) seed supply programs. The important distinction between certified seed and regulated seed is that the latter does not require proof of origin of the seed. SCCS quite recently also recognized two categories of pink label seed: LMJ and TDL, of which TDL (*Tidak Diperiksa Lapang*) indicates that there was no field inspection involved, but stipulates the time of harvesting.

Table 1 Locations and capacity of SCCS stations in five provinces in Indonesia.

SCCS	Province	Staff		Samples/Yr	Samples of	Standard
		HQ	District		Secondary Crops	Analyses/Yr
SCCS III	East Java	68	66	6,453	19%	22,711
SCCS X	NTB	73	26	1,595	16%	5,924
SCCS I	West Java	120	51	3,276	14%	15,624
SCCS IV	N. Sumatra	56	27	2,168	13%	8,607
SCCS XII	D.I. Aceh	39	40	2,290	41%	9,322
SCCS	Indonesia	1,696	-	43,249	23%	151,661

* Secondary crops = maize, soybean, mungbean, and groundnut.
Source: SCCS, Directorate of Seed Development 1994/1995.

Table 2 Quality standards for certified and pink labeled seeds of secondary crops.

Crop	Variable/Seed class	FS (white/purple)	SS (purple)	ES (blue)	ES (1-4) (green)	LMJ/TDL (pink)
Maize	Germination, min %	80	80	80	70	70
	Moisture content, max %	12	12	12	12	12
	Pure seed, max %	98	98	98	97	97
	Inert matter, max %	2	2	2	3	3
	Off-types, max %	0	0.1	0.2	0.5	1
	Off-colored seed, max %	0.5	0.5	1	1	2
Soybean	Germination, min %	80	80	80	70	70
	Moisture content, max %	11	11	11	11	11
	Pure seed, max %	98	98	97	97	97
	Inert matter, max %	2	2	3	3	3
	Off-types, max %	0.1	0.2	0.5	0.7	1
Groundnut	Germination, min %	80	80	80	70	70
	Moisture content, max %	11	11	11	11	11
	Off-types, max %	0.1	0.2	0.5	0.7	1
	Other seeds/weeds, max %	0.5	0.5	1	1	1.5
Mungbean	Germination, min %	80	80	80	70	70
	Moisture content, max %	11	11	11	11	11
	Pure seed, max %	98	98	97	97	97
	Inert matter, max %	2	2	3	3	3
	Off-types, max %	0.1	0.2	0.5	0.7	1

Source: Guidelines for Certification, Directorate of Seed Development 1988, 1989.

National efforts to increase adoption of new varieties have been quite successful, especially in rice, soybean and maize, but less so in mungbean and groundnut, which have so far received little attention. Among these three crops, however, there are significant differences in the rate farmers replace their seed with certified or pink label seed. The annual seed replacement rate by farmers in Indonesia with certified seed use as a proportion of total seed use is 24% for rice, 4% for maize, 1% for soybean (6% including pink label), and <0.1% for mungbean and groundnut. The exceptionally high replacement rate in rice, the highest in Asia, contrasts with the low rate in soybean and maize. Although one would not expect high levels of replacement in secondary food crops similar to rice,

Message from the Director

The meetings of the Technical Advisory Committee (TAC) and the Governing Board (GB) of the CGPRT Centre for the year of 1996 were held at the Centre in Bogor, Indonesia, from 26 to 28 November and from 3 to 5 December 1996, respectively.

The TAC meeting was attended by nine members from nine countries and one officer representing the ESCAP Secretariat. The Centre invited a new member from the Republic of Korea this year. The Centre reported its activities in programmes of research and development, and human resources development and information services during 1996 and those planned for 1997 and beyond. The TAC acknowledged the achievements of the research projects and recommended further activities on women's role, impact analysis of trade policies and agricultural sustainability. The TAC expressed interest in the proposed projects related to the effect of trade liberalization and a dynamic atlas of Asian monsoon agriculture.

The GB was attended by the representatives of France, India, Indonesia, Japan, Papua New Guinea, Republic of Korea, Sri Lanka and Thailand, and chaired by the representatives of Thailand and India.

Overall activities and management issues of the Centre were reported to the GB. The GB expressed its general satisfaction with the Centre's programme activities in 1996 and planned activities for 1997. The monthly cash-flow movement of the institutional support resources was illustrated in detail. The GB noticed that the time gap between expenditures and the payment of contributions by member countries sometimes creates a critical condition in the financial management of the Centre and recognized the necessity of improvement of the Centre's financial status.

The representative of the ESCAP Secretariat informed the Board of the on-going ESCAP reform, and indicated that the Centre's activities would be covered under the theme of poverty alleviation and that no negative implications are anticipated for the Centre. The Centre expressed its strong hope that its actual function in agriculture should be maintained in the new thematic structure of the ESCAP Secretariat.

HARUO INAGAKI

the low replacement levels clearly signal difficulties with the supply of certified seed to farmers in secondary food crops.

The difficulty of supplying certified seed to small farmers is a complicated issue, which is widely acknowledged. New approaches to enhance farmer managed seed systems are being studied. For Indonesia, some have argued that certification procedures are too rigid and standards too high to facilitate cost-effective services. Lower standards, such as the quality declared seed, are less demanding on government resources and facilitate availability. The recent introduction of pink labels is a step toward greater flexibility. It is maybe too early to conclude, but so far, lower standards in Indonesia have done little to fuel demand for certified seed in secondary crops. Possibly, the reputation of the state seed companies has been affected, because of the generally low physical quality of the (pink label) seed supplied. To encourage the use of extension seed, the government is now planning to withdraw subsidies to pink label seed.

Thus, it is important that farmer seed systems be thoroughly studied to evaluate the impact of organized seed supplies. Various factors determine the financial benefit of improved seed to the farmer. Whether certified seed is really an improvement depends largely on the genetic potential of the seed supplied, the farmer's cropping environment, and the quality of the farmer's own seed resources. This paper presents preliminary results of two seed quality surveys conducted in the crops soybean and maize in Indonesia in 1994/95.

Survey objectives and methodology

Evaluation of seed quality in soybean and to a lesser extent in maize was undertaken using a two stage analysis. In the first step, the identification stage, an objective analysis of soybean seed quality in Indonesia was carried out. In this survey,

farmers' seed was analyzed in terms of genetic and physiological quality using laboratory and field techniques. In the second part, an attempt was undertaken to assess the incremental net benefit of improved seed as compared to farmers' seed. This was done by using the quality levels found in the first stage as a reference in on-farm trials. The surveys were implemented from August 1994 to October 1995.

The specific objectives of the first survey were:

- to determine the quality of soybean and maize seed at the farm level;
- to identify location specific and season specific seed quality deficiencies;
- to evaluate seed quality of certified seed and assess differences with farmer seed.

