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FACTORS AFFECTING SEED MARKETING IN SRI LANKA

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EXECUTIVE SUMMARY

This executive summary presents the major conclusions and recommendations derived from a study of seed markets in Sri Lanka. The study was based on a national survey of farmers and also drew upon existing information from other studies, as well as the data bank of the Seed and Planting Materials Division of the Department of Agriculture.

It is hoped that this information will become a useful guide to policy makers and to seed enterprise managers in particular, and others involved in agricultural development in Sri Lanka in general.

Because all of the major conclusions and recommendations are found in this section, there is no summary chapter provided at the end of this report.

Conclusions

Current effective demand for seed supplied through the formal sector is valued at around 540 million Rupees. More than half of this value is for potato seed. Another 90 million of this market is for vegetable seeds which are normally imported. The current market for paddy seed is estimated at about 76 million. However the demand for paddy and other seeds could rise with more active promotion and distribution.

The formal seed market is characterized by repeat buyers who purchase seed every year or once every two or three years. For many crops such as paddy, farmers who purchase seed from formal sources represent a small percentage, but they purchase seed frequently. The formal market for paddy seed is typified by farmers with larger holdings using short-age varieties planted by broadcast method.

A great many farmers obtain paddy seed from other farmers. Most transactions of this kind between farmers are by exchange of paddy for paddy seed, but many are also made on a cash basis.

Farmers recognize the potential impact of seed quality on yields for all crops covered in this study. This response was general, even among farmers that do not purchase quality seed from formal sources. This suggests that the market can expand with new efforts in promotion and marketing. Germination is the dominant factor cited by farmers which leads to improved yields. Genetic purity is second in importance for paddy, varieties resistant to pest and diseases is next for all crops.

Home storage methods are aimed at protecting seed from insects and rodents. Farmers did not seem to appreciate the problem of deterioration due to heat and humidity during storage. This is probably because deterioration in germination and vigour cannot be verified visually.

Farmers realize they have difficulty in determining which seeds are high quality when they purchase them in the market. They wish to have more information provided to them at time of purchase. A DOA label is recognized as a sign of quality, but no respondent mentioned "certified seed" in this regard.

Information about seeds is not generally available to farmers. Information sources such as dealers, media including print media, seed container labels, and extension personnel are not being used effectively.

Most farmers carry seed from point of sale to the farmstead by hand, bicycle, or public transportation. Most purchase at the nearest outlet. Currently large pack sizes are a problem for grain seeds, including paddy.

Outlets located nearest to farmers are cooperatives and dealers. A few farmers, however, will travel to more distant point to obtain seed of the desired kind and quality.

Timeliness in availability is the dominant problem cited with DOA seeds. Germination was also cited for vegetables and paddy. Part of the problem related to vegetable seeds may be attributed to low shelf-life after leaving DOA cold storage facilities.

Price is a factor in attracting first-time buyers. Seed quality--especially germination and vigour--becomes more important to maintain repeat customers.

Farmers seem convinced that high quality seed can improve yields and bring other benefits. There are opportunities to open more channels of distribution, especially through cooperative outlets. Additional promotion and information, along with timely distribution through more outlets, will lead to significant expansion of the seed market in Sri Lanka.

Recommendations

The recommendations listed below can be drawn from the findings and conclusions of this study. The list is not intended to be comprehensive of all the actions that might be taken to support development of the seed sector. Other actions, particularly in the area of policy and enterprise development, should also be considered.

1. More information related to seed quality and recommended agronomic practices should be provided to farmers, especially at point of sale. Better labelling and additional printed information are appropriate methods. Dealers should be trained to help provide and interpret information about seed quality, and farmers need training to use the information provided.
2. Farmer education programmes on methods to select and handle paddy and other seeds obtained from informal sources, including the farmer's own seed, could have an important impact on the quality of material used by farmers.
3. Subsidizing seed sales does not appear to be necessary. Rather than acting to expand the market, low prices may only restrain the expansion of a competitive market. DOA prices should be set at realistic market levels in order to allow development of other enterprises.
4. The number of outlets should be increased and seed should be packed in convenient-sized containers--especially for paddy and other grains. Timeliness of supply is a prerequisite.

5. Methods to improve shelf-life of vegetable seeds should be explored. It may be necessary to improve packing materials and dry seed to lower moisture levels before packing.
6. Storage periods should be shortened where possible to reduce deterioration in germination and vigour. Specific strategies in production programmes, such as producing a Yala seed crop for sale in Maha season, should be given priority where possible.
7. Viable alternatives for storage should be explored, including cold storage and suitable locations for ambient storage, such as up-country. Timely harvest and prompt drying are imperative under tropical conditions.
8. Applied research to identify new methods of home seed storage should be carried out, with emphasis on reducing deterioration of seed.
9. Market coordination to ensure availability and quality of seeds through the sequence of classes (eg. breeder, foundation, registered, certified) will be of increasing importance. This should be done on a regional and national basis.
10. Continued market research will be needed. More specific studies of target markets and crops would be helpful to new enterprises.
11. Expansion of the seed market can become reality by proper attention to the following:
 - Time, Place and Form (including right pack size and variety)
 - Seed Quality
 - Prestige and Quality Recognition
12. The Seed Certification Service should become more pro-active to enhance the prestige of the certification label. This label should become a symbol of quality. Certification should also help in farmer education.

CHAPTER 1. INTRODUCTION

1.1 Background on Sri Lanka Seed Industry

The organized seed production and distribution programme in Sri Lanka was initiated by the Department of Agriculture (DOA) after the selection and breeding of improved paddy varieties in the late 1950s. Between 1960 to 1980, the industry matured within the state sector and in the late 1970s the national Seed Certification Service began functioning. With growing private sector interest in local seed production and government policy of scaling down commercial activities in the public sector, the DOA is interested in broadbasing the national seed programme to allow more private sector involvement in the seed industry.

A few countries in the region, and many developing countries in the world, have recently opened their seed industries to the private sector, with a great deal of success. Successful seed production and distribution programmes have led to significant increases in yields and production. Such programmes often begin with dissemination of new varieties developed through national and international agricultural research institutions. Another important contribution of an active seed industry is to improve the quality of seeds: germination and vigour; varietal purity; freedom from disease and weeds; etc. Sri Lanka, needs to develop its seed industry rapidly to make high quality seed freely available to the farming community and thus to increase the overall agricultural productivity of the country.

The new policies that lean towards developing an active seed sector based on many independent seed enterprises provides opportunities to place more emphasis on marketing, including distribution and promotion. Independent, competing enterprises have the incentive to improve the quality of seed and to promote its use by farmer/users in order to increase their share of the market.

1.2 Importance of Seed Marketing

Seed is the primary input used by the farmer to grow annual crops. Quality of seed is often critical in determining the success or failure that will be obtained at harvest. With this in mind, farmers are particular about the kind of seed they use. It must be of the right variety, able to adapt to the agroclimatic situation and producing the kind of grain vegetable, or other product desired for consumption. The seed must germinate and produce a healthy, uniform stand of plants.

From what sources do farmers currently obtain good seeds? How does the farmer select the best seed to use? It is usually impossible to determine the viability of seed from its physical appearance. While seed may appear perfectly useable, it may in fact be of the wrong variety, may not be capable of germinating, or could be affected by disease.

Farmers often harvest seed from their own fields and save it at their homes for use in the following season. Seeds of most grain crops including paddy are relatively easy for the farmer to harvest and store for planting in the following season. But it is more

difficult for the farmer to collect and store seed of some other crops, including many vegetables.

Also vegetable seeds are usually small and are sometimes not a costly input on a per acre basis. For grains and also potato, seed is bulky and can be a major capital item if purchased from a formal supplier and transported to the farmer's field. Therefore, for many crops the actual demand for seed from formal sources is lower than the "total seed requirement." Effective demand may be less than 5 percent of total seed requirement of some crops, while for others it may be 30 percent, and for still others up to 100 percent.

"Effective demand", then, is the amount of seed that farmers will purchase from suppliers, such as seed dealers. Besides depending on the characteristics of the crop, effective demand for seed can be enhanced by increased efforts in marketing.

The most important factor that can increase demand is to offer very high quality seed to farmers. If seed produced through a specialized, formal system offers important attributes--such as a new variety, higher germination and vigour, or freedom from disease and pests--that the farmer's own seed cannot achieve, then the demand for seed will be greater. Of course these improvements must translate into increased yields or other important differences (better quality product, lower production costs) that benefit the farmer. The greater the quality improvements of purchased seed over the farmer's own seed and the greater the impact of these quality attributes on yield or other aspects of the crop, the higher the demand for purchased seed.

Efforts in promotion and distribution can also lead to an increase in effective demand because seed is available when needed, in a convenient place, and in the right sized container. Promotion is also important to present the seed in a favorable manner. Since the farmer cannot usually determine the quality by visual inspection, he depends on the supplier to obtain the best quality and to stand by his product. Therefore, quality guarantees are important in promoting use of high quality seed. Certification services throughout the world fulfil an important role by assuring the farmer of minimum quality standards applied in the seed industry.

1.3 Purpose of This Study

This study was undertaken to identify ways to stimulate growth of seed markets in Sri Lanka. The purposes were to:

1. Identify the problems that farmers encounter in obtaining high quality seed.
2. Explore possibilities of seed market development.

