Farmers' perceptions of the factors that influence the uptake of SRI practices in Sri Lanka

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February 2007

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1.0 Introduction

Rice is unquestionably the most important crop for human well-being across the third world. It is the staple food in at least 33 countries of the world and consumed on a daily basis by at least one-half of the world's population, many of whom are in the Asia region (Krupnik, 2005). Rice is also the staple food and principal crop in terms of food security of rural households in Sri Lanka, which account for up to 75% of the national population. About two-thirds of the rural population depends mainly on rice farming. Also, as most of the poor are based on the rural area, there is close relationship between agricultural developments and poverty reduction in Sri Lanka. In addition to its economic importance to the agricultural sector rice has cultural and symbolic importance in Sri Lankan society.

Improvement of rice productivity has been one of the main objectives of agriculture and rural development programs implemented by successive governments over the last few decades. These productivity improvement programs have experimented with different approaches and strategies to increase rice yields of small farmers, which in turn are expected to improve food security, increase incomes and reduce the vulnerability of rural households. The main thrusts of these programmes were to improve the paddy yield, protect paddy farmers from competitiveness and certify a market price for paddy. These programmes and policies changed over time according to the political agendas in the country, but can be described as the conventional system of production intensification (Namara et al., 2003). This system had serious social and environmental impacts such as the depletion of water tables, decline in soil fertility, aggravation of air pollution, and resistance of weeds to certain herbicides (Stoop et al., 2002, cited in Namara et al., 2003). Hence, technologies that improve returns with lower input costs and are favourable to the environment should be a great interest.

In Sri Lanka, most land suited to the production of rice has already been exploited, and most readily available water resources have been developed to irrigate paddy fields. The dominant practice in rice production is flooded irrigation, which requires large amounts of water. Hence, any further increase in rice production depends on intensification in existing rice lands. But the intensification process should, if possible, avoid the environmental, resource, health and social malaises of the conventional system of production intensification described above. New intensification processes go by different labels, such as low external-input sustainable agriculture, organic farming, ecological farming, intermittent irrigation, alternate wetting and drying, aerobic rice cultivation, etc. The system of rice intensification (SRI) shares one or more features with each of these methods of production.

System of Rice Intensification (SRI)

The System of Rice Intensification was 'discovered' in part by accident in 1983 by Fr. Henri de Laulanié, a French missionary who worked closely with peasant farmers in Madagascar. An unusually severe drought resulted in decreased water availability for rice farmers, forcing them to resort to intermittent, rather than constant flooding of their fields. Rather than allowing the water to stand, as in most paddy cultivation systems, Malagasy farmers could do little more than keep their fields moist. Concurrent seed shortages forced peasant cultivators to plant their rice in less dense configurations than usual. Such conditions would usually spell disaster for farm productivity, but much to Laulanié's surprise, farmers reaped bountiful harvests. (Krupnik, 2005)

Laulanié was intrigued by this irony and began experimenting with less input-intensive forms of rice cultivation. He reported massive yield increases gained through sparse planting densities and reduced irrigation. Based on these and other principles Laulanié began promoting what he called 'the System of Rice Intensification', across Madagascar (Krupnik, 2005). Farmer adoption was rapid, and further extension of the system occurred largely through farmer to farmer networks.

Table 1: Comparison of conventional and SRI techniques

Conventional Practice	SRI Method
1. Transplant seedlings at 3-4 weeks of age	1. Transplant seedlings at 8-12 days old.
2. Transplant 3-4 seedlings per mound.	2. Transplant one seedling per mound.
3. Transplant seedlings into an anoxic aquatic environment.	3. Transplant seedlings into a moist, but not flooded field.
4. Transplant seedlings by plunging directly into soil.	4. Transplant seedlings with care, keeping the seed coat attached at the base of the tillers.
5. Dense seeding rate of 50-100 kg/ha (10-15cm^2 spacing).	5. Sparse seeding rate of 5-10 kg/ha (20-30cm^2 spacing).
6. Flood consistently throughout the growing cycle (to a depth of about 6 cm).	6. Maintain soil moisture throughout growing cycle (anoxic conditions are to be avoided).
7. Maintain flooding through panicle initiation.	7. Maintain flooding through panicle initiation.
8. Control weeds by flood, hand and/or by herbicides.	8. Control weeds by hand or with rotary hoe.
9. Maintain fertility with inorganic nitrogen fertilisers (at the rate of about 100-150 kg/ha/season).	9. Maintain fertility through generous compost applications each season prior to planting.
10. Control pests with pesticide/insecticide applications.	10. Control pests naturally, with traditional organic techniques.

Source: Randriamiharisoa and Uphoff (2004), cited in Krupnik (2005).

The main differences and similarities between the SRI and conventional methods are seen in Table 1 above. But SRI is promoted as a system rather than a technology. SRI is not a fixed set of practices or a package of technical specifications; it is rather a system of production formulated on certain core principles from soil chemistry and biology, rice physiology and genetics, and the principles of sustainability. There is always the possibility of adjusting the exact technical components based on the prevailing biophysical and socioeconomic realities of an area.