This survey was carried out in cooperation with the SCCS in five provinces, NTB, East Java, W. Java, N. Sumatra and D.I. Aceh. Field inspectors took seed samples from farmers at planting in major districts of the commodities concerned. At the same time farmers were queried regarding farming practices and seed source. Each sample was submitted to the main provincial SCCS laboratory and analyzed using standard ISTA tests on viability (sandtest), analytic purity, and 1000 seed weight. In addition, soybean seed coat discoloration (mottling) was determined and seed health analysis (seedborne fungal diseases only) carried out in a few provinces. In addition, SCCS routine test data were compiled to obtain data sets on the pre-market quality of certified seed.

The specific objectives of the second survey, which began halfway the first survey were:

- to determine the actual on-farm yield increase and net economic benefit of quality soybean seed to farmers;
- to obtain data on how farmers assess soybean seed quality in relation to their cropping pattern and farming practices.

This survey was carried out in the provinces of East Java and NTB, in cooperation with the BPTP (Assessment Institute for Food Crops) and the *Dinas Pertanian Propinsi* (Provincial Agricultural Services). Four villages were selected in East Java and two villages in NTB, each representing major soybean cropping systems. In each village, one farmer group was choosen, and, within these farmer groups, 7 to 10 farmers randomly selected. Each farmer received a set of three samples with respectively high, medium and low quality seed, enough to plant 50 m^2 from each sample. Farmers planted the seed along with their own field crops and were requested to apply their own farming practices. Seed was also sampled from the farmer's field at planting and sent to the SCCS laboratory for analysis. Survey staff monitored the planting, and determined the seed rate (from the balance seed), plant density and yield from each plot, including that of the farmer's field. Data were analyzed using each farmer as one replication. Farmers subsequently were interviewed to obtain information on seed source, farm inputs, prices and to assess the farmer's perception of seed quality.

Results

This section provides wherever necessary an interpretation of the survey data based on farmer interviews, personal observation and available literature. In addition, farmer soybean storage techniques are discussed, since farmer seed is believed to be vital when seed supplies become unreliable.

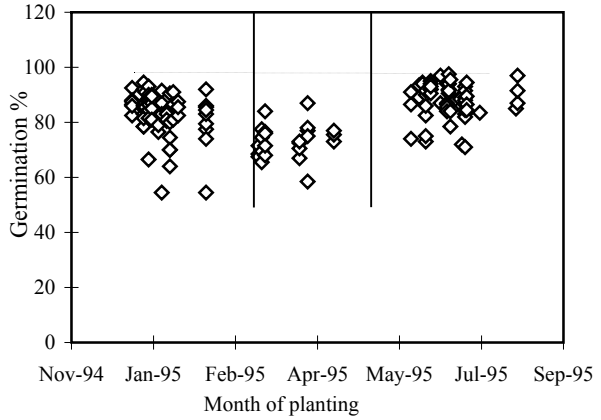
Physiological quality of farmer's soybean seed

Seed longevity of soybean poses a particular problem. In humid tropical conditions, seed maintains viability only for three to four months, beyond which viability of a particular seed lot rapidly decreases to unacceptable levels, to hit zero viability after 10 months open storage. Seed supplies are usually limited to the three month period following harvest. This is not sufficient for farmers to retain their soybean seed up to the next soybean planting, which is usually at least four months away. Many farmers, therefore, purchase new seed at the beginning of the new soybean planting season; preliminary data from field surveys indicate that 70% of farmers purchase seed at least once a year. The time of purchase varies per location and cropping pattern. Because many regions in Indonesia have both upland, rainfed lowland, and irrigated *sawah* located within 25 km, a movement of soybean seed between farmers, hamlet and village collectors, and district traders results. Typically, the distinction between grain and seed is not clear, because operators mostly handle both at the same time. The quality of seed found in the hands of farmers just before the time of planting provides a good indication of the efficiency of local seed systems.

Individual results from viability testing of farmer's soybean seed, sampled in 10 districts at

roughly three different planting seasons in the province of East Java, are presented in Figure 1. Viability in these 142 samples ranged from 55% to 98%. Of these seed lots, 92% was found to be above the pink label minimum standard of 70% viability, and 71% even above the 80% minimum level for extension seed. Marked differences in viability appear to exist between the rainy planting season (mostly upland) and the first and second dry planting seasons in lowland *sawah*. In the rainy planting season, average viability was 83%, which dropped to 75% in the first dry planting season, to subsequently reach a peak of 88% again in the second dry planting season. This reduction of viability is presumably caused by adverse wheather conditions during the harvest of the previous rainy season crop. Soybean is known to be extremely vulnerable to wet conditions during harvest. Little variation was observed between the districts: lower quality of seed was especially noted from the districts of Jember and Lumajang.

Figure 1 Seasonal fluctuation in viability of farmer soybean seed in East Java.



In the province of NTB, seed was sampled in two consecutive years, 1994 and 1995, both during the second dry planting season. In 1994, 61 samples were collected from all six provinces, and in 1995, 18 samples were collected from farmers from the West Lombok district only. Soybean in the latter well irrigated district is planted after two crops of paddy. The expectation was, therefore, that most seed would be purchased, which would give a good indication of the seed quality in the market. Results of viability testing from the farmer seed samples in NTB are very similar to those obtained in East Java. Most of the seed was found to have a viability above the 80% standard. Little difference in viability was found among the districts observed, and between the two years, which indicates that the farmer seed supplies are efficient and well organized.

Table 3 Quality of certified seed from maize and soybean at the date of issue of the lab.

	Soybean		Maize	
Destined for planting season:	March-April '95	June-Aug '95	March-Aug '95	June-Dec '95
Germination %	80.8	85.8	96.7	97.4
Normal seed %	99.7	99.3	99.8	99.9
Inert matter %	0.3	0.7	0.2	0.1
Other seed %	0	0	0.1	0
Seed moisture %	10.1	9.9	11	9.7
Samples certified	14	24	153	248
Quantity certified (ton)	126.5	168	926	1241
% Extension seed	17%	3%	100%	100%
% Pink label	83%	97%	0%	0%
% Composite	-	-	37%	41%
% Hybrid	-	-	67%	59%
Date of harvest	Febr-Mar '95	May-June '95	Febr-May '95	Apr-Aug '95
Producer	Private	NSC, Private	Pt Pioneer, Govt Pt. Bisi	Pt Pioneer, Pt Bisi

Source: SCCS certification data 1995.
Planting season: DS1 first dry season; DS2 second dry season; RS rainy season.

In contrast, results from samples in the province of D.I. Aceh indicate a much lower viability, especially in the district of East Aceh. Seed in these areas was sampled in the month of June and July, when farmers plant soybean in upland rainfed areas. Time did not permit investigation of the reason for the low germination; however, other data suggest that low input management and farmer inexperience with soybean may have caused the low viability.