An effort is made to quantify the total seed requirement and effective demand of major seed crops. Emphasis is placed on identifying the benefits that farmers expect to obtain from using high quality seed of different crops. Means of increasing effective demand through improving quality, and through better promotion and distribution are then investigated.

Besides recommending different improvements in the production/distribution systems that will result in increased utilization of improved technology through high quality seed, it is also hoped that this effort will help bring focus to public policy and assist in seed enterprise development.

The study focuses on individual crops for which the potential market for seed is of an important volume and value. It includes only use of seed for commercial production, rather than home garden uses. It also emphasizes the kinds of seeds which are likely to be grown locally.

1.4 Value of High Quality Seed

The actual value of many kinds of seed, such as rice, is the alternative value it has for consumption. Value of high quality seed is in addition to the value it has for purposes of consumption. Also, production, extraction and handling of seed of some crops presents technical difficulties. Big onion seed, for example, is produced independently of the onion production crop, in a different season, and using special techniques. Sometimes these processes can be handled more efficiently by an enterprise, and the farmer finds it more convenient to purchase seed when needed. Again, the value highlighted below is the additional value derived from the using seed of superior quality.

High quality seed derives its additional value from its impact on yield, improvements in the quality of product obtained by the farmer, or because it allows the farmer to produce at lower cost per acre. Here are some examples of each:

Yield: Characteristics introduced by plant breeders can result in higher productivity. A new variety may have a higher capacity of production, or may be better adapted to the agroclimatic conditions of the zone. Even if the farmer uses the same variety as before, improved seed may still increase yields because of higher germination and vigour, producing a more healthy, uniform stand of plants, thus increasing the efficiency of utilizing other inputs.

Product Quality: Seed of a new variety can be in high demand because the product obtained is preferred by the consumer. The farmer may get a higher price for his goods in the market as a result. The desire of farmers to change varieties creates a demand for seed. Here too, seed quality can also enter in. Varietal impurities resulting from mixing seed is a problem in many crops which can affect productivity, but can also lower product quality. Therefore, seed quality along with selection of variety can affect quality of the farmer's final product.

Production Costs: Lower costs of production can often be achieved by using the right seed. A new variety may offer resistance to pests, permitting the farmer to use less pesticides. Also, lower seeding rates are sometimes used when the farmer is certain of obtaining a minimum germination percentage, and of obtaining strong plants from seeds that germinate.

As can be seen in the above, the value of seed is derived from the benefits that the farmer can expect to obtain from it. The benefits are in turn derived from either the characteristics of a new variety or from improved seed quality.

CHAPTER 2. METHODOLOGY

2.1 Selection of Target Crops

The primary factor used in selection of crops to include in the study was size of the potential seed market. An initial estimation can be obtained by multiplying total extent planted by seeding rate, by value per unit of seed. Although this procedure obtains only a rough estimate, the figures are reliable enough for an overview and intercrop comparison.

Two crops stood out above all others in terms of the estimated total value of seed used by all farmers. They are potato and paddy. Seed requirements for all of the remaining crops are considerably lower in total value compared to these two. Studying the seed market of these two crops would, however, require different approaches, given that cultivation of paddy is widespread, covering hundreds of thousands of hectares, while that of potato is concentrated in a limited area and amounts to less than 10,000 hectares. It was felt that ample information about the potato seed market was already available. Therefore this crop was included, but was not emphasized in the survey.

A similar difficulty arose in relation to big onion, which at the time of the survey was produced by a limited number of farmers, perhaps as few as 1,000. Again, because the market for big onion seed is fairly well understood, this crop was included, but not emphasized. That is to say, no special sampling procedures were used to ensure that potato and onion farmers would be sufficiently represented in the survey in order to draw any inferences about these specific seed markets.

Another problem arose in relation to many vegetable crops which are grown on very small scale, such as in home gardens. It was decided that the thrust of this survey should be on marketing of seed to farmers for commercial production. The topic of garden and flower seeds could be taken up in a separate study. Therefore, it was decided to place the following minimum limits on each crop for inclusion in the survey:

Paddy	One-half acre
Other Field Crops	One-quarter acre
Vegetables	One-eighth acre

These refer to minimum amounts planted during any one season. Families that failed to reach the minimum for at least one crop during either Maha or Yala seasons were not considered "farm families" for the purposes of this survey.

Traditional vegetables such as brinjal (eggplant), snakegourd, bittergourd, pumpkin, and tomato are grown generally throughout the island, while non-traditionals such as cauliflower, leeks, and raddish are concentrated largely in the up-country.

The survey instrument covered a total of 16 crops. But crops such as snakegourd, bittergourd, pumpkin and onion were very poorly represented and were dropped from the analysis. Carrot was mistakenly omitted from the survey. It appears, however, that carrot seed has a market similar in importance to some other vegetables such as

raddish, beets and leeks. Also vegetable cowpea (bushitavo) was overlooked in the design of the survey.

For purposes of analysis and reporting results, vegetable crops except chilli and beans were combined into two categories frequently used in Sri Lanka:

1. Traditional vegetables
2. Exotic vegetables (or non-traditionals)

The final list of crops included in the study are:

Vegetables

Chilli

Beans

Traditional Vegetables (Tomato, Okra, Brinjal)

Non-Traditional Vegetables (Leeks, Beet, Raddish)

Field Crops

Paddy

Potato

Grain Legumes (Greengram, Cowpea)

Other Field Crops (Groundnut, Maize)

2.2 Market Segmentation

Segmentation of a market into different parts provides a means of identifying kinds of farmers or areas where demand might be greater. This is especially useful in developing market strategies for seed enterprises. With a relatively small sample of farmers, it was anticipated that market segmentation would be possible only for paddy.

Based on previous experience of the Department of Agriculture, and discussions with Research Officers at the Batalagoda Rice Research Centre, it was felt that segmentation by region would lead to the most useful information. The differences in paddy cultivation between in the wet zone and that of the rest of the country has important differences. For example, most paddy in the wet zone is "rainfed" in the sense that the water is not collected in tanks nor drawn from rivers. Instead the fields are flooded from the accumulation of rainwater that flows naturally into the lowlying areas. In the dry and intermediate zones, however, paddy cultivation is normally undertaken only when irrigation water is available, either from a tank or a diversion from a stream or river. According to the "Classification of Rice Growing Environments in Sri Lanka" strictly upland cultivation of paddy in the dry and intermediate zones (chena) is very limited and can be disregarded as a separate segment for paddy seed market.

Average paddy yields are normally lower in the wet zone, and therefore the expected impacts of using high quality seed would be less. The average paddy yield of all the districts which are predominately wet zone was 65 bushels in 1990, but the figure was 85 bushels for the same year in the remaining districts, excluding the north and east. (Census and Statistics) Whereas a farmer in a dry zone area with a good water supply

may hope to improve yields by 20 bushels or more per acre by using quality seed, a farmer in the wet zone might expect an increase of perhaps only half this amount.

Therefore, seed markets are often strongest where current yields of a particular crop are already high. This is because the impacts of improved technology (in this case through high quality seed) are usually greater where growing conditions are most favourable.

However, it was noted that farmers in the wet zone experience more difficulties in storing seed, and find it necessary to replace seed more often. Therefore, the seed market in this area could be stronger than expected, but for different reasons.

A more specific geographical segmentation is possible in terms of irrigation system because of greater reliability of the source of water in major irrigation schemes. However this phenomenon may apply more to head areas of major schemes rather than tail areas. (Classification of Rice Growing Environments in Sri Lanka)

A second kind of segmentation might be done on the basis of size of holdings and method of planting. Farmers with larger parcels would be expected to plant more frequently by broadcasting seed rather than transplanting because of the labour costs involved in the latter system. When seed is broadcast, quality is more important in obtaining a healthy, even stand than when the field is transplanted from a nursery. Again there may be a geographical dimension to this phenomenon, in that broadcasting seed may be more popular in areas where land holdings are larger and where labour is more scarce.

A third possible segmentation of the paddy seed market is by variety, at least by age class (time from planting to maturity). Short age was defined as 3 to 3 1/2 months and long age as 4 to 4 1/2 months. (Note that long-age is technically defined by breeders as 5-months and over, which are varieties found primarily in the wet zone. The 4 and 4 1/2 month varieties should technically be called medium age rather than long age. In this report, however, the terminology commonly used in the dry and intermediate zones was adopted.)

2.3 Sample Size and Selection

The sampling unit used in the study is the farmer. Since the variation in land holding size among Sri Lanka farmers is not large, this sampling unit would provide a fair representation of area cultivated.

Based on prior knowledge of the distribution of the farm population, it was estimated that the number of families growing at least 0.5 acres of paddy during the Maha season in each of the three geographical segments might be as follows:

Wet Zone	750,000
Major Schemes	250,000
Other	500,000

The minimum sample size would assure that at least 50 valid observations are obtained for each segment of the market. If the sample is proportional to the number of farm families in each segment, 50 responses from the major schemes implies 100 from other dry and intermediate areas and 150 from the wet zone. This was increased by 25 percent to allow an additional margin of error, arriving at a target sample size of 375 valid questionnaires in total. The sampling frequency is therefore approximately one in 4,000.