The main components of SRI can be listed as: planting method, soil fertility management, weed control and water management. These components should always be tested and varied according to local conditions rather than simply adopted. And SRI practices are still evolving as concerns shift to improving productivity of land, labour, water and nutrients, and harnessing the potential of soil biology for pushing up the yield plateau of rice further. (Namara et al., 2003)

2.0 Background and objectives of the study

Background

SRI has gained unprecedented popularity among farmers since its introduction to agricultural nations outside Madagascar. There are several reasons for this. The most commonly cited advantages of SRI over the conventional system of paddy cultivation are:

- Improved quality and yield of paddy,
- Savings in irrigation water and seed, (water savings have been up to 50%)
- Reduced demand for external inputs like inorganic fertilisers and herbicides,
- Enhanced tolerance to biotic (eg. diseases and insects) and abiotic stresses (eg. lodging and low moisture stress.) (Namara et al., 2003)

Farmers who have experimented with SRI around the world relate many success stories, with reported increases in paddy yield ranging from 50-100%

What is less apparent from the various studies that have been undertaken on SRI, and the feedback from farmers who have experimented with it, are the problems that the implementation of SRI entails. The main demerits of SRI that have been identified include:

- Extremely high demand for labour (demand for labour increases by 25-50%, although this can be transitory, once the methods have been mastered)
- Problems of weed control
- Non-availability of organic fertilisers

SRI was introduced to Sri Lanka by Professor Norman Uphoff, Director of CIIFAD,[1] at a meeting of farmers in Gal Oya in September 1998. After this, communication commenced and information was shared with the Ministry of Agriculture and Lands. This led to a visit by Joeli Barison of Cornell University in January 2000. SRI ideas were taken up by Dr. Gamini Batuwitage, at the time Senior Assistant Secretary (later Additional Secretary) in the Ministry of Agriculture, and The Hon. Salinda Dissanayake, Deputy Minister of Agriculture (later Minister of Lands). They teamed up with H. M. Premaratne, an organic farmer who had been using SRI ever since reading about it in 1999. (Batuwitage, 2002)

SRI was not introduced via the Department of Agriculture and has met with some resistance from the department and the government's rice research station at Batalagoda. Most government researchers have been sceptical of SRI, claiming that the reported yields are beyond the biological limit for rice, a concept that is itself now disputed (Batuwitage, 2002). However other government agencies have shown interest in SRI and have been promoting SRI methods to farmers in different districts and irrigation systems. For instance the Ceylon Electricity Board took steps to promote SRI among farmers in a large irrigation scheme as a way of saving water.

In 2002 the International Water Management Institute (IWMI) did an evaluation of SRI in Sri Lanka. According to the IWMI report (Namara et al., 2003) the average increase in yield reported by SRI farmers was 44%, which is still lower than that reported by farmers in other countries. Despite the obvious benefits that SRI has to offer, its adoption has been relatively slow in Sri Lanka compared to other countries.

[1] Cornell International Institute for Food, Agriculture and Development.

For almost 30 years Oxfam Australia[2] has been working to alleviate poverty among the very poor in Sri Lanka through participatory community based development. SRI was identified as an approach that could increase food security and possibly income for poor farming families and reduce their dependence on costly farming inputs. Oxfam Australia (OAus) teamed up with Mr. Premaratne in 2003 to trial and promote SRI techniques in various areas of the country, primarily through the organisation's CBO partners. OAus's involvement in the initial years was tentative, small-scale and mostly experimental; itself assessing the feasibility and possibilities of SRI techniques for very poor, mostly women, farmers.

As OAus's confidence grew in the potential benefits of SRI cultivation, the agency gradually increased its commitment grew and is now ready to publicise and popularise the approach in a more considered and strategic manner. Hence it was decided to undertake a study that could be used to inform strategies and guide the setting of priorities in the future. This report draws heavily on paddy farmers' perceptions of SRI and forms part of this larger study.

Objectives of the study

1. To ascertain the main motivators in the growing of rice and the perceived advantages of adopting SRI cultivation methods.
2. To identify the challenges faced in Sri Lanka to the promotion of SRI practices and to propose actions that can be realistically taken to overcome them.
3. To better understand the social repercussions, particularly on gender relations, of adopting SRI practices.

SRI paddy after 8 weeks

[2] Oxfam Australia has undergone a number of organisational and name changes during this time as a result of various mergers. Freedom From Hunger merged with Community Aid Abroad, later to become known as Oxfam CAA, and finally Oxfam Australia.

3.0 Methodology

Data for this study were mainly collected by way of a survey conducted in six districts during August/September 2006. Data was collected in Matara, Hambantota, Anuradhapura, Polonnaruwa, Kegalle and Ampara, purposefully covering all climatic (wet, dry and arid) zones. In addition to climatic diversity, these districts provided a variety of geographical., social and economic differences that could usefully inform the findings.

A total of 151 paddy farmers were randomly chosen from these six districts, and data were gathered using a questionnaire (Appendix A) administered by trained university students. In addition, a desk review of available documents, 41 semi-structured interviews with field officers from a number of OAus's partners[3] and other key informants, and 14 focus group discussions with CBO members were used to complement and validate the findings. It must be acknowledged that, due to the selection process, there is a very strong bias in the sample in favour of SRI farmers who have been trained and technically supported by OAus.