Very little certified seed was found at the farmer level in East Java and Aceh. Of the two samples found, one sample was pink label, the other stock seed, and average viability was 79.5%. On the other hand, in the 1994 survey in NTB, 24% of the samples were found to hold a label; however sampling in this survey was not completely random. Most of the certified seed samples were found among seed growers, and had either a FS or SS label. Of the five farmers that used commercial seed, two purchased ES and the others pink label.

The average viability of the certified seed (87%) was better than the survey average (81%).

Analytic purity of farmer's soybean seed

With regard to analytic purity, there were few problems found in farmer's seed. Only in the districts of Ngawi, Lumajang and Pasuruan, some samples contained relatively high levels of damaged seed and/or inert matter. This may have been caused by mechanical threshing. Paddy power threshers used for soybean threshing operations are known to cause much damage, especially when cylinder speed is not adjusted.

Quality of pre-market certified seed

Official figures (1994) indicate that in the province of East Java about 900 tons of commercial soybean seed is produced annually, yet very little certified soybean seed was found in the hands of farmers. To investigate whether there is a quality problem with commercial seed, seed certification test data for soybean from January to August 1995 were compiled from routine testing at the SCCS in Surabaya. Similar data were also collected from maize (Table 3).

Individual results of the soybean seed analyses indicate a fairly wide variation in viability, between 70.5% and 95%, with an average of 83.9%. Analytic purity of the seed is adequate. Typically, there is a tendency for seasonal fluctuation similar to the non-labeled farmer's seed in the survey. This, after all, may not be surprising considering that the seed is harvested at the end of the same rainy season and therefore equally affected by adverse weather conditions.

It is important to know that these data concern pre-market seed quality. After harvest, seed is dried, processed and sampled for certification. Certification procedures usually take a few weeks from the date of sampling until the label is issued. From then on, the producer can start with the distribution of seed and sale to the farmer via, for example, regional wholesaler and kiosk. All together, after harvest it may take up to three months or longer for the seed to reach the farmer. There is therefore good reason to expect that the seed viability at this point is below the level indicated on the label. Therefore, a significant amount of commercial certified seed presumably does not match up with fresh farmer seed, which may explain why so little labeled seed is found in the hands of farmers.

Regarding maize, virtually all commercial seed samples submitted to SCCS for certification and analyzed for this survey (representing roughly 2,100 tons) were found to have excellent physiological quality with a 97% average viability. Most of this seed was produced by the private sector.

Choice of varieties

In the survey, 79% of the farmers in East Java and 60% in NTB indicated that they plant the Wilis variety, while in D.I. Aceh farmers grow mostly local varieties. There is as yet little understanding why farmers choose and stick with varieties. The relationship between locations and varieties found in the various surveys (including the annual SCCS survey, Table 4) cannot be explained from the description of the variety alone. Sometimes, it appears that once a variety is introduced, it starts to lead its own life within the restrictions of the local seed system, until a better variety is introduced.

Patterns in the use of varieties in soybean started to change dramatically with the introduction of the Wilis variety. After its release in 1983, large quantities of this variety were produced at government farms, and supplied by state seed companies to government intensification and extensification projects all over the country. In addition, farmers, traders and the processing industry for tempe and tahu seem to be well satisfied with the yellow small-seeded variety. The high frequency of Wilis found in East Java and NTB is unmistakably the combined result of bulk government supplies combined with rapid inter trader and farmer dissemination.

Although the area planted to soybean is decreasing, soybean farmers in Indonesia still grow many local genotypes, which are a good source for national breeding programs because these varieties often are more adapted to local situations and have developed tolerance to drought, pests and diseases. Black soybean, for example, supplied exclusively for the kecap industry is still largely of local origin. This soybean is grown in East Java, mostly in the eastern districts of Banyuwangi and Jember. Also, local varieties such as No. 41, Gepak, Sinonya, No. 29 and Kipas putih seem to be popular in various regions in Indonesia. In some areas, improved varieties other than Wilis are grown, such as Orba and Davros in the uplands of West Java, and Lokon, a short maturing variety, in the drylands of NTB and West Java. Farmers evidently are constantly looking for other varieties.

The surveys indicated that although a number of new varieties have been released, farmers have difficulties in obtaining them, which may show a lack of effort on government's side, but similarly might indicate that the local dissemination system is fairly slow to react to farmers' requirements, or that the genetic potential of the new varieties is not sufficiently attractive to farmers.

Table 4 Varieties of secondary food crops planted by farmers in Indonesia.

Crop	Variety	Percentage of each variety planted				
		N.T.B.	East Java	West Java	North Sumatra	D.I. Aceh
Maize	Arjuna	24	44	33	27	3
	Hybrid C-1/C-2	27	5	4	42	5
	Hybrid CPI-1	-	5	10	-	-
	Hybrid Pioneer	-	4	17	16	1
	Genjah Kertas	-	20	2	-	-
	Other improved	7	15	22	1	1
	Local	42	7	12	14	90
Soybean	Wilis	79	73	9	79	5
	Orba	3	1	24	< 1	4
	Lokon	2	2	48	< 1	-
	Lumajang Bewok	-	-	10	-	-
	Galunggung	< 1	2	-	4	-
	Other improved	9	14	9	-	1
	Local	6	8	(-)	16	90
Groundnut	Gajah	22	17	51	3	< 1
	Kidang	-	9	21	< 1	-
	Schwarz	-	< 1	6	-	-
	Other improved	-	13	22	1	1
	Local	78	60	(?)	95	99
Mungbean	No.129	-	13	41	14	-
	Merak	-	11	21	-	1
	Bhakti	-	3	2	25	-
	Betet	90	2	< 1	-	-
	Other improved	-	18	29	1	
	Local	10	53	6	60	99

Source: SCCS provincial annual reports 1993/94.

Genetic purity of farmer seed

Generally, it is assumed that grain yield is negatively affected by varietal impurities because of yield potential differences of the varieties in the mixture and/or because of genetic segregation. As soybean is a strict self-pollinator, the latter aspect is negligible.

Genetic purity analysis was undertaken to investigate the impurity level of each sample. The variety name indicated by the farmer was used as reference. For this purpose, a number of samples from East Java, were planted in field check-plots at two stations of the Research Institute for Legumes and Tuber Crops. Preliminary results of the frequency distribution for hypocotyl and flower color of Wilis off-types (Wilis: purple color) are presented in Table 5.

Table 5 Frequency distribution of Wilis off-types.

% Off-types (white color)	Frequency (% of samples)
0	60 %
1-5	13 %
6-20	4 %
21-80	22 %
> 80	1 %

Total Wilis seed lots: 79.