It was understood that a sample of this size would be too small for many purposes. Information on paddy could be expected to be valid on a national level. But representation of nearly all other crops would be low by comparison. Time and resources did not permit a significant increase in sample size nor the design of different sampling techniques for each crop of interest. Much of the information gathered, however, dealt with the general topic of seeds, and especially with farmers' perceptions of quality seed. Crop-specific data was less important than the farmers' comments about different sources of seed, problems encountered, expected benefits from using good seed, information needs, and so forth. These answers could often be aggregated for all paddy, all vegetables, and all other field crops. Potato was excluded because the peculiar characteristics of seed potato make it a poor fit in any of the above groups.

A two-stage random sampling system was used, with Grama Niladhar (GN) areas as the sampling unit in the first stage and farmers in the second. GN areas were listed by Agrarian Service Centre for all districts of the country except those in the north and northeast which are inaccessible due to civil disturbances. Each GN area was given equal weight in the selection. After removing those in the greater Colombo area, a total of 140 GN areas were selected randomly from the sample frame. It was anticipated that perhaps 30 would be dropped later because of being in troubled areas, or because of being predominately urban. This would leave a sample of farmers distributed over about 110 GN areas. With an average of about 3.5 valid questionnaires per GN area, the target sample size would be reached.

The primary concern in selection of families to interview was to set procedures that would allow a minimum of free choice on the part of the enumerator in the field. This was to reduce the natural human tendency to lean towards interesting cases having more experience and more information concerning the phenomena which are emphasized in the survey. This would naturally lead the enumerator toward the larger, more prosperous farmer who is often the leader and innovator among farmers in the village. To reduce this source of bias, which is frequently the most severe in field surveys, the selection of farmers was made from names in the electoral register using a random procedure. The GN would identify families which were not engaged in farming, even to a small extent. When six names of farm families had been chosen, then the field team would proceed to the field to make contacts for interviews. The team would complete up to four questionnaires in each GN area.

Although most GN areas probably have close to 300 families, some areas were highly urban and others had a high representation of plantation agriculture. Consequently, some GN areas had only 20 farmers and others over 200. Therefore, the sampling method is not completely proportional to the farm population. It has a bias, over-representing areas with fewer farmers. Upon completing the initial data tabulation,

a check of crops grown in GN areas with few farmers was made against crops grown by all other farmers in the sample. The distribution among crops--paddy, vegetables, and other field crops--was roughly similar between the two groups. Therefore it was felt that the sampling bias did not impact too greatly on the data set. Observations from both groups were therefore kept in the sample.

2.4 Questionnaire Design and Study Schedule

In preparation for the study, more than ten group discussions were held with research and extension personnel around the country. At the beginning of each discussion, a presentation on concepts of seed marketing was given by the study team. Participants in each group were asked to provide their best estimates of the impacts of high quality seed for two crops--paddy and one other crop dominant in the particular region. The information was used in a model to illustrate the very high value of quality seed given its impacts on yield and other factors.

Suggestions for the study were received from the participants in these workshops and used to develop the questionnaire. The study was designed to first estimate the volume of the current market for seed. Then the focus turned toward the nature of the benefits of using quality seed, and farmer estimates of seed value. Finally, many aspects of marketing were explored, including physical distribution as well as supplementary services.

The crop cycles covered by the questionnaire were Maha season of 1990/91 and Yala season of 1991. The questions were structured to ask about the immediate season (Yala 91) first, then recall back to the previous season (Maha 90/91).

Space was provided to record data for two parcels of paddy in each season, three other field crops, and three vegetable crops. If the farmer had more than three OFCs or vegetables, a priority order was given depending on the expected frequency of occurrence of each crop--the less frequent the higher the priority.

Development of the design and methodology was carried out from May to July of 1991. Interviews required about 1.5 hours to complete. Field work required travel to many remote areas of the island, except to the troubled north and east. A four-person team worked from August through November, 1991, to complete field work. Tabulation was completed in February 1992.

DARP Special Project Funds were used to print the questionnaire and cover costs of three enumerators who carried out field work and data tabulation. The enumerators were Mr Jayantha Senanayake, Mr H M S Herath, and Mr S K P M K Esselle. The team was guided by a DOA Officer from the S&PM Division. Unfortunately, the officer who participated in the design, Mr Govinage Sunil, met with an accident the day before field work was to begin. DOA assigned another officer to guide the team during field work. After data tabulation, work on the study was suspended for several months. However, with the recent formation of several new seed enterprises, the need for information is increasing and analysis of data from the study was resumed.

Most information was tabulated numerically and entered into a database. In a few cases, answers were recorded in text form. From the original database, two data sets were created, a smaller set containing crop-specific information and a larger file with farmer information. Analysis was done using the dBase STATS package.

2.5 Other Sources of Information

Besides data from the survey, the study draws on reports of the Department of Agriculture and DAR Project, as well as other seed market studies conducted in Sri Lanka. Experience of the personnel of the Seeds and Planting Materials Division was a valuable additional source. Secondary data on extent planted and production of various crops was obtained from the Division of Agricultural Economics and Planning. Seeding rates were obtained mainly from the Crop Recommendations Technoguide published by the DOA.

CHAPTER 3. CHARACTERISTICS OF FARMERS AND CROPS IN THE SAMPLE

This chapter describes characteristics of farmers in the sample, and also crops grown by them.

3.1. Geographic Distribution

The 369 farmers surveyed represent all or portions of 17 districts of the country. The number of Grama Niladhari (GN) Divisions included in the sample frame is shown in Table 3.1 by district, totalling over 10,000. The percentage of GN Divisions in each District is compared with the number of sample farmers from that District. The two percentages are very close in each case, showing that the random sampling system did, indeed, result in the desired geographical dispersion of the sample.

Table 3.1. Sample Farmers and GN Divisions in Sample Frame by District

	Number of GN Divisions in Sample Frame		Number of Farmers in Sample		
		Percent		Percent	
=====					
Predominately Dry and Intermediate Zones					
1	Anuradhapura	621	6.2	24	6.5
2	Polonnaruwa	201	2.0	12	3.3
3	Puttalam	550	5.5	22	6.0
4	Kurunegala	875	8.7	40	10.8
5	Badulla	452	4.5	16	4.3
6	Monaragala	106	1.1	4	1.1
7	Hambantoca	445	4.4	17	4.6
8	Matale	545	5.4	22	6.0

Predominately Up-Country Wet Zone					
9	Kegalle	570	5.7	26	7.0
10	Kandy	1030	10.2	49	13.3
11	N'Eliya	274	2.7	12	3.3

Predominately Low-Country Wet Zone					
12	Gampaha	1159	11.5	30	8.1
13	Colombo	553	5.5	10	2.7
14	Kalutara	602	6.0	19	5.1
15	Galle	879	8.7	26	7.0
16	Matara	650	6.5	23	6.2
17	Ratnapura	545	5.4	17	4.6
=====					
TOTAL		10,057	100.0	369	100.0
=====					

After completion of the survey, farmers were classified according to agroclimatic zone depending on their specific location. About half sample farmers (182) are in the dry and intermediate zones, and the other half (187) in the wet zone, which is just the distribution assumed earlier in developing the sample methodology. Because of the many interpretations of the concept of "major irrigation schemes", including areas under

tanks and areas where water is diverted from streams and rivers. this category or market segment was not found used in the analysis.

3.2. Farmer Characteristics

The level of education reported by farmers is shown in Table 3.2. Nearly 70 percent have secondary education or above, and 98 percent indicate basic skills in reading and writing.

Table 3.2. Level of Education of Farmers

LEVEL OF EDUCATION	Frequency	Percent
No Schooling--Cannot Read nor Write	7	1.9
No Schooling--Can Read and Write	2	0.5
Primary (Grades 1-5)	111	30.1
Secondary (Grades 6-12)	224	60.7
Tertiary (Diploma or Degree)	9	2.4
Special Training	7	1.9
No Response	9	2.4
TOTAL	369	100.0

Farmers were asked if there is a landlord who receives rent or who takes a portion of the harvest as payment. Nearly 40 percent responded positively. The proportion is between 45-50 percent in the wet zone and 30 to 35 percent in the dry and intermediate zones. This factor can have important implications for seed marketing and other aspects of agricultural development. It is worth noting, however, that the vast majority of farmers in the survey indicated that landlords did not take an active role deciding what crops to grow, nor in the provision of inputs, such as seed.

Table 3.3. Farmers with Landlords Who Receive Rent or Part of the Harvest

AGROCLIMATIC ZONE	LANDLORD		Percent Yes
	Yes	No	
	(No of sample farmers)		(%)
Dry and Intermediate	57	125	31.5
Up-Country Wet Zone	37	36	50.7
Low Country Wet Zone	52	62	45.6
Total	146	223	
Percent	39.6	60.4	

3.3. Crops and Extent Cultivated

The numbers of crops represented in the sample came to 817 between Yala and Maha seasons. Fully 636 of these were paddy, of which the majority is short-age (3 or 3.5 months). The sample becomes sparse for some crops, such as potato (12 cases), but is greater for chilli and beans. Traditional vegetables will be treated as a group, as well as non-traditional vegetables. There were 40 observations of grain legumes in the sample.