This is principally a qualitative survey of the factors that influence the adoption and use of SRI practices in paddy cultivation in Sri Lanka. It will be complemented by farmer-based research into productivity being undertaken with eight SRI farmers in four climatically diverse locations and a study of the market potential of SRI rice.

SRI paddy prior to harvest

[3] Oxfam Australia currently works with and through around 20 community-based organisations (CBOs) in Sri Lanka. While a number of these were asked to help facilitate the field work, they were not actively involved in the collection or analysis of the data.

4.0 Findings and analysis

Survey sample

The survey covered a total of 151 farmers, 71 of whom are following conventional methods of cultivation, and 80 farmers who have adopted and have been using certain SRI techniques for at least the last two growing seasons. The respondents were drawn largely at random from villages serviced by CBO partners of OAus in six districts that in turn are located in three different climatic zones. Composition of the respondents, by zone and by district, is as follows.

Table 2: Geographical representation of the sample

Climatic zone	District	Conventional		SRI		Total	
		Respondents	%	Respondents	%	Respondents	%
Wet	Matara	7	10.0	8	9.9	15	9.9
	Kegalle	20	27.1	26	33.3	46	30.5
Dry	Anuradhapura	15	21.4	15	18.5	30	19.9
	Polonnaruwa	11	15.7	11	13.6	22	14.6
	Ampara	5	7.1	7	8.6	12	7.9
Arid	Hambantota	13	18.6	13	16.1	26	17.2
	Total	**71**	**100.0**	**80**	**100.0**	**151**	**100.0**

The interviewee sample consisted of 108 (71%) male farmers and 43 (29%) female farmers. However, 39% of the SRI farmers interviewed were women, compared with just 17% of those using conventional techniques. In Ampara, Matara and Polonnaruwa districts, female respondents were significantly higher among SRI farmers, 57%, 62% and 64% respectively. The fact that OAus has been promoting women's participation in SRI farming probably accounts for this phenomenon.

Table 3: Gender breakdown of sample

	Conventional		SRI		Total	
	Respondents	%	Respondents	%	Respondents	%
Male	59	83.1	49	61.2	108	71.5
Female	12	16.9	31	38.8	43	28.5
Total	**71**	**100.0**	**80**	**100.0**	**151**	**100.0**

The average age of the respondents is just over 46 years, with no significant difference between the SRI (46.6 years) and conventional (45.7 years) farmers. There is also no significant difference in the length of time they had been cultivating rice, with both SRI and conventional farmers averaging 19 years of experience.

However, there is a significant difference in family size. While the average family size of the sample overall is 4.75 people, compared with 4.31 nationally, the average family size of the SRI farmers is 5.0 members per family. This is significantly higher than the 4.5 members per family in those following conventional farming techniques and possibly reflects OAus commitment to working with the poorest families.

The survey also looked at family rice consumption and found that each family member consumes 12.3 kgs. per month, on average. However, with the exception of Ampara where the consumption among SRI farmers seems unusually low, there

appears to be an inverse relationship between family size and per capita consumption of rice; the larger the family, the less the individual consumption. The largest average family size (5.5) is in Polonnaruwa district where the per capita rice consumption (10.2 kg/month) is lowest.

While the average consumption of SRI farmers appears to be higher than conventional farmers, this holds true in only three of the six districts and is therefore inconclusive. The average family size and average per capita rice consumption of the families by district is shown in Table 4 below.

Table 4: Average family size and rice consumption, by district

District	Average family size			Per capita rice consumption (kg per month)		
	SRI	Conventional	Average	SRI	Conventional	Average
Matara	5.3	4.1	4.7	12.2	13.1	12.6
Kegalle	5.2	4.4	4.8	11.4	12.3	11.6
Anuradhapura	4.5	4.4	4.4	14.8	13.8	14.4
Polonnaruwa	5.5	5.5	5.5	11.2	9.2	10.2
Ampara	4.4	2.8	3.8	11.2	15.7	12.4
Hambantota	4.8	4.6	4.7	14.0	11.1	12.6
Overall	**5.0**	**4.5**	**4.7**	**12.4**	**11.9**	**12.3**

The average land size used for paddy cultivation is 1.63 acres overall, comprised of an average of 1.94 acres for the conventional farmers and 1.37 acres for the SRI farmers. This difference in cultivated area is significant and is borne out in each of the districts studied other than Kegalle and Polonnaruwa, where the holdings are similar. There are also significant differences between districts with the average plot size for rice cultivation ranging from 0.5 and 0.6 acres in Kegalle and Matara districts, respectively, to 3.2 acres in Polonnaruwa. Both Kegalle and Matara are located in the wet climatic zone. A shortage of suitable land was mentioned as a major obstacle by SRI farmers during both focus group discussions and interviews in Kegalle, Matara and Anuradhapura.