These data indicate that at least 40% of the Wilis seed found among farmers is genetically impure, although 13% contains only slight quantities of off-types. Seed densities in Wilis samples averaged only 8.9 grams per 100 seeds, which is markedly below the official description characterizing Wilis as having a density of 10 grams per 100 seeds. This may be an indication that the variety is mixed with smaller seeded local varieties. However, it could also point to the stress related low-input environment of soybean, which typifies so much the cultivation of secondary food crops in Indonesia. Farmers in the survey were conscious of the fact that their seed was not a pure variety, but indicated that they did not mind admixtures provided this remained below 20%. However, the check-plot revealed that many farmers have seed with a much higher proportion of genetic impurity.

A previous study on the effect of mixtures in Indonesia showed that varietal blends of soybean varieties can yield significantly more than pure line stands. Probably, because of complications with certification procedures, this issue has not been further pursued. However, as soybean in Indonesia is prone to heavy pest pressure and drought stress, better yield could be expected from mixtures. Therefore, further research is strongly advocated.

Seed health quality

Soybean is affected by a number of diseases which are seed-borne in nature. Based on surveys in Java and Bali, these can be arranged these can be arranged in order of occurrence and importance as follows: *Xanthomonas campestris* (bacterial pustule), soybean stunt virus (SSV), *Cercospora kikuchii*, (purple leafspot) and *Colletotrichum dematium* (anthracnose). Other pathogens such as soybean mosaic virus (SMV) and *Macrophomina phaseolina* may be capable of seed borne infection in Indonesia. Seed samples were analyzed for the presence of seed-borne fungal diseases using the blotter test. The provincial SCCS is yet not capable of testing for bacterial and virus diseases.

The incidence of seed-borne fungal pathogens on the seed in the East Java samples is presented in Table 6. Most diseases appear to have a very low incidence, except for *Fusarium moniliforme* and *Phomopsis* spp. These are common diseases that thrive in humid rainy conditions and are the main cause of the so-called weathering disease, reduced seed germination which is caused by delayed harvest in wet conditions. *Fusarium*, mostly a soil-borne disease, also causes damping off. The high incidence of *Fusarium* in the March planting season proves that the seed is harvested under humid conditions, probably around February, which could be the main cause of the lower seed viability observed.

Table 6 Incidence of seed-borne fungal pathogens in soybean seed planted by farmers in East Java.

No.	Pathogen	Planting season RS (n=51)	DS1 (n=21)	DS2 (n=9)
1	*Colletotrichum dematium*	+/-	+	-
2	*Cercospora kikuchii*	-	+/-	+/-
3	*Corynespora casiicola*	+/-	+	+/-
4	*Macrophomina phaseolina*	+/-	+/-	+
5	*Phomopsis sojae*	-	+	+/-
6	*Rhizoctonia solani*	-	-	-
7	*Botryodiplodia theobromae*	+/-	+/-	+
8	*Fusarium solani*	+/-	+/-	+/-
9	*Fusarium equiseti*	-	-	-
10	*Fusarium semitectum*	+/-	+/-	+/-
11	*Fusarium moniliforme*	+	+++	++
12	*Fusarium oxisporum*	-	-	+/-
13	*Phoma sp.*	-	-	-
14	*Peronospora manchurica*	-	-	-

- zero incidence; +/- spores.
+ more than 1% less than 5%.
++ more than 5% less than 20%.
+++ more than 20%.

Fungal seed-borne disease incidence was markedly lower in farmers' seed in December, which was probably harvested somewhere in October at the end of the dry season. This points to an interesting feature of the local seed system in East Java and NTB where soybean seed is alternately produced in the rainy season and in the dry season, the latter sometimes in two successive seasons. It appears that this flow of seed reduces the level of fungal (and possibly bacterial) infection in the seed. Levels of fungal seed-borne diseases in more humid areas such as West Java and North Sumatra could be markedly higher.

Farmer perception and benefit of improved seed

Farmers usually find their own way to solve seed quality deficiencies. They may test the seed before planting, adjust their seed rate, and/or increase the number of seeds per plant hole. Technically, seed quality, and even vigor can be measured in the laboratory and in check-plots, but how big a deficiency will actually have an impact on the farmer's yield and, more important, on the farmer's net income is a question one would like to answer. This was the objective of the second survey. Thus far, data from 40 out of 55 on-farm trials have been analyzed and are presented below.

With an average of 0.51 ha, farmers in the districts of Pasuruan and Jombang in East Java are typical farmers for lowland sawah in Java. Soils are fertile Regosols. Cropping patterns are simple: where irrigation is sufficient, two crops of rice are grown followed by soybean; where this is not sufficient, rice is followed by two crops of soybean. Planting practices vary per season and per cropping pattern:

- Following paddy, soybean seed is planted broadcast (in the first dry season) or dibbled (second dry season) within one week after harvest in between the rice stubble. Before planting, no tillage is applied; after planting, the field is covered with rice-straw mulch to protect the emerging crop against bean fly and to prevent early weed competition;
- Following a previous soybean crop, the soil is tilled by hand or by simple ox-driven plough and soybean seed is dibbled in the field.

The latter planting system was recorded in 50% of the on-farm trials in Jombang and in 85% of the trials in Pasuruan. All farmer trials were planted by the end of June or early July.

Most farmers in Pasuruan reported that they usually purchase seed in the first soybean season, and use their own seed in the second season. Some farmers changed their variety and again purchased in the second season. In the Jombang area, however, rainfed sawah land is virtually non-existent. As a result, many farmers (60% of respondents) used their own seed year round. Certified seed was found at two farms in Jombang and none in Pasuruan.

Results from the East Java trials are presented in Table 7. Clearly, almost all 40 farmers possessed seed with excellent viability, mostly at par or slightly

below the high quality control. Seed rates differ little within, but large differences are found between, the two areas. Very high seed rates are found in Pasuruan, up to 77 kg/ha. However, plant densities in Pasuruan, counted at 6 weeks after planting, were only slightly higher than in Jombang because of reduced field germination. Pasuruan fields experienced more pest infestation and drought stress, which may explain the lower yields.

yielded the highest seed quality from certified origin by 100 kg/ha approximately, which was significant (p = 5%) in the two Jombang locations. In Pasuruan, seed quality differences seem to affect yields only slightly, as might be expected at such high seed rates.

The government recommended optimum plant density for Wilis is 360,000 to 400,000 plants per ha (seed rate of 40 - 45 kg/ha; 90% germination), which would indicate that above this density no

Table 7 Soybean yield benefit from different qualities of seed tested under farm conditions.