Table 3.4. Number of Crops Represented in the Sample

CROP AND CROP GROUP	NUMBER OF CROPS IN SAMPLE	
VEGETABLES		
Chilli		37
Beans		38
Traditional Vegetables		29
Tomato	14	
Brinjal	6	
Okra	9	
Non-traditional Vegetables		9
Beets	3	
Raddish	3	
Leeks	3	

PADDY		
All Paddy		636
Short-age	391	
Long-age	245	

POTATO		12

OTHER FIELD CROPS		
Grain Legumes		40
Green Gram	24	
Cowpea	16	
Other Crops		16
Groundnut	6	
Maize	10	
Total		817

Total extent in the sample planted to each group of crops is given in Table 3.5. Nearly 60 percent of extent planted of all crops is represented by the dry and intermediate zones. About 58 percent of extent of all crops in the sample is planted in Maha season, and 42 percent in Yala.

Table 3.5. Total Extent of Land by Crop Group and Season, and Average Extent per Farmer Represented in the Sample, by Zone

CROP GROUP	Agroclimatic Zone		TOTAL
	Dry & Intermed.	Wet	
=====			
(acres)			
Total Extent by Crop Group			
Vegetables	32	16	48
Paddy	451	347	798
Potato	11	1	12
Other Field Crops	44	2	46

All Crops	538	366	904

Total Extent by Season			
Maha			527
Yala			377
=====			

The average extent of land cultivated by farmers was 1.45 acres. This was derived by taking the larger areas cultivated between Maha and Yala seasons for each farmer. Not surprisingly, the figure is larger for the dry and intermediate zones than for the wet zone. While extent cultivated per farmer approaches two acres in the dry and intermediate zones, it is just over one acre in wet zone.

Farmers were asked to classify each crop according to the kind of irrigation system, if any. The majority of crops are grown without a specific irrigation system, but instead with water that is accumulated as rains flood the low lying areas in the wet zone. Only 81 crops were found under major irrigation tanks, 125 under minor tanks, and 138 under other specific irrigation systems, such as anicuts, where water is diverted from a stream or river. Many of the latter are also considered major irrigation schemes. The majority of crops, 473 in total, could not be classified by farmers into any of the above categories.

Table 3.7. Sample Crops by the Type of Irrigation System

IRRIGATION SYSTEM	CROP GROUP			Total
	Paddy	Vegetables	OFC	
	(Number of sample crops)			
Major Tank	71	8	2	81
Minor Tank	102	21	2	125
Other (anicut)	113	24	1	138
Rainfed (incl wet zone)	350	72	51	473
Total	636	125	56	817
Percent:	77.8	15.3	6.9	100.0

The survey did not distinguish between upland and lowland. However much of the other field crops (OFC) are grown on rainfed uplands.

CHAPTER 4. DEMAND FOR SEED: VOLUME

The seed market can be thought of as consisting of three parts: the seed material that farmer would save from a previous harvest to plant the following season, the seed a farmer might purchase or trade informally from a neighbor or farmer/leader, and seed purchased from formal sources, such as a seed dealer. There are variations, of course, but the three principal parts of the seed supply system described above will be referred to in the remainder of this document as 1) farmer's own seed, 2) seed from another farmer, or 3) seed from formal sources. "Formal sources" refers to distributors from which the farmer would purchase inputs. Seed found at these locations is normally packed in special containers and appropriately labelled.

Chapter 4 first addresses the concept of total seed requirement. "Effective demand" is the portion of this that might be purchased from formal sources. An attempt is made to estimate this demand for many major crops. Some of the main factors affecting demand are pointed out.

4.1. Total Seed Requirement

A general overview of the potential market for seeds in the country can be obtained by calculating the value of seed needed to plant all of the extent cultivated by farmers each year. This sort of information provides a perspective on the potential market among the various crops, but should not be taken to represent effective demand. The actual amount of seed farmers may wish to obtain through formal channels (certified or other high quality seed) will be lower--perhaps only a fraction of the potential market. Table 4.1 provides estimates of total seed requirement for the major seed crops. Extent is multiplied by seed rate per hectare to obtain total volume required for planting. This is multiplied by a representative price to estimate potential market value of seed.

Among vegetables, the greatest volume and value of seed is used for beans. This is followed by dry chilli, okra and big onion. Out of these, most seed used in the country is produced locally, except big onion seed which is mostly imported. It is apparent that the size of the potential market for seed of other kinds of vegetables is relatively small.

The next two crops, paddy and potato, are singled out because of their very large scale. Whereas the extent of potato grown in the country is lower than that of many other crops, the potential market for potato seed is very great--nearly as great as that of paddy. It reaches a level of over 900 million Rupees. Potential market for paddy seed is estimated at over 1,000 million. The reason for the high value of potato seed used in the country is because of the large amount of seed potato used per hectare, and because of the high price of potato in Sri Lanka.

The final group includes other field crops, which are actually grain crops in addition to paddy. Green gram (mung bean) and cowpea have the largest seed requirement in volume and value. These are followed by groundnut, blackgram and soybean. The total value of all seed in this group is about equal to that of all vegetable seed. Again, both are small compared to potato and paddy.

Table 4.1 VOLUME OF POTENTIAL SEED MARKET IN SRI LANKA

	Extent (has)	Seed Rate (kg/ha)	Total Seed Reqm't (mt)	Seed Price (Rs/kg)	Potential Market Value (Mn Rs)
VEGETABLES					
Dry chilli	41,849	1.00	42	750	31.4
Big Onion	2,400	8.00	19	750	14.4
Okra	9,790	4.50	44	330	14.5
Brinjal	9,361	0.35	3	590	1.9
Bittergourd	3,679	6.00	22	460	10.2
Snakegourd	2,786	4.00	11	470	5.2
Tomato	4,518	0.25	1	1600	1.8
Cucumber	2,290	1.00	2	660	1.5
Cabbage	2,747	0.25	1	950	0.7
Carrot	1,608	4.00	6	1000	6.4
Beet	1,332	6.00	8	1200	9.6
Raddish	2,231	5.00	11	560	6.2
Beans	6,772	62.50	423	135	57.1
Leeks	694	4.00	3	2200	6.1
Pumpkin	7,164	1.00	7	250	1.8
Capsicum	1,595	1.00	2	1400	2.2
Subtotal	100,816				171.2
PADDY	856,707	104.00	89,098	12.22	1,088.6
POTATO	7,745	2000.00	15,490	60	929.4
OTHER FIELD CROPS					
Cowpea	27,846	40.00	1,114	45	50.1
Greengram	42,683	30.00	1,280	50	64.0
Soybean	5,795	60.00	348	22	7.6
Blackgram	10,232	30.00	307	40	12.3
Groundnut	10,991	100.00	1,099	30	33.0
Gingelly	17,775	7.00	124	35	4.4
Maize	47,941	20.00	959	10	9.6
Kurakkan	7,485	8.00	60	15	0.9
Subtotal	170,748				181.9
TOTAL	1,136,016				2,371.1

Note: Figures for extent of land sown are for 1990 and 1991. The greater of the two was used. Prices are from 1991.

Sources: DOA, Division of Agricultural Economics and Planning and Seeds and Planting Material Division

4.2. Current Effective Demand

Effective demand refers to the volume of seed that might be purchased from farmers from formal sources. Effective demand will be a high percentage of total seed requirement for some crops, and low for others. For some of the vegetables, for instance, nearly all farmers purchase their total seed requirement each year. Therefore effective demand is virtually 100 percent of potential. Some crops will be in the middle range. Potato, chilli, beans and traditional vegetables are examples where some farmers

use their own seeds held over from previous harvest, whereas others purchase seeds from a formal supplier. Still others have poorly developed seed markets, and actual demand is always expected to be a low percentage of potential market. Examples are most grain crops, including paddy. As stated previously, one of the primary objects of this study is to estimate the volume of seed in demand.

Table 4.2 below shows that the percentage of seed obtained from formal sources by farmers in the survey did indeed vary greatly from one crop or crop group to another. Nearly half of the 15 acres of chilli from the sample were planted with seed purchased from formal suppliers. Eight of 18 acres of beans (about 45%) follow this pattern. For other traditional vegetables (tomato, okra, and brinjal), the percentage increases to 70. But the amount purchased from formal sources goes even higher for non-traditional vegetables (leeks, beet, radish), up to 93 percent. Although the sample size is small for this category of crops, generally it is observed that farmers do not harvest seed from these crops, but instead purchase all of their needs from private dealers, who obtain it from importers.

Table 4.2 Source of Seed Used by Farmers, 1991

CROP OR CROP GROUP	SOURCE OF SEED			
	Own Seed	Another Farmer	Formal Supplier	Other Source
(Percentage of Extent Planted)				
VEGETABLES				
Chilli	43.8	6.6	49.6	0
Beans	52.6	1.4	45.4	0.7
Traditional Veges	27.7	2.1	70.1	0
Non-trad Veges	0	0	93.1	6.9
PADDY	67.7	24.3	5.8	2.1
POTATO	24.5	20.3	55.1	0

Source: Survey results

Nearly 6 percent of the paddy extent was planted with seed purchased directly by farmers, but another 2 percent of extent was planted with seed from other sources. In some cases, the landlord provided the seed, which may have also been purchased from formal suppliers. (As the farmer being interviewed usually did not know the original source, it was not recorded.) So the estimated current utilization of paddy seed might be as high as 7 percent of the potential market. Here again, however, current utilization is affected by supply. If more paddy seed was distributed and actively promoted, the effective demand may rise to as high as 9 percent of the seed requirement, perhaps approaching 8,000 metric tonnes each year.