Table 5: Average cultivated land area

District	SRI farmers			Conventional farmers			Overall		
	Land holding (acres)	Owned	Rented	Land holding (acres)	Owned	Rented	Land holding (acres)	Owned	Rented
Matara	0.5	100.0%	0.0%	0.9	100.0%	0.0%	0.6	100.0%	0.0%
Kegalle	0.6	61.8%	38.2%	0.6	74.4%	25.6%	0.5	66.8%	33.2%
Anuradhapura	1.6	55.2%	44.8%	2.3	77.0%	23.0%	1.9	67.7%	32.3%
Polonnaruwa	3.2	57.1%	42.9%	3.3	61.6%	38.4%	3.2	59.5%	40.5%
Ampara	1.7	93.3%	6.7%	2.1	100.0%	0.0%	1.9	95.3%	4.7%
Hambantota	1.6	69.4%	30.6%	2.8	59.5%	40.5%	2.2	63.1%	36.9%
Overall	**1.37**	65.0%	35.0%	**1.94**	69.2%	30.8%	**1.63**	67.2%	32.8%

From the table above it can be seen that approx. 1/3 of land used in paddy cultivation is rented, with a slightly higher proportion among those using SRI methods. However, this was not the case in Hambantota, where conventional farmers rented 40.5% of their land compared with 30.6% among SRI farmers. Rented land accounted for 40.5% of all cultivated land in Polonnaruwa, but only 4.7% (1 of 12 respondents) in Ampara. None of the respondents rented land in Matara.

Crop yields

The survey sought indicative figures on yields for both the 2005 *yala* season and the 2005/06 *maha* season, based on the respondents' recollections. The responses were erratic and indicate no clear difference in yield between conventional and SRI farming practices. This finding is in sharp contrast to virtually all other research conducted in Sri Lanka and elsewhere and is therefore highly questionable.

As a result, OAus decided to sponsor farmer-based research in order to more carefully explore the difference in yield potential of the two systems. This research, being undertaken during the current 2006/07 *Maha* season, consists of eight independently managed farm-based trials spread across four districts and undertaken in close collaboration with the local agricultural extension officers. It is expected that the involvement of both farmers and extension workers will give greater credibility to and encourage greater acceptance of the results, possibly leading to attitudinal changes among both groups. The results of these trials should be known within a month of the release of this report.

However, comparing the total annual yield (from both seasons) with average family consumption, Table 6 below shows that both categories of farmers are producing paddy well in excess of their consumption needs, with the exception of SRI farmers in Matara. There is however, a significant difference among farmers in terms of their apparent excess, with conventional farmers producing almost twice the excess of SRI farmers. This, of course, reflects the differences in land under cultivation.

Table 6: Production vs. consumption needs

District	2005 *Yala* + 2005/06 *Maha* seasons (kgs)		Family consumption (kg/month)		Percentage of annual consumption covered	
	SRI	Conventional	SRI	Conventional	SRI	Conventional
Matara	713	1,110	64.4	53.6	92.3%	172.5%
Kegalle	1,635	975	59.2	53.9	230.2%	150.7%
Anuradhapura	2,902	4,380	66.5	60.7	363.7%	601.3%
Polonnaruwa	10,566	11,028	61.4	50.5	1,434.0%	1,819.8%
Ampara	2,063	3,818	49.3	44.0	348.7%	723.1%
Hambantota	6,135	10,895	67.3	51.2	759.7%	1,773.3%
Overall	**4,258**	**6,028**	**61.8**	**53.6**	**574.2%**	**937.2%**

However, the survey was unable to gather sufficient information to determine the actual amounts sold and the market prices attained. The poor response may indicate that either excess paddy is sold off in small quantities as and when the need arises, that sale prices are not considered important or not remembered, or that much of the apparent excess (and even some of that needed for personal consumption) is paid to land-owners in the form of rent or creditors as repayment for cash and in-kind loans during the growing season. A lack of markets and the low selling price of paddy were mentioned as major difficulties for farmers during focus group discussions only in Polonnaruwa where, as Table 6 above indicates, both SRI and conventional farmers produce well in excess of their annual consumption needs.

Factors influencing paddy cultivation

It was expected that farmers may engage in paddy cultivation for a variety of reasons but the priority given to the various reasons was common among SRI and conventional farmers, even though it differed slightly from district to district.