Province/District/ Village	No. of Farmers		Seed Quality A*	B*	C*	D*
East Java	10	Variety	Wilis	Wilis	Wilis	100% Wilis **
Jombang/		Germination % (lab)	91	80.8	58.2	87.5***
Mentaos		Field germination %	90	83	61	-
		Average plants/hill	2.6	2.3	1.9	2.8
		No. of plant hills/10 m^2	120	110	91	130
		Plant density (pl/ha)	509,000	412,000	283,000	597,000
		Yield (kg/ha)	1,625	1,331	1,027	1,745
East Java	10	Variety	Wilis	Wilis	Wilis	90% Wilis**
Jombang/		Germination % (lab)	91	80.8	58.2	85.4***
Krembangan		Seed rate (kg/ha)	50	52	57	-
		Field germination %	91	82	61	-
		Average plants/hill	2.4	2.2	1.6	2.4
		No. of plant hills/10 m^2	118	115	109	120
		Plant density (pl/ha)	459,000	414000	288,000	450,000
		Yield (kg/ha)	1,478	1,069	817	1,569
East Java	10	Variety	Wilis	Wilis	Wilis	100% Wilis**
Pasuruan/		Germination % (lab)	91	80.8	58.2	69.2***
Kluwut		Seed rate (kg/ha)	75	75	75	76
		Field germination %	82	78	59	-
		Average plants/hill	2.2	2	1.8	2.2
		No. of plant hills/10 m^2	253	251	248	253
		Plant density (pl/ha)	549,000	502,000	442,000	547,000
		Yield (kg/ha)	946	928	809	1,142
East Java	10	Variety	Wilis	Wilis	Wilis	30% Wilis**
Pasuruan/		Germination % (lab)	91	80.8	58.2	85.8***
Karangasem		Seed rate (kg/ha)	73	74	76	77
		Field germination %	86	78	59	-
		Average plants/hill	2.2	2	1.8	2.2
		No. of plant hills/10 m^2	252	251	251	251
		Plant density (pl/ha)	523,000	514,000	439,000	507,000
		Yield (kg/ha)	1,284	1,378	1,067	1,327

* Treatments consist of : A: high viability, B: medium viability, C: low viability, all pure Wilis, and D: farmer's own seed; plot-size/treatment: 50 m^2.

** Percentage refers to the proportion of farmers using the variety Wilis.

*** Farmer's seed might have been damaged while bringing the samples from the field to the SCCS. laboratory in Surabaya.

Significant differences in yield were found between the plots in the Jombang farmer's fields. A grain yield increase of more than 600 kg/ha was recorded between the lowest and highest seed quality from certified origin. Farmers' seed out-

higher yields are expected. However, plant densities in Jombang were, except for the lowest seed quality, well above 400,000 plants per ha. Nevertheless, marked yield differences were recorded even between plots with higher densities.

This indicates that the optimum plant density of Wilis under the prevailing farming conditions was not yet reached. The belief, therefore, that farmers use high seed rates because of low seed quality has to be rejected. Farmers in Pasuruan, obviously, applied seed rates proportionally higher than in Jombang because of stem-borer (*Melanagromyza sojae*) prevalence. As such, seed rates of 60 kg/ha are found to be not exceptionally high in these areas.

Farmer's storage techniques

How do farmers obtain viable seed, when the market cannot provide sufficient quality? The Jombang farmers provide a good example. More than 60% of the farmers in the area save their own seed, and hardly ever purchase new seed. The technique used is quite simple: after harvest farmers clean the grain they intend to take as seed and (re-)dry it in the sun for about 2-3 days. Moisture content is determined by cracking the seed in the mouth. When the seed is sufficiently hard, they place the seeds with some ash in metal bins of 15 kg capacity and close it with a lid. Some also store the seed in simple tightly closed double plastic bags.

The on-farm trials demonstrate that the farmer seed which was stored sometimes up to nine months could retain viability well. In storage trials conducted recently by the RILET in cooperation with the *Palawija* Seed Project, in which low cost packing materials were tested, similar low losses of viability are recorded. These trials indicate that viability can be maintained even for up to 12 months, provided the seed is dryed below 8% moisture and packed in a vapour proof container.

The situation in Jombang is not uncommon in Indonesia. Similar techniques are found in other parts of East Java, NTB, and West Java. Yet, although the benefits may be clear, and the technology widespread, a majority of farmers still purchase their seed.

The reason for this behavior is probably found in the low incremental value of seed compared to grain. The incremental value of seed in the surveyed areas ranged from Rp 155 to Rp 444 per kg. Fluctuations seem to occur more between sources and types of seed (kiosk vs hamlet; certified vs non-certified), than between locations and over seasons. Farmers who decide to store their seed between October and March of the next year could also receive a small incentive from the price fluctuation that occurs between the seasons (approximately Rp 100 for East Java). As indicated in Table 8, the farmers' net benefit from storing soybean seed is very little. However, such storage is invaluable, when high quality seed is not available in the market place.

Table 8 Costs and net benefit of farmer saved soybean seed.

10 kg grain @ Rp 800 (October 1994)	-Rp 8,250
Loss of 7% seed moisture (0.7 kg)	-Rp 560
Labour for cleaning/drying/packing	-Rp 2,250
Packing material (tin or plastic)	-Rp 500
Loss of interest (6 months, 1.5%/month)	-Rp. 740
Save cost of 10 kg seed @ Rp 1250 (March 1995)	+Rp12,500
Net financial benefit to farmer (per 10 kg seed)	+ Rp 200

Conclusions

The lessons learned from these surveys can be summarized as follows:

- It appears that the local seed system for soybean in Indonesia is working fairly well. It provides acceptable levels of quality in terms of viability, analytic purity and seed health, which gives no reason so far to believe that there is a structural problem in soybean seed quality.
- Soybean seed quality does occasionally show deficiencies depending on location and season. Farmer's practices, however, appear to largely overcome or prevent quality deficiencies through increased seed rates, time of planting and prolonged storage.
- Such farmer practices or cultivation knowledge may not be widespread in new soybean production areas, such as Aceh province. The use of paddy threshers, for example, for soybean could reduce seed quality significantly. Also, there are indications that farmers could still learn from improved storage techniques, as described in this paper. Further research is needed to investigate farmers' post harvest seed handling practices.
- Although there are some slight problems with seed health, including widespread seed-borne virus, there is yet no proof that these diseases at the observed levels pose a real threat to production in the provinces.

Further research should determine whether the high seed-borne virus level indicated in certain districts is detrimental to farm yields. Provinces with high rainfall such as West Java and N. Sumatra, from which data were not received in time for this analysis, might have even higher levels of fungal and bacterial seed-borne infection.

- With regard to genetic purity, there is so far no evidence that yields are negatively affected by impurities. As some farmers' seed out-yielded the highest quality seed, this could indicate that impurities might even be beneficial to the farmer. It is strongly suggested that the effect on yield of varietal blends, multilines and farmer seed be compared with pure lines in farmer managed conditions be investigated.
- From the survey data, it can be concluded that there is yet no proof that certified seed, equal to the A and B qualities in the on-farm trials, is better than farmer seed. The present seed produced by the formal sector, though more expensive, is not better in terms of physical and genetic quality. The contribution of certification programs to national soybean production at this moment, therefore, is considered insignificant. This could change when new varieties with significantly higher yield potential appear on the market, as in the case of Wilis a decade ago. However, the government should seek justification, considering the high cost of maintaining a certification program for a product like soybean. It appears, that the local farmer/trader system in soybean can well take care of distribution of improved varieties within certain areas, thus opening the way for a truly integrated system.
- With regard to maize, the high yield potential of improved varieties, especially hybrids, and the fact that this crop is open pollinated and therefore more prone to degeneration could make the contribution of certification very significant. So far, few data are available on local farmer seed supplies in maize, the yield potential of improved varieties under farmer stress environments, and farmer seed quality, which indicates the need for additional surveys in this field.