Potato seed has a strong market in Sri Lanka. High quality, disease-free seed potato is of critical importance to obtain a good yield in this crop. The estimate of 55 percent currently being purchased from formal sources is undoubtedly overstated given that

the supply of potato seed has not been able to reach the demand. The demand might eventually come up to this level if more seed were available from formal suppliers and if it were distributed in a timely manner to farmers. Several farmers obtained potato seed material from neighbouring farmers.

With other field crops the proportion planted with seed from formal suppliers is much lower. Unfortunately results from the survey regarding these crops were not useful because of inconsistencies in the answers given by farmers. Judging from recent experience reported by the DOA Seeds Division, a much smaller amount of seed of these crops is purchased from formal sources. Farmers instead customarily use their own seed.

Applying the percentages derived above, one can estimate the current effective demand for different kinds of seed (Table 4.3). The percentage is multiplied by the total seed requirement to obtain the quantity in demand. Then the value of this market is shown. The first group of crops are vegetables, followed by paddy and potato and finally other field crops. Less significant seed crops, such as cucumber, cabbage, pumpkin and kurakkan have been dropped from the list.

This method of analysis reflects only the demand derived through the farming sector. The home garden market for vegetable seeds is not included. A comparison was made between the estimates in Table 4.3 for seeds that are commonly imported--carrot, beet and leeks. The volumes imported in recent years are about 50 percent over the estimates shown below. It appears that this difference is due to several factors:

- Home garden use of seed is not accounted for.
- Farmers often use more than recommended seeding rates when they are unsure of the germination rates they might obtain.
- Sometimes reseeded is required either because of seed quality or unfavourable field conditions.

In addition, it should be borne in mind that not all crops are included in the table. There are literally dozens of others grown by farmers and home gardeners for which seed requirements are small on an individual basis, but may be important when added together. The total value of imported seeds is generally estimated at around 90 million Rupees per year, including seed of such crops as beans, big onion, beet, carrot, radish, leeks, knol-knol, butternut, cabbage, capsicum, and tomato.

With above explanation it is clear that the total value of 97 million shown in the table is only a portion of the actual total market for vegetable seed in Sri Lanka. The true value might be closer to 150 million. This figure would include imported seed but it still fails to fully account for seed used in home gardens.

In terms of individual vegetable seed crops, the market for bean seed is the largest, followed by chilli and big onion. Next is okra, then some of the other seeds which

are commonly imported. Of all vegetable crops taken individually, only bean, chilli and okra currently offer important opportunities for seed enterprises in the country.

The current market for paddy seed amounting to over 6,000 metric tonnes or around 300,000 bushels. This amount of seed would cover about 150,000 acres of land. In the past, however, distributions of paddy seed by the DOA have approached 8,000 metric tonnes, which represents close to 9 percent of total seed requirement. It is felt that that level can be attained once again with increased efforts in marketing.

Table 4.3 Estimated Effective Demand for Seed of Selected Crops in Sri Lanka

	POTENTIAL MARKET		EFFECTIVE DEMAND	
	Total Seed Requirement	Percent from Formal Sources	Quantity in Demand	Market Value
	mt	%	mt	Mn Rs
VEGETABLES				
Dry chilli	42	49.6	21	15.6
Okra	44	70.1	31	10.2
Brinjal	3	70.1	2	1.4
Tomato	1	70.1	1	1.3
Beans	423	45.4	192	25.9
Big Onion	19	100.0	19	14.4
Carrot	6	100.0	6	6.4
Beet	8	100.0	8	9.6
Raddish	11	100.0	11	6.2
Leeks	3	100.0	3	6.1
Subtotal				97.1
PADDY	89,098	7.0	6,237	76.2
POTATO	15,490	32.0	5,000	300.0
OTHER FIELD CROPS				
Cowpea	1,114	2.0	45	2.0
Greengram	1,280	2.5	51	2.6
Soybean	348	10.0	14	0.3
Blackgram	307	5.0	12	0.5
Groundnut	1,099	2.0	44	1.3
Gingelly	124	4.0	5	0.2
Maize	959	4.0	38	0.4
Subtotal				7.3

Note: Refers to estimated demand by farmers for commercial-scale crops. Seed demand for home gardens not included.

As mentioned earlier, potato seed has a strong market in the country. Potato prices in Sri Lanka are also very high, making potato seed prices high compared to other countries. The estimate in the table is based recent experience. The value of potato seed is greater than that of all other seed used by farmers put together, including paddy seed.

The percentages of total seed requirement used to estimate demand of other field crops reflect the recent experience of the DOA. The total effective demand for seed of other field crops (in reality grain crops except paddy) does not reach 10 million Rupees. Note however that soybean was at very low levels of production during 1990/91, and

it has since recovered somewhat. Demand for soybean seed could become much higher if interested organizations were to promote production of this crop for designated markets.

The total value of the seed market in the country is estimated at nearly 540 million Rupees, when the additional amount of vegetable seed is taken into account. However the bulk of this is potato seed. When potato is excluded, total market value reduces to only 240 million Rupees, or about five million US dollars.

Farmers were also asked about the frequency of purchasing seed.

Frequency of purchasing chilli and bean seed is polarized between "every season or every year" on the one hand, and "never purchase" on the other. This is an important finding for seed enterprises that are developing their production programmes and are attempting to maintain or expand their market share. Client farmers tend to be repeat buyers, not one-time purchasers. The same farmers that purchased seed earlier will look for seed again in the future. If the client is satisfied with the quality of seed obtained from a particular source he will likely return to obtain the same kind of seed a second time. Farmers that have bad experience with seed of a particular brand may try a new source the following season. Therefore, enterprises that provide seed of unreliable quality may be able to make some initial sales, but will lose ground over time. Those that provide seed of superior quality will increase their market share, if efforts in promotion and distribution are adequate.

Table 4.4 Frequency of Purchase of Seed Stated by Farmers by Crop or Crop Group

CROP GROUP	FREQUENCY					Total
	Every Year	Every 2 Years	3 TO 5 Years	More Than 5 Years	Never	
(Number of farmers)						
VEGETABLES						
Chilli	11	4	5	2	10	32
Bears	13	2	1	2	8	26
Traditionals	18	1	1	2	3	25
Non-Traditionals	8	0	0	0	0	8
SUBTOTAL	50	7	7	6	21	91
PADDY	14	30	55	73	158	330
POTATO	6	0	1	0	1	8
OTHER FIELD CROPS						
Grain Legumes	5	2	4	1	16	28
Other Grains	0	3	1	0	8	12
SUBTOTAL	5	5	5	1	24	40
TOTAL	75	42	68	80	204	469

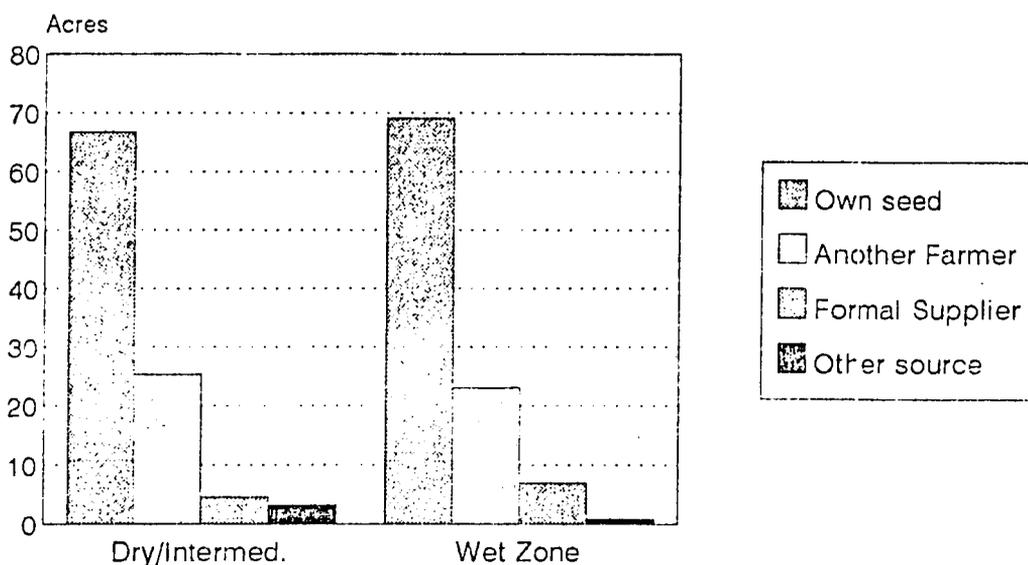
The same phenomenon occurs also with paddy. Certain farmers, perhaps only 1 in 7 purchase paddy seed every year or season, or every other year. The remainder purchase much less frequently. Therefore, the majority of the paddy seed market is made up of repeat customers.