Table 7: Main reasons for growing rice

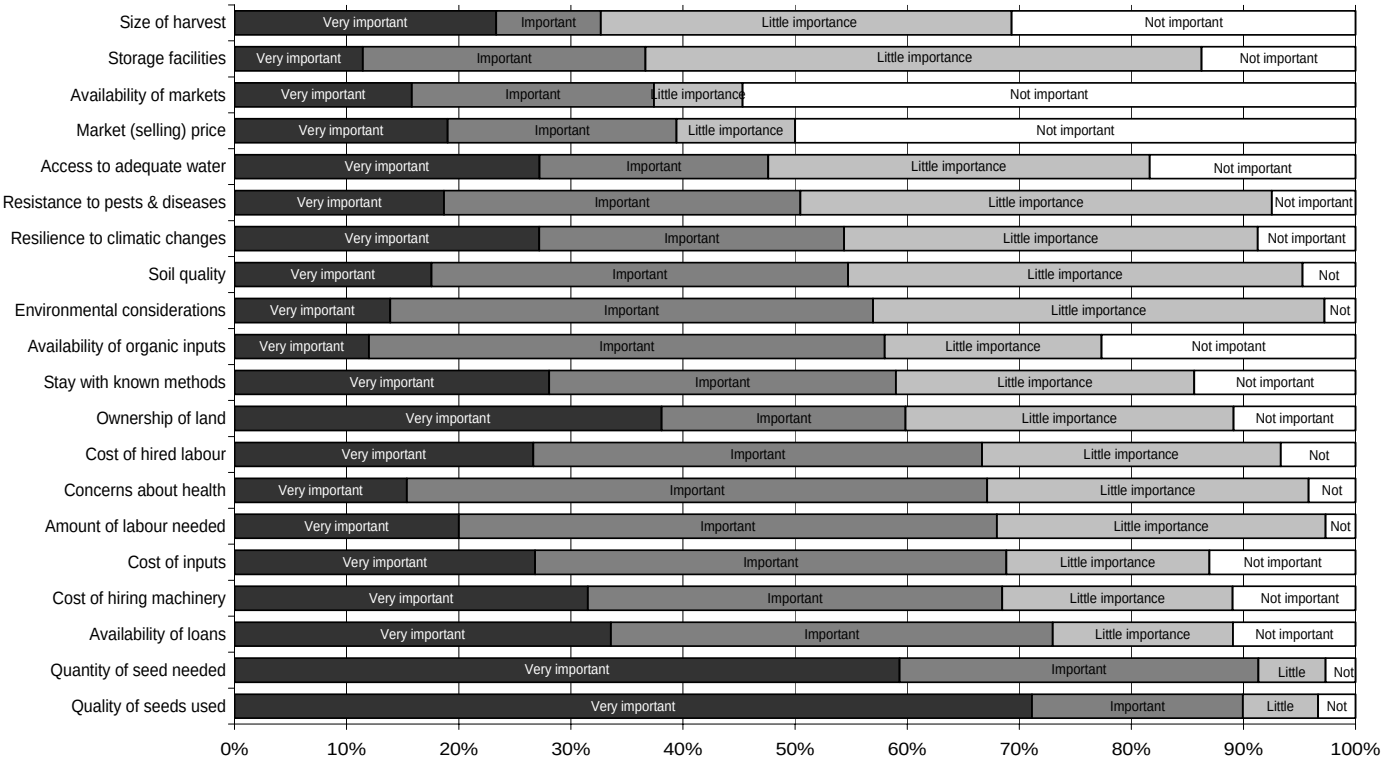
Reasons	Overall ranking*	By district					
		Matara	Kegalle	Anuradhapura	Polonnaruwa	Ampara	Hambantota
Family consumption	**1** (1.4)	**1** (1.0)	**1** (1.1)	**1** (1.5)	**1** (1.9)	**1** (1.5)	**2** (1.7)
Income generation	**2** (2.0)	**-**	**4** (3.5)	**1** (1.5)	**2** (2.0)	**2** (1.9)	**1** (1.6)
Lack of other works	**3** (3.3)	**3** (3.1)	**4** (3.5)	**8** (5.1)	**3** (2.4)	**3** 2.6)	**3** (3.1)
Fertilizer subsidy	**4** (4.0)	**-**	**2** (2.7)	**3** (3.9)	**7** (5.8)	**7** (6.0)	**5** (4.4)
Knowledge & skills	**4** (4.0)	**4** (3.2)	**3** (3.2)	**3** (3.9)	**6** (5.2)	**4** (4.3)	**6** (4.5)
Lower inputs than other crops	**6** (4.2)	**2** (3.0)	**8** (4.1)	**5** (4.3)	**4** (4.3)	**5** (4.5)	**-**
Easy to do	**7** (4.3)	**5** (3.4)	**6** (3.7)	**7** (4.9)	**5** (4.7)	**6** (5.0)	**7** (4.8)
Ability to get loan	**8** (4.8)	**6** (5.0)	**7** (3.8)	**6** (4.5)	**8** (6.3)	**8** (6.5)	**4** (3.9)

* Ranking from 1 (most important) to 8 (least important). Figures in brackets ( ) are actual average scores.

Personal consumption is the main reason for cultivating rice and is ranked highest (or marginally second highest) in all districts. This was confirmed during focus group discussions and interviews and correlates with the earlier speculation that very little of the harvest is actually sold. The purpose of generating income and a lack of other income-generating opportunities come in second and third, although there appears to be an anomaly with Anuradhapura. If rice is used to repay loans, it can be considered a source of income without actually being sold. Having he required knowledge and skills and the fertiliser subsidy are also identified as important factors in the growing of paddy.

Respondents were also asked to rate the importance of a number of factors in influencing the net benefits obtained from paddy cultivation. (See Figure 1 following.) By and large, there was little difference between conventional and SRI farmers in their assessments, and between districts. Both the quantity and quality of seed are of prime importance in influencing the outcome. This is true across districts, and for both conventional and SRI farmers, and came up in the focus groups. The availability of loans or credit facilities is also rated highly, along with the costs of inputs and machine hire, labour requirements and cost, and concerns about personal/family health. However, the cost of labour was not considered important in Anuradhapura.

Figure 1: Factors influencing the net benefits of paddy cultivation



The availability of organic fertiliser is of much greater concern to SRI farmers than those using conventional methods (and presumably using chemical fertilisers) and was specifically mentioned in several interviews in Hambantota. There is a high degree of concern about the control of pests and disease in Anuradhapura, but in Matara, Polonnaruwa and Anuradhapura, focus group participants said that this was of much less concern for those practicing SRI spacing methods.