The Role of Chinese Rural Women in the Development of Agriculture

Tong Yu-e[*]

Introduction

China is a large agricultural country with a high population, little cultivated land and limited land resources. Eighty percent of the population is distributed in the rural areas. China's agriculture has developed quickly, especially since 1979 when the system of contracted responsibilities on the household basis with remuneration linked to output was implemented. The farmers became motivated and the development of agricultural production in China improved as never before. From 1979 to 1992, the total production value of agriculture increased at a rate of 5.9% on average annually. The total grain production increased from 332.12 million tons in 1979 to 442.66 million tons in 1992 with an annual average increase of 2.7%; production of coarse grains such as maize, soybean and tuber crops increased from 95.96 million tons in 1979 to 134.12 million tons in 1992 with an the annual average increase of 2.8%. The grain yield increased by a large margin, from 2,835 kg per ha in 1979 to 3,141 kg per ha in 1992. The rural women in China are important participants in agricultural production and have made a great contribution to the development of China's agriculture.

Role of rural women in the development of agriculture

The main force in agricultural production

During the last 30 years before China's reforms and opening to the outside world, rural women together with men have taken part in agricultural production. Women have become the major labour force in agricultural production. During the 15 years of reforming and opening to the outside world, with the adjustment of agricultural structure, the development of township enterprises and the transfer of agricultural labour force to non-agricultural

[*] Department of Science and Technology, Ministry of Agriculture, Beijing, People's Republic China.
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production, the rural women labour force has increased, and its contribution to the development of agriculture increased, and women have become an indispensable force for developing the rural economy. The rural women labour force accounts for about 50% of the total rural labour force. According to the fourth census in 1990, the percentage of women in the labour force for agriculture in the developed economic zones such as Beijing, Shanghai, Jiangsu and Shandong already exceeded 50%, and in some areas even reached 65%. Women labour forces in agriculture, forestry, animal husbandry, fisheries and water conservation works account for more than 50%. Women undertake most of the cotton management work in cotton-producing areas; women account for 80-90% of the labour force in pork, poultry and egg production; among the 90 million people participating in farmland water conservation construction every winter and spring, women account for 70%. The production value created by rural women accounts for 50%-60% of the total agricultural production value.

Participation in the management of farm and sideline products

With the development of a commercial economy, the scope for rural women to participate in the development of agriculture has become wider. Women have become the mainstay not only in production, but they have also entered into the commercial circulation field. Among the 14 million rural commercial service individual labourers, women account for about 33%, and farmer women engaging in commerce account for about 50% in the developed commercial economic areas. In the three provinces of Shandong, Fujian and Shaanxi, 2.8 million women have entered into the commodity circulation field. Among the 300,000 business households in Liaoning province and 187 township-level markets in Songhuajiang area, Heilongjiang province, business women account for more than 80%. Fifty-two thousand women in Nanzhao County of Henan province have engaged in the sales of farm and sideline products.

Promotion of development of township enterprises

After China's reforms and opening to the outside world, township enterprises have rapidly been set up. In the past 15 years, the development of township enterprises has made an active contribution to promoting the rural economy and strengthening China's economy. The total production value of township enterprises in 1993 was 2,902.2 billion yuan, 58 times that of 1978, accounting for 71% of the rural social production value, and for 36% of the total national social production value in 1993, compared to 7% in 1978. Township enterprises have become the main force for the development of rural economy and social progress. Rural women in China are important promoters of the development of township enterprises. At present, there are more than 100 million labourers in township enterprises in China, of whom women labourers constitute about 40 million. Many women are leaders in township enterprises. There are about 2,000-3,000 women directors of factories and managers in township enterprises, and tens of thousands of production technical mainstays in workshops and groups in Jiangsu, Guangdong, Anhui, Fujian and Henan provinces.

Longkou city of Shandong province was selected as an International Monitoring Station on Rural Women Issues by the United Nations Development Programme and Food and Agriculture Organization of the United Nations. Rural women in that area not only undertake 40%-60% of farmland work, but also undertake 70% of the textile, garment and embroidery production in township enterprises. The embroidered arts and handicrafts they make can be exported and US$ 2.5 million in foreign exchange earned annually. In the past several years, more than 100 experts who made study tours here determined that rural women in Longkou city have played a role equal in importance to that of men.

Rural women's organizations and their functions

Government as a source of funds, technology and information for rural women

The Chinese Government advocates equality for men and women, so the organizations that service men in the rural areas can also service rural women. From the end of the 1980s to the beginning of the 1990s, the state required 2/3 of the provinces to implement a policy of giving priority, preferential loan interest rates and simplified formalities to rural women. For instance, the Agricultural Bank of Fujian province has provided US$ 12.15 million in loans for rural women to solve farm production problems; and in order to encourage rural women to popularize rapid pig-raising, the Agricultural Bank of Heilongjiang province has provided US$ 1.82 million in loans and the financial departments have been responsible for interest-subsidizing. According to incomplete statistics, in the past five years, the

agricultural banks at all levels throughout the country have provided about US$ 823 million in loans for rural women, and financial departments at all levels have provided US$ 23.5 million of working capital for rural women.

When agro-technical extension organizations and scientific and technical associations are popularizing agricultural technology and training services, they treat men and women alike.

All-China Women's Federation.

The All-China Women's Federation is a non-governmental organization for women. By 1992, there were more than 60,000 people in women's federations and 810,000 people in women's congresses at all levels in townships and cities throughout the country. The basic functions of these organizations are to represent and maintain the rights and interests of women, and to help women eradicate poverty and participate in the development of the economy.

With the support of the government, poverty alleviation work is carried out in order to help women get rid of poverty. Women cadres in poor hilly areas have been organized to visit developed areas. Since 1989, directors of women's federations from 331 key poverty-stricken counties and 560 directors of women's federations in districts have been trained; training courses have been held for more than 1100 directors of women's federations at above township level in the three poorest prefectures of Hexi and Dingxi in Gansu province and Xihaigu in Ningxia Hui Autonomous Region; and more than 230 cadres from women's federations in poverty-stricken areas have been organized to visit developed areas and receive in service training.

To upgrade the educational level of women, technical training has been developed. In the poor mountain areas, 62,679 training courses of various kinds have been held, with women trainees totaling more than 5 million, and 50,000 literacy classes has been held with about 960,000 participants. With a view to helping poor women, 6.5 million women have been organized to work in economically developed areas.