4.3. Factors Affecting Demand for Paddy Seed

Surprisingly no significant difference was seen in survey results regarding purchase of paddy seed by agroecological zone in 1991. Figure 1 shows that nearly 70 percent of farmers use their own seed to plant paddy, and about 25 percent obtain seed paddy from another farmer, probably someone in the same village. The remaining 5-8 percent obtain seed from formal or other sources.

The above result is contrary to the hypotheses formulated in preparation for the study, which was that sales should be higher in areas where conditions for cultivation of are more favourable--the the dry and intermediate zone. The finding from the survey was checked against Department of Agriculture data on seed sales by region. DOA sales of paddy seed are presently about 1,000 mt in the wet zone and 3,000 mt in the dry and intermediate zones, which is roughly proportional to the extent of paddy planted in those zones. Therefore the survey results do seem to reflect reality. Farmers in the wet zone probably have better access to seed outlets. As distribution and promotion improve in other areas, it is possible that the pattern will change in future years.

FIGURE 1: SOURCE OF PADDY SEED BY REGION



Another important factor to notice in the Figure is the very great importance of lateral spread of paddy seed among farmers. This form of distribution is a major factor in the spread of new varieties, even to farmers that never purchase seed from formal sources. The use of high yielding varieties (HYV) is extremely high, over 95 percent according to DOA statistics. Perhaps farmers are also able to obtain seed with less varietal mixtures and perhaps fewer weeds seeds as well by obtaining seeds from neighbors with cleaner, more uniform fields. It is unlikely, however, that germination

and vigour will be much improved, since farmers generally use the same systems of handling, threshing, cleaning and storage. Therefore seed is generally exposed to the same environmental conditions.

Curiously, the same number of farmers reported obtaining paddy seed from neighbors as reported providing paddy seed to other farmers. This implies widespread one-to-one trading of seed, as opposed to a situation where a few leading farmers provide seed to a mass of villagers. Further, farmers who provide seed may or may not be the same ones who sometimes purchase from formal sources. Therefore the path beginning with certified paddy seed leading to a few progressive farmers and from there laterally to others could not be clearly seen in survey data. Instead, responses indicate a massive trading of seed that includes most farmers as both recipients at one point and as providers at another.

Still, farmers that purchase paddy seed seem to be ones with a larger extent of land under cultivation. The average extent of paddy cultivated between both seasons is nearly 3 acres among farmers that sometimes purchase seed paddy, and less than 2 acres for those that state they never purchase.

Quality of seed paddy is more important when seed is broadcast. This is because the farmer can compensate to some extent for poor seed and improve the uniformity of the stand when transplanting. Therefore, purchasing from formal suppliers and even from neighbors might be more frequent when seed is broadcast.

About 80 percent of short-age paddy is broadcast, compared to less than 50 percent for long-age paddy. Therefore the market for short-age paddy seed should be stronger than that of long-age.

Table 4.7 Percent of Sample Paddy Crops Transplanted Versus Broadcast by Age Group

AGE GROUP	METHOD OF PLANTING		
	Transplant	Broadcast	Both Methods
	(Percent of crops)		
Short-age Paddy	18.2	81.8	61.8
Long-age Paddy	54.0	46.0	38.2
All Paddy	31.9	68.1	100.0

Not surprisingly, when average parcel size is greater, more fields are broadcast than transplanted. Average parcel size is 1.34 acres for broadcast and .98 for transplant. Hence, whereas about 68 percent of paddy crops were planted by broadcasting, 74 percent of all paddy extent is planted by broadcasting. Also, farmers reported that seed use per acre is greater when using the broadcast method.

The tendency to purchase from a formal supplier when planting by broadcasting is evident in the table below. The statistical significant is low due to the small number of observations of farmers purchasing from formal sources. However it is evident

that the formal paddy seed market will be stronger where parcel sizes are greater, and where seed is broadcast. It was seen earlier that the probability of broadcasting is greater where short-age varieties are being used.

Table 4.8. Source of Paddy Seed by Method of Planting--Number of Crops and Extent

METHOD OF PLANTING	SOURCE OF SEED				Total
	Own Seed	Another Farmer	Formal Supplier	Other Source	
(Number of Crops)					
Transplant	137	49	4	3	193
Broadcast	271	111	23	7	412
Total	408	160	27	10	605
(acres per parcel)					
Transplant	1.01	0.90	1.69	0.38	0.98
Broadcast	1.36	1.19	1.53	2.21	1.34
Total	1.24	1.10	1.55	1.67	1.22
(total acres)					
Transplant	138.7	43.9	6.8	1.1	190.5
Broadcast	368.2	131.9	35.1	15.5	550.6
Total	506.9	175.8	41.9	16.6	741.1
(percent of acreage)					
Transplant	72.8	23.0	3.5	0.6	100.0
Broadcast	66.9	23.9	6.4	2.8	100.0
Total	68.4	23.7	5.8	2.1	100.0

CHAPTER 5. SEED QUALITY AND VALUE

Seed quality is ultimately the factor that determines the farmer's choice of buying seed from a formal source. Seed available from the formal sector must be far superior to that of the informal sector, ie, farmers' saved seeds or seed obtained from neighbor farmers, for the seed market to develop. If farmers do not benefit significantly by using seed bought from a formal source, they will depend on seeds coming from the informal sector, which is often more convenient to obtain. This is particularly true in self-pollinated crops such as rice. This chapter discusses the value farmers place on seed, the quality parameters they feel are most important, and their experience in using seed in the past. It also looks at seed storage methods practiced by farmers at home.

5.1. Value of High Quality Seed

Almost all farmers, irrespective of crops they grow, seem to know the importance of seed. The vast majority reported that the use of quality seed alone would help obtain a better yield. Details given in Table 5.1 are percentages of farmers that grow the respective crop or crops in the category.

Table 5.1. Expectations of Yield Increase by Using High Quality Seed

CROP	Expected Yield Increase				Total
	No Increase	0-10%	10-20%	Above 20%	
	(Percent of Farmers)				
VEGETABLES					
Chillie	05	15	42	38	100
Beans	-	14	43	43	100
Traditional vegetables	18	14	32	36	100
PADDY	05	10	59	26	100
POTATO	-	-	43	47	100
OTHER FIELD CROPS					
Grain legumes	15	04	38	43	100
Other grains	12	12	76	-	100

Only in the cases of traditional vegetables and "other grains" did a significant number of respondents indicate that high quality seed would make not an important impact on yields. The vast majority of farmers answered that quality seed alone will increase yields by 10 percent or more in all crops or crop groups. In fact for most crops, about a third of responses indicate that yields might increase by more than 20 percent. (Unfortunately, the range of options in the survey form did not go above this amount.) For paddy about one-fourth of farmers believed that yields might increase more than 20 percent.

Farmers were asked about the quality parameters they expect in seed, particularly that coming from the formal sector. Out of many quality attributes, germination appears to be the most crucial factor that most farmers are concerned with in all crop categories, as shown in Table 5.2.

Table 5.2 Characteristics Farmers Expect in High Quality Seeds

CROP	QUALITY CHARACTERISTIC			
	Germination	Genetic purity	Resistance to pest & diseases	Free of weed seeds
(Percent of Farmers)				
VEGETABLES				
Chillie	75	9	28	3
Beans	74	9	61	9
Traditional Veg.	83	17	38	13
Non " "	90	10	40	10
PADDY	83	54	42	28
POTATO	67	0	67	0
OTHER FIELD CROPS				
Grain legumes	75	9	13	3
Other grains	92	8	17	0

Note: Percentages show the proportion of farmers that mentioned the characteristic over all farmers who grow the particular crop or crops in the category.

After germination, resistance to pest & diseases seems to dominate for most crops, especially for potato and beans. However the genetic purity was the second most mentioned quality parameter for paddy. Freedom from weeds is only important in seed paddy.

Questions were asked about the quality of seed farmer used during the two seasons under study (1990/91 Maha and 1991 Yala) and subsequent yield levels. About 90 percent said that they were satisfied with the quality of seed they used. The few farmers who were not satisfied with seed quality mentioned low germination, impurities and susceptibility to pest and diseases.

However, about 60 percent of farmers were not satisfied with yields they obtained during the two seasons. Farmers attributed these low yields mainly to pest and disease, and water scarcity. Cases where poor quality seed was identified as an important factor causing low yields were negligible (only 3%). However, considering the very low levels of high quality seed usage in the country it is evident that the yields can be substantially increased if the use of quality seed is increased.

5.2. Value of Paddy Seed

It is clear that more than 90 percent of farmers use their own seed or seed exchanged from other farmers in the production of paddy and other grains. However, many farmers in Sri Lanka have the habit of renewing seed every few seasons. Therefore the demand for seed does exist, even with the minimal promotion in seed marketing at present.

When farmers obtain seed from other farmers they often trade paddy for seed. There were 112 such exchanges made among sample farmers in 1991, and the average rate of exchange was 1.25 bushels of paddy for one bushel of seed. About half the exchanges were made at a ratio of 1:1 and most of the others at 1:1½. A few exchanges were made at 1:2. In addition, 51 farmers paid cash for paddy seed obtained from another farmer. The price paid by one farmer to another averaged about 90 percent of the price charged by the DOA in the same season. (DOA prices were Rs 225/bu in Maha 1990/91 and Rs 255/bu in Yala 1991.)