The harvest, storage and marketing of the paddy are generally of least importance, although opinions on the importance of markets are divided in Ampara, Polonnaruwa and Hambantota. These factors were rarely, if at all, mentioned during the interviews and focus group discussions in each district. However, the threat posed by cattle and wild elephants was raised during discussions in Ampara as a serious issue that impacted on the benefits realised at harvest.

Knowledge about SRI

SRI has a very short history in Sri Lanka, and most of the SRI farmers in our surveyed areas began using SRI techniques only in 2005. The take-up rate appears to relate closely to the number of trainings provided. Of those practicing SRI, 96% of the respondents (77 of 80) reported having received training (from OAus), 88.3 % of whom were trained in either 2004 or 2005. The table below shows almost an exponential rise in the number of farmers being trained in SRI methods since OAus first starting promoting the approach in 2003.

Table 8: Respondents trained in SRI methodologies

District	Year Prior to 2003	2003	2004	2005	Total trained	% of total respondents
Matara		1	1	6	8	100%
Kegalle			4	19	23	88.5%
Anuradhapura	4	3	3	5	15	100%
Polonnaruwa			8	3	11	100%
Ampara		1	3	3	7	100%
Hambantota			1	12	13	100%
Total	4	5	20	48	77	96.3%
Percentage	5.2%	6.5%	26.0%	62.3%	100%	

Focus group participants, in Matara in particular, commented on how useful the training had been, while others asked for more training. When asked to name the most important things they had learned from their experiences in using the SRI approach farmers came up with the following.

- New methods for cultivating paddy.
- Quality of harvest depends on the enthusiasm and hard work of the farmer.
- A harvest of high quality and quantity can be gained with lower inputs.
- Organic farming gives more satisfaction.
- Paddy cultivation can be a good strategy for food security.
- Groups are very useful for paddy cultivation.

Differences in outcomes between SRI and conventional methods

A survey of the SRI farmers on the main differences in outcomes from SRI cultivation compared with conventional methods provided the following:

- More vigorous growth of the paddy plant
- Quantity of the harvest is higher
- Cost of inputs is lower
- Amount of labour needed is higher
- Quality of the harvest is higher
- Weed control is easier than expected
- Water required for irrigation is less
- Amount of seeds needed is lower

This assessment was confirmed during interviews and focus group discussions and corresponds with the findings of empirical studies conducted in Sri Lanka and a number of other countries.

In an attempt to understand the factors that are considered important in deciding whether or not to adopt SRI practices, farmers were asked to rank the same set of factors as had been previously used to understand what influenced the net benefits obtained from cultivating rice in general. A table of the average rankings follows.

Table 9: Factors influencing the shift to SRI from conventional practices

Influencing factor	Rank		Influencing factor	Rank
Size of the harvest	1		Resistance to pests & diseases	11
Availability of organic inputs	2		Availability of markets	12
Access to credit facilities	3		Amount of labour needed	13
Hire cost of machinery	3		Environmental considerations	14
Cost of inputs	5		Cost of labour	15
Ownership of land	6		Access to adequate water	16
Market (selling) price	7		Post-harvest storage facilities	17
Health concerns	8		Quality of soil	18
Amount of seeds needed	9		Follow methods used by parents	19
Quality of seeds	9		Resilience to climatic variations	20

A higher yield and the availability of organic inputs are of highest priority, whereas traditional farming methods and resilience to drought are of very little consequence. That credit facilities and machinery hire are given such importance in encouraging a switch to SRI practices is puzzling in that organic inputs needed for SRI are not generally available on credit and, other than perhaps in land preparation, the use of machinery is optional. However, a number of the respondents may have received livelihood loans from OAus to encourage them to try SRI techniques as a group. Simple machines have been developed by OAus, and are available on hire from the resident CBOs, to reduce the work involved in row seeding and weeding.

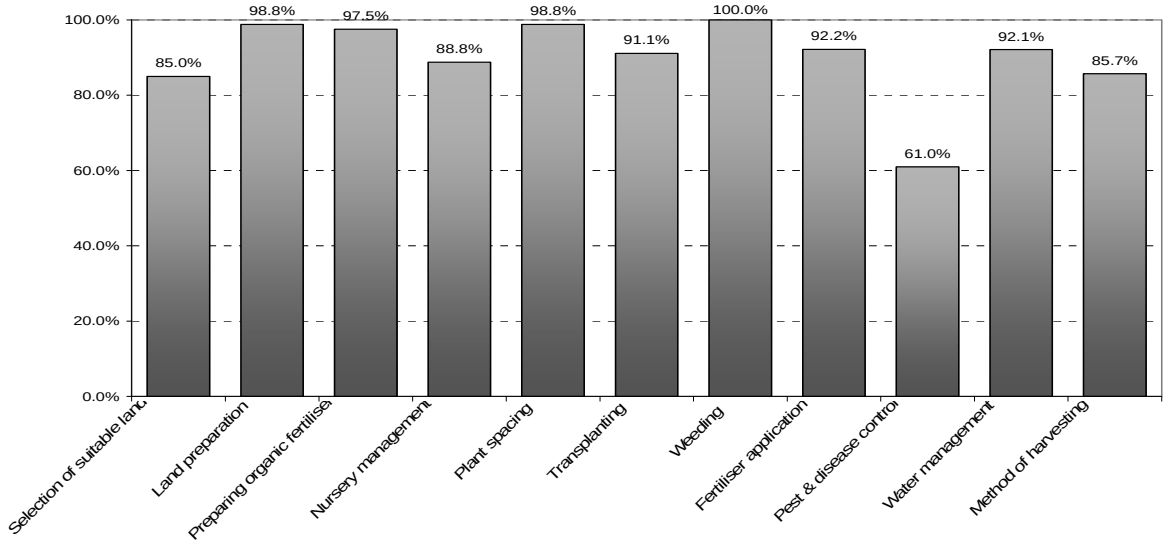
The middle ranking given to health concerns and resistance to pests and diseases is not borne out by the semi-structured interviews and focus groups that consistently identified these as major benefits of SRI over conventional practices. Not using poisons and a significant reduction in pests and disease were cited as clear advantages of SRI. There appears to be greater interest in markets and market prices among SRI farmers, possibly indicating an ambition to sell more of their harvest if the return was better. In view of the fact that SRI is generally considered to be very labour-intensive, it is interesting to find both amount and cost of labour ranked so low.