Assistance for women's participation in economic development

In early 1989, a campaign of "learning how to read and write and learning technology and competition for achievements and competition for making contributions" (simplified as double-learning and double-competition) was held in rural areas initiated by the All-China Women's Federation and supported by 13 governmental ministries and committees, thus, effectively helping women to get involved in economic development and to benefit from such development.

In accordance with different levels of women's education, science technology training courses have been established including training for literacy, popularizing practical technology and upgrading educational level and professional training. Since the launching of this movement, more than 10 million women have become literate and 90 million women participated in practical technical training, More than 80% of women have a good command of one or two kinds of practical technique, 27 million women received professional training, and 2 million women entered agricultural correspondence universities and farm broadcast colleges. Among them, 510,000 persons obtained the title of farmer technician and 1.067 million scientific and technical demonstrations were held in households with women as the main force. Due to these training activities, women's scientific and technical levels in rural areas have been raised, with a stronger sense of using new technology in agricultural production. Four million mu of paddy rice were planted by women in rural areas in Jiangsu province in 1991. Due to application of new technology and new varieties of rice, the average output per mu was increased by 20%.

In order to help rural women get involved in agricultural development, the All-China Women's Federation and other organizations provide participating women with funds, materials, technology and information services. For example, agricultural banks give priority on loans to women. The forestry sector helps women set up forestry enterprises, and this sector actively provides seedlings, technical services, etc. to women who plant trees.

Women have been organized to take part in agricultural production competition to stimulate enthusiasm in agricultural development. The All-China Women's Federation at different levels has organized women to carry out competitive activities in planting, aquaculture and processing operations. One hundred and twenty million rural women in the whole country have been involved in these activities. Various types of model farmers are emerging in large numbers. On "March Eighth Day" every year, many women model farmers are praised by the All-China Women's Federation. During the past 5 years, more than 15,000 women

have won the title of woman model farmers at provincial and higher levels.

The educational and technical level of women involved in competition activities has been raised, and their involvement in agricultural development enforced, resulting in better harvests and increased income. In Hunan province, the annual income of 300,000 women who have participated in the competition has increased by 12 dollars. In Hebei province, women's income which accounts for half of the family income increased by 50%. The increase of rural women's income gives them more management power and the right to speak in their families. The percentage of families jointly managed by both wife and husband in making major decisions on planning family production operations, purchasing of production means, investment and deposit of money is rising, averaging 55.9% and even 70% in developed economic zones.

Changing role of rural women in agricultural development

China's rural reforms in general have provided opportunities for rural women to get involved in agricultural development in which rural women are playing larger and larger roles.

The introduction of a household-based contractual responsibility system linking remuneration with output has led to a change in policies and the overall environmental improvement in urban and rural areas, and great changes have also taken place in rural production systems. Grain production as the only practice in the crop farming sector has been replaced by an increasing development of cash crop farming; different types of agro-economic structures have come into being with an overall growth of livestock, aquaculture and processing industries, and township and village enterprises have seen rapid development. All this has helped to broaden the scope for rural women to participate in development, thus creating conditions to further tap the potential of rural women.

China's rural areas have long been facing the problem of limited land resources versus a huge population, a shortage of cultivated farmland and a relative surplus labour force. However, since reforms and the open-door policy were introduced and along with the change of China's rural areas toward industrialization and urbanization, industrialization in the rural areas has started, and the surplus labour force in the countryside has been freed from the farmland and transferred in great numbers to non-agricultural activities. In this process, male labourers are clearly transferred faster and in greater numbers compared to female labourers who have clearly lagged behind. As a result, the number of women in agricultural production, particularly in crop farming and livestock and aquaculture, is growing, and this shows women will play an ever increasing role in agriculture.

Based upon a 1990 survey on the social status of Chinese women, the flow of agricultural labourers has led to 79.5% of male farmers and only 42% of female farmers changing from agricultural to non-agricultural sectors. The same survey also indicated that women account for 86.4% of those staying on the land in natural and direct ways, ten percentage points higher that men (76.35%). Mr. Meng Xianfan pointed out in his article "The Chinese Women in the Transfer of Rural Labour Force" that of the 130 million Chinese rural labourers already transferred to non-agricultural sectors, about 50 million are women accounting for 38% of the total.

The positive side of this change lies in the possibility that women's potential in agricultural production could be further tapped, thus allowing them to make greater contributions to agriculture. At present, China's agricultural production is household-based. Given the fact that cultivated land resources are limited, the farm labour force has a relative surplus, and male labourers in a family are shifting to non-agricultural activities. Thus, rural women are naturally in a state of full employment in agricultural production, turning them into decision-makers and managers of agro-production. This has helped to bring women's potentials and their roles in farming activities into full play.

The negative side of this change is that it will hold up women's development as well as agricultural development. Agriculture in China still remains a weak industry with lower benefits compared to secondary and tertiary industries. In spite of the great contribution made by women to agricultural development and the 50 - 60% of total agricultural output value made by them, the share of agricultural output value in the total rural social output value has dropped from 57.09% in 1978 to 35.79% in 1992 (Table 1). The Survey on the Social Status of Chinese Women indicates that the average annual income of rural men and women stands at Rmb 1,519 yuan and Rmb 1,235 yuan, respectively. Women's average income is only 81.4% of man's average income.

Table 1 The shares of production value of agriculture, construction, transport, commerce and catering industries in total rural social output value (%).

YYYear	Total rural social output value	Agri-culture	Industry	Con-struction	Trans-port	Commerce & catering
1985	100	57.09	27.60	8.05	3.00	4.25
1990	100	46.10	40.43	5.89	3.49	4.09
1991	100	42.92	43.50	6.01	3.48	4.09
1992	100	35.79	50.09	6.18	3.57	4.35

Source: China Statistics Almanac 1993.

At present, agricultural mechanization in China is at a low level, especially in mountain areas where field operations are mainly done by physical labour. Rural women are burdened with heavy farm work and tied down by household chores and by giving birth to children, which has a negative effect on women's participation in education and technical training and on efforts to improve women's quality.

Those women who, as surplus labour, have shifted to non-farm activities are mainly middle-aged and young. Therefore, there is a trend of low quality and old age among the women who remain in the agricultural field, and that is unfavorable to the development of agricultural production.

Improving women's participation in agricultural development

Although Chinese rural women have made a great contribution to China's agricultural development, their social status and economic income remain relatively low, mainly reflecting their overall low educational level. Through efforts by the Chinese government in past decades, the illiteracy rate of Chinese women declined from 90% in 1949 to 32% in 1990. Although there has been a remarkable increase in the number of women with primary and secondary education, their overall educational level is still low compared with Chinese males. According to China's fourth census in 1990, there were 180 million illiterate or semiliterate persons at the age of 15 and above throughout the country, of which 70% were females (Table 2), and most of these persons were distributed in rural areas. To a certain extent, this has restricted the popularization and application of agricultural science and technology among rural women and has become a constraint to rural women's participation in economic development.