Farmers were asked about the price they are prepared to pay for seed paddy from formal sources. About 10 percent indicated a willingness to pay around Rs 250/bushel, or a grain:seed ratio of about 2:1. As indicated before, the bulk of the seed market is concentrated in this select group of farmers. It is natural, however, to expect that farmer responses to a question such as this would point to a low value, especially considering that the DOA was conducting the survey and it is the same DOA that provides nearly all paddy seed through formal market channels.

If greater efforts were made in distribution and promotion, the value placed on paddy seed from formal markets could undoubtedly be greater. Taking the yield increases shown Table 5.1 for paddy, the potential value of paddy seed can be estimated. A 20 percent increase in yield implies an increase of about 15 bushels per acre.

The net benefit or value of quality seed paddy can be derived as follows:

1. Increase in yield times the net on-farm value of consumption paddy (15 bu x Rs 80/bu)
2. Add value of farmers own seed per acre (2.25 bu x Rs 135/bu)
3. Divide total by seed rate per acre using high quality seed (2.00 bu/acre)
4. Divide above result by seed price (135/bu)

The Rs 80/bu net on-farm value of consumption paddy used in step 1 is a guess as to the net value to the farmer, excluding additional costs of harvesting and handling the larger volume produced.

If high quality seed did indeed increase yields by 15 bushels (seed alone, without changing the level of other inputs except labour and handling costs to manage the additional volume produced), then the maximum value of that seed to the farmer would be about 5-6 times the value of consumption paddy. Estimates provided by extension and research personnel in the discussions prior to the survey were usually between 6-10 times--value of seed over that of consumption paddy.

The above calculation suggests that reliably high quality seed can be worth more to the farmer than he currently believes. It is meant to show the total benefits that farmers can derive from using high quality seed, rather than the price that should be set in the market, which depends on both supply and demand, and especially on seed quality. Another recent DARP study suggests that the eventual price that should emerge might be well over Rs 250/bushel, at 1993 prices, in order to cover production costs, including costs of capital and all fixed costs at commercial rates. The eventual market price

should allow seed enterprises to cover costs while leaving a ample margin of gain for the client/farmer.

5.3. Problems Associated with Home Seed Storage

About 60 percent of farmers mentioned that they do not have problems in storing seeds on the homestead. This is surprising when one considers the fact that seed storage under ambient conditions is a major problem encountered in humid tropical countries like Sri Lanka.

Seed storage methods and associated problems mentioned by respondents are given in tables 5.3 and 5.4.

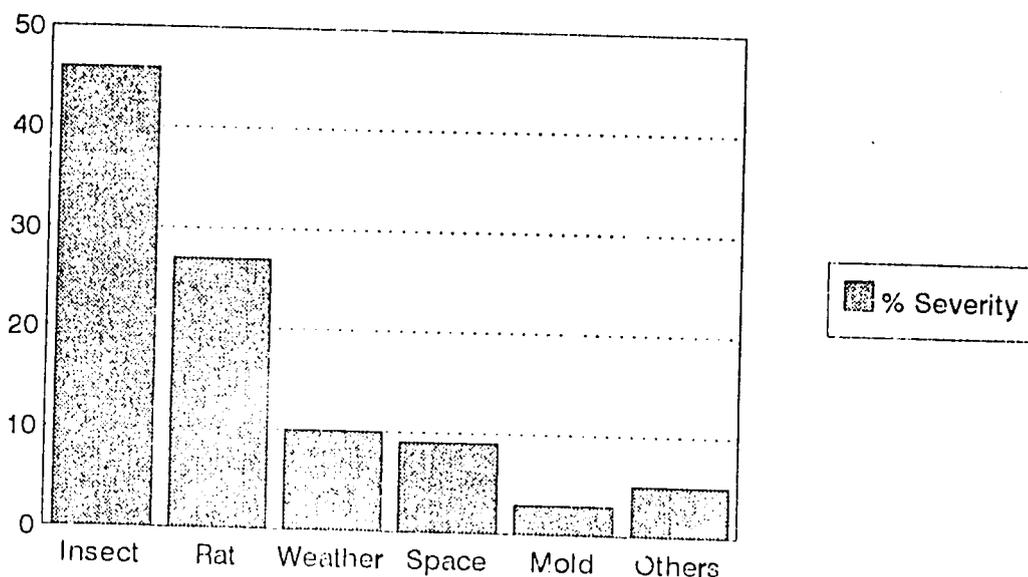
Table 5.3 Home storage methods widely adopted in Sri Lanka

Paddy	GFC	Vegetables	Potato
1. Dry and keep in gunny bags	1. Dry and keep in gunny bags	1. Dry and keep in bags	1. Store in a wooden box.
2. Dry and store in Atuwa	2. Mixed with an insecticide and store in a container	2. Mixed with an insecticide and store in a container	
3. Store in a wooden box.			

Storage methods used by farmers are mostly geared to solve problems they can detect-- primarily insect damage to the seed. However, farmers do not seem to be sufficiently aware of the deterioration of seed caused by hot, humid conditions. Seed is a living organism that respire during storage, gradually losing its viability over time. It is also affected by microorganisms that cause further deterioration. The higher respiration rate and the more attacks from external elements, the faster the loss of viability. This is evident later in the field in terms of germination and vigour to help the plant emerge from the soil and withstand field conditions before the crop becomes fully established.

Respondents to the survey were concerned about germination of their own saved seed and of that purchased on the market. However they do not seem to be completely conscious of the causes of these problems or what they can do to prevent them. In particular, farmers were not able to identify some of the important problems related to seed storage.

FIGURE 2: PROBLEMS ENCOUNTERED IN FARM SEED STORAGE



5.4. Ability of Farmers to Identify Seed Quality

Ninety-nine percent of farmers are confident that they can determine the quality of their own seed. However, many farmers mentioned that they realized the problems only after the crop was planted and the stand established.

Farmers do see that it is more difficult to identify quality before purchasing seed. (In reality, it is impossible to determine many important aspects of seed quality by visual inspection, such as germination and vigour). Thirty-eight percent of the farmers mentioned they would have difficulty.

Instead of determining seed quality by visual inspection, the buyer must rely on other indicators, such as the reputation of the dealer, or familiarity with the brand name. For paddy and many other crops, farmers recognize and trust the "Department of Agriculture" label. None of the farmers, however, mentioned that they look for the word "Certified" on the label. In effect, the DOA has been able to establish its own brand name as a symbol of quality, but it has not established the concept of "certification", which represents an industry-wide system. Proper labeling of seed sold through the formal sector is vital and there should be a strong campaign to educate farmers in reading labels attached to seed packs. The concept of "certification" or "high quality seed" should be actively promoted.

CHAPTER 6. FORMAL SEED SUPPLY SYSTEM

At present more than 90 percent of certified seed paddy, other field crops and local vegetable seeds are produced by the Seeds and Planting Materials Division (SPM) of the DOA. Prior to 1990, all seeds that were produced by the SPM Division were distributed in the country by the Extension Division of the DOA through Agrarian Services Centres (ASC). A village level Officer called a KVS was assigned at each ASC to undertake seed sales. This was undertaken primarily as a service and therefore, no special attention was paid to improve seed sales, develop attractive packaging, identify appropriate pack sizes, etc. Since ASCs are scattered throughout the country, farmers had access to DOA seed.

After 1990, however, with the change in the administrative structure and withdrawal of KVSS, private seed dealers emerged. At present, more than 90 percent of seed produced by the DOA is distributed by a dealer network, which includes private individuals, ASCs, co-ops, and others. Normal distribution of seed was disrupted during the transition period, but has recovered substantially in recent years.

This chapter discusses the problems farmers are currently experiencing in purchasing certified seed and provides suggestions to improve seed sales.

6.1. Source of Agricultural Inputs

Farmers indicated that most of their agricultural inputs, except seeds, are purchased from private dealers and co-ops. ASCs were still the most common source of formal seeds in 1991, followed closely by private traders or dealers. Other sources were government seed farms and co-ops.

Table 6.1. Sources of Agricultural Inputs

Source	Seed	Fertilizer	Agro chemicals	Implements
	(percent of farmers)			
Cooperative	1	44	16	11
Private trader	8	45	75	86
ASC	13	9	9	1
Govt. farms	2	0	0	0
Own	50	0	0	0
Neighbours	25	0	0	0
Others	1	2	0	0
TOTAL	100	100	100	100

Co-ops and private shops are located closer to the farming community (table 6.2). Therefore these sources, particularly co-ops, can be utilized to a greater extent in the future for quality seed promotion and distribution.

Around 90 percent farmers interviewed mentioned that they buy seed from the nearest source. Interestingly the other 10 percent indicated they travel to a more distant point to obtain seed of the desired variety or to obtain seed of better quality.