The priorities set out in Table 10 differ significantly from the importance given to the same factors by both SRI and conventional farmers in determining the benefits from growing rice in general (see Figure 1 above). The earlier question explores the importance of these factors in producing beneficial outcomes in relation to the inputs (the profitability factor), while the second question compares SRI cultivation with conventional practices. As such, the priorities identified in Figure 1 become a ‘given’ in Table 10. For example, the quantity and quality of seed is considered very important (Figure 1) in influencing the quality of the harvest and net benefit from growing rice, whereas they are of lesser importance (Table 9) when choosing SRI over conventional methodologies.

Use of SRI techniques

The SRI system contains a number of different techniques that can be applied individually or as a whole. The survey explored the extent to which these various techniques, all part of the initial training, were actually being used by respondents. The findings, displayed in Figure 2 below, indicate extremely high compliance with virtually all recommended SRI techniques.

Figure 2: SRI techniques actually practised by SRI farmers



The relatively low use of recommended pest and disease control methods, very apparent in the figure above, is even lower in Polonnaruwa, Anuradhapura, Hambantota and Matara, where less than 50% of the farmers have adopted this practice. However, during focus group discussions, participants stated that both pests and disease were less of a problem with SRI. They claimed that the spacing of the paddy meant more light around the plants and hence less places for rodents to hide. The healthier plants resulting from SRI practices were also said to be more resilient to disease and insect attacks. Therefore, the lower use of recommended pest and disease control methods may actually reflect a reduced need. All other SRI practices have been widely adopted, with all or almost all respondents claiming to follow recommended practices in the preparation of their land, use of organic fertiliser, plant spacing, and weeding.

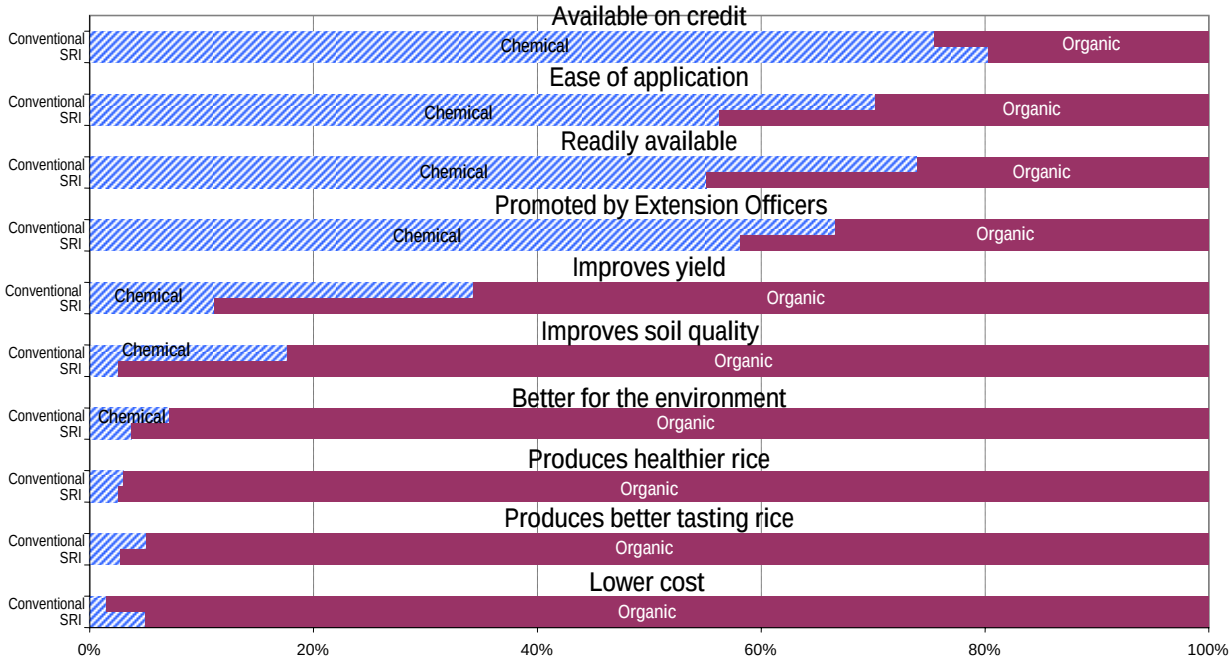
SRI farmers were also asked for details of the planting methods they normally use. Of the 80 respondents, 25.0% (20 farmers) practiced direct row seeding (by machine), and the others transplanted their seedlings using either the fixed spacing technique (68.8% or 55 farmers) and/or a special technique that keeps the soil around the plant roots intact during transplanting (10.0% or 8 farmers). Eleven farmers (13.8%) followed conventional practice by transplanting in clumps. The fact that farmers often use different methods at different times or in different parts of their field (borne out in the responses) accounts for the sum exceeding the total number interviewed.