The following steps should be taken to improve women's participation in agricultural development:

- strengthen the training and education of women in order to further raise their educational level;
- organize technical training for farming activities and provide women with training opportunities so as to gradually standardize technical training and enable women to be the major beneficiaries of technological communications; and
- provide further financial, material and information services to rural women and necessary facilities for their participation in agricultural development.

Table 2 Literate and semiliterate population aged 15 years and above, 1990.

Age group	Literate and semiliterate population aged 15 and above ('000 persons)			Share in total by gender and age group (%) By gender		By age group		
	Total	Male	Female	Male	Female	Total	Male	Female
Total	18,160.91	5,435.97	12,724.94	29.93	70.07	22.21	12.98	31.93
15-24	1,406.30	380.56	1,025.75	27.06	72.94	5.72	3.02	8.55
25-34	1,747.69	380.56	1,367.04	21.78	78.22	9.29	3.92	15.03
35-44	2,771.86	710.53	2,061.33	25.63	74.37	18.47	9.12	28.57
45 and above	12,235.06	3,964.23	8,270.82	32.40	67.60	52.42	33.61	71.65

Source: State Statistics Bureau.

CGPRT Centre News and Activities

Research and Development Programme

During the period of September - December 1996, three research projects remained in their active phase while one project was being finalized. The study on pulse trade has been completed and the projects DIVAPOL-1 and Market Prospects of Upland Crops (MPUPA) are near completion. The project on sustainability, Economic Assessment of Selected Resource Management Techniques in Marginal Upland Agriculture (SUASA-2), has begun. The SUASA-2 Project Officer and the R&D Programme Leader visited the participating countries (India and China) to conduct planning meetings with national experts.

DIVAPOL Activities

The Agricultural Diversification and Food Crop Trade Project (DIVAPOL-1) has completed the first phase of its activities. The project has successfully developed and tested the Multilevel Analysis Tool for the Agricultural Sector (MATA) Model in Indonesia, Thailand and Vietnam. To disseminate information on the model, in September 1996, Dr. Françoise Gérard, the CGPRT expert, presented results of the MATA Model at CIRAD, Montpellier, France. As the follow up of the presentation, a workshop was conducted at the CGPRT Centre with the INSA Team on 26 October - 10 November 1996. The subject of the workshop was "Finalizing the MATA Model Typology and Equations for the Red River Delta, Scenario Definition".

Still in relation with the model's development, Dr. Gérard joined the AFSA Seminar, 11 - 16 November 1996 in Colombo, Sri Lanka, and presented a paper entitled "Consequences of Agricultural Trade Liberalization for Food Crop Production and Farm Income in Java's Lowland". In December 1996, Dr. Gérard submitted an article with Dr. Erwidodo from CASER (Center for Agricultural Socio Economic Research) for the International Association for Agricultural Economists (IAAE) seminar. The seminar will be held in Sacramento, USA, August 1997. The title of the paper is "Evaluation of the Impact of Trade Liberalization on the Food Crop Production and Farm Income in Java Lowland, Indonesia".

Human Resources Development Programme

In December 1996 a team from the Centre visited Kathmandu, Nepal, and Dakha, Bangladesh, to provide in-country working seminars on integrated database management. The seminars were attended by senior government officials and technical staff from planning agencies, resource management agencies and research agencies.

International Courses and Meetings

International Course on Extension Management

International Agricultural Centre
Wageningen/the Netherlands June 13 - July 20, 1997

The strategic objective of the course is to contribute to the improvement of staff performance in organizations involved in extension, be they government or non-government services. After completion of the course, participants should have acquired:

- adequate knowledge on the role and function of extension in rural development;
- skills in needs assessment and problem identification techniques;
- analytical skills and diagnostic capacity to assess the performance of agricultural knowledge and information systems and understand the interaction between perceptions and problem identification;

- skills to assess the quality of socio-economic data collection methods;
- enhanced understanding of the role and tasks of extension management.

International Course on Nutrient Management for Sustainable Agriculture

International Agricultural Centre
Wageningen/the Netherlands August 24 - September 20, 1997

The course aims at widening knowledge and enhancing the managerial capabilities of staff involved in policy formulation on, and planning and management of soil resources and plant nutrient programmes.

Participants will be provided with insight on the assessment of soil production potentials and on how to arrive at an optimal utilization of these potentials by farmers. An understanding of the concept of sustainability will be developed, and environmentally sound integrated plant nutrition management programmes elaborated.

International Course on Food Processing: Quality Assurance and Marketing in Food Processing Enterprises

International Agricultural Centre
Wageningen/the Netherlands August 17 - November 22, 1997

This programme aims to broaden participants' views on problems of small and medium scale food processing, to upgrade participants' knowledge concerning the analysis of problems and the selection of appropriate technologies, and to impart techniques for the implementation of selected technologies, focusing on quality assurance and marketing.

For further information, contact:
International Agricultural Centre (IAC)
P.O. Box 88
6700 AB Wageningen, The Netherlands
Lawickse Allee 11
Telephone: +31-317-490111
Fax.: +31-317-418552
E-mail: IAC@IAC.AGRO.NL
Telegrams: INTAS
Telex: 45888-INTAS NL

Workshop: Participatory Monitoring and Evaluation: Tools, Experiences and Lessons

The Philippines
November 17-30, 1997

A practitioners' workshop on Participatory Monitoring and Evaluation (PME) is being organized by the International Institute of Rural Reconstruction with the Institute of Development Studies of Sussex University, International Institute of Environment and Development, World Neighbors and UPWARD.

The workshop will provide a forum for an active exchange of tools, experiences and lessons among individuals and organizations involved in developing and using participatory monitoring and evaluation approaches.

The meeting will attempt to synthesize participatory monitoring and evaluation practices and identify gaps and priority areas for action-research. The workshop will help sharpen thinking about the conceptual, methodological, institutional and policy issues surrounding PME that could further refine its application. A resource book will be produced out of the workshop.

The organizers are seeking suggestions for participants, topics, donors and partners. Please send any response or ideas to:

Ms. Angie Ibus
Director
Institutional Capacity Building Program
Y.C. James Yen Center
IIRR, Silang, Cavite, 4118 Philippines
Fax: (063) 46-402-0891 or (63-2) 522-2494
E-mail - iirr@phil.gn.apc.org

CGPRT Centre

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

Objectives

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

Programmes

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

Palawija News

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

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

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CGPRT Centre
Jalan Merdeka 145,
Bogor 16111, Indonesia
Telephone: (0251) 336290, 343277
Fax: 62-251-336290
Cable: ESCAP CGPRT Bogor
E-mail: cgprt@server.indo.net.id
CGPRT Home Page: http://www.cgprt.org.sg

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