Table 6.2. Distance from Home to Source of Buying Agricultural Inputs

Distance (miles)	Co-op	Private trader	ASC	Govt. Farm
	(Percent of respondents)			
0-1	83	84	19	2
1-2	11	8	14	1
2-5	6	7	50	5
5-10	0	1	14	11
> 10	0	0	3	81
TOTAL	100	100	100	100

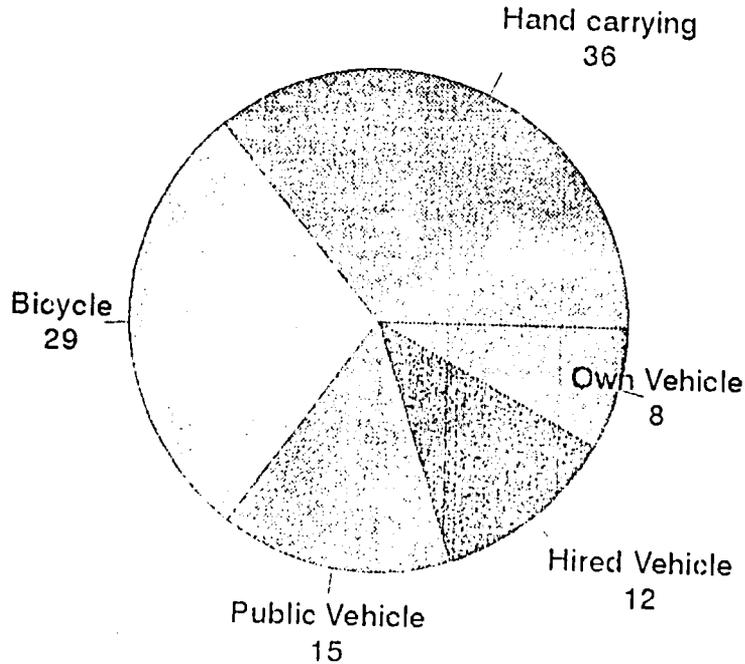
About a third of farmers handcarried seed purchased from formal sources from the outlet to the farmstead, while another third used bicycles (Figure 4). Many others use public vehicles.

Mode of transport is of particular concern when promoting paddy seed sales. About 60 percent of farmers preferred one-bushel bags for seed paddy while about 15 percent preferred half-bushel bags. Most of the remainder indicated that two-bushel bags are manageable. The table below presents the frequency by which farmers indicate their preferences for pack sizes of vegetable, paddy and other field crop seed.

Table 6.4. Pack Size Preferred by Respondents, Vegetables, Paddy, Other field Crops

VEGETABLES							
Crop	Pack Size (Grams)						Total
	10	50	100	250	500	1000	
	(percent of respondents)						
Brinjal	40%	30%	20%	10%	-	-	100%
Beans	-	5%	-	12%	13%	70%	100%
Tomato	36%	36%	18%	10%	-	-	100%
Okra	-	30%	50%	10%	10%	-	100%
Chillie	-	14%	33%	33%	20%	-	100%
PADDY							
	Pack Size (Bushels)					Total	
	1/2	1	2	>2			
	(percent of respondents)						
	14%	61%	23%	2%		100%	
OTHER FIELD CROPS							
	Pack Size (Kg)				Total		
	.500	01	02	10			
	(percent of respondents)						
	7%	83%	3%	7%		100%	

FIGURE 3: MODE OF SEED TRANSPORT



Interestingly, the preference in pack size for other field crops--grains including green gram, cowpea, maize and groundnut--is predominantly one-kilogram. A few farmers even indicated a preference for half-kilogram containers, although others stated that 10-kilogram packs would be acceptable. The desire to purchase a very small amount of these bulky grain seeds suggests that farmers are interested in obtaining genetically pure seed of new varieties, which they may then multiply and use in the future.

6.2. Problems with Locally Produced Seed

Nearly half of farmers mentioned that they did not have serious problems with regard to DOA seed. However, the other half had problems such as non-availability in time, poor germination, and inconvenient pack sizes. Figure 5 gives the details.

Non availability in time seems to be the biggest problem faced by farmers. Poor germination is the next most important problem, a factor that was also stressed by respondents in the last chapter when referring to their own saved seed. Vegetable seed produced by DOA is stored under refrigeration until its distribution to dealers. It appears that the seed may be deteriorating while held at ambient conditions until sold and used by farmers. This raises questions about the packing material used for vegetable seeds produced by the Department.

As suggested above, pack size is a problem for seed of other field crops and paddy, especially in light of the mode of transport from point of purchase to the farm. Most farmers are satisfied with the pack sizes used by the DOA for vegetable seeds.

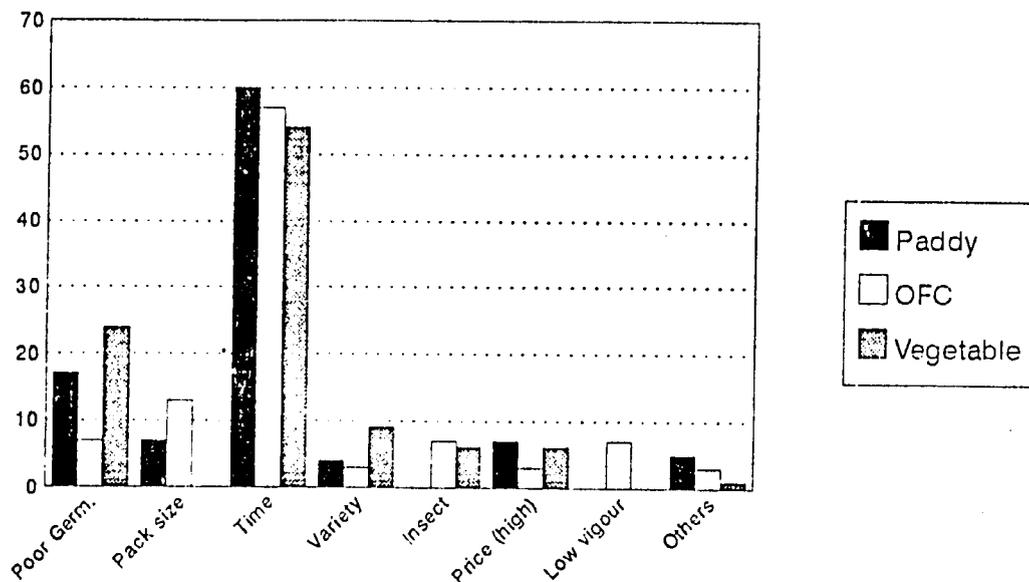
Interestingly seed price was not cited as an important issue among users of DOA seeds.

Farmers do not have a reliable source to get information about improved seed and they still prefer the service of KVS to obtain information (Table 6.5). Grama Niladhari (GN) was second in preference.

Table 6.6. Information on Improved Seeds

Source	Information received at present	Prefer to receive information
KVS	7	50
GN	6	18
Agric. Instructor	10	8
Neighbour Farmers	64	12
Newspapers	1	0
Radio	2	1
Private dealer	2	0
Other	2	11
Total	100	100

FIGURE 4: COMPLAINTS REGARDING DOA SEEDS (Percent of Farmers Responding)



About 65 percent of farmers mentioned they would like to get additional technical information enclosed with the seed container. This is an important finding, suggesting that there are ways to reach farmers through print media at the time of purchasing seed. Farmers are literate and are interested in having more technical information made available to them. The Department can prepare leaflets and have them distributed through seed dealers.

Private dealers are becoming a popular source in buying seed, as shown by farmers' evaluation of the service offered by different suppliers.

Table 6.7. Best Service in Supplying Seed

Source	Percentage
ASC	39
Private dealer	34
Co-op	14
Other farmers	6
Government farms	3
Mahweli authority	2
Others	2
Total	100

Although the questionnaire did not specifically ask for clarification about the nature of the services provided, several respondents volunteered that the government sometimes replaces seed or compensates farmers when seed performs poorly.

6.3. Measures to Improve Seed Marketing

Farmers suggestions to improve seed marketing in the future is summarized in Table 6.7. Timing and fair price are two of the main considerations emphasized by respondents.

Table 6.8. Farmers suggestions to improve seed marketing in the future

Suggestion	Percentage
Availability in time	45
Availability at a fair price	32
Available with a credit facility	9
Available in manageable units	7
Available through government sources	2
Others	5
Total	100

Besides timing, price entered into farmers' minds when developing the seed market. A marketing plan of an individual enterprise should distinguish between attracting first-time buyers on the one hand and keeping repeat customers on the other. For first-time buyers, the factors of importance would like be the following:

1. Timeliness of supply
2. Desired Variety
3. Convenient location and pack size
4. Competitive price
5. Reputation of the outlet or brand

Timeliness and desired variety can be considered prerequisites to a marketing plan. The remaining three factors could take on more or less importance given the crop and specific situation.

In order to generate repeat sales to the same customers, which was seen earlier as crucial for success of an enterprise and to the development of the seed market, superior seed quality is essential, ie:

1. Germination and vigour
2. Genetic purity

After the farmer uses the seed he procures from a particular source, he must be satisfied with it. If the seed offered on the market is not truly superior and the farmer does not perceive an important change in his crops, he will not return to the same source the following year or season.

Price will be found to become less important over time when the benefits of superior quality of seed become evident to farmers. If farmer obtains benefits in terms of increased yields, better products, or lower production costs, then the cost of superior seed necessary to obtain these benefits is usually small by comparison.

An overall summary of conclusions and also recommendations are given in the executive summary at the beginning of this document.

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