Respondents in Kegalle and Matara districts, where plot sizes were particularly small, used only the fixed spacing method, but this method was not used at all in Anuradhapura district where row seeding was most popular. In the other districts at least three of the four methods were used.

Benefits of chemical vs. organic fertiliser

Farmers use fertiliser on their land ostensibly to increase yield. However, chemical and organic fertilisers each have certain distinct advantages over one another. As Figure 3 below shows, there is a high degree of agreement (and knowledge) among both SRI and conventional farmers as to the relative advantages of each type of fertiliser. Focus groups in Ampara added that recent price hikes in agrochemicals, and especially fertiliser, were also an incentive to switch to organic substitutes.

Figure 3: Relative benefits of chemical and organic fertilisers



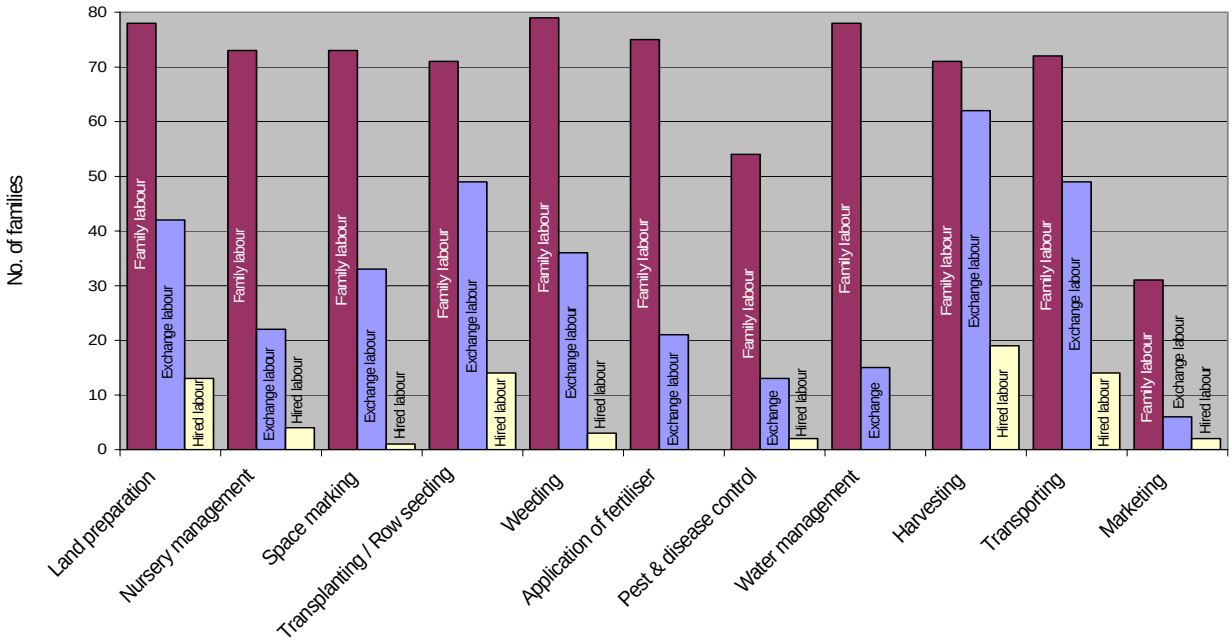
There appears to be general agreement that organic fertiliser is cheaper, produces better tasting and healthier rice, and is better for the environment. Some dissension arises over the impact of organic fertiliser on soil quality and yield, with SRI farmers believing more strongly in the benefits of SRI. In contrast, chemical fertiliser has the advantages of being obtainable on credit, readily available, easier to apply, and promoted by most Agricultural Extension Officers. However SRI farmers, who have experience in both cultivation methods, rated organic fertiliser higher in terms of its ease of application and availability than did conventional farmers (who have presumably not tried SRI methods).

Labour Requirements

The SRI system has been categorised as highly labour-intensive in comparison with conventional practices. Although the actual amount of labour for each activity was not explored during the survey, the following figure (next page) shows that the bulk of this labour comes from family members. In each case, the main source of additional labour is by way of mutual assistance (exchange labour) whereby families assist one another at certain times. These two factors could account for the relatively low priority given to labour in Table 9 above. From the responses, it appears that outside assistance, i.e., external to the family, is mostly sought when specialist equipment is needed, such as in land preparation and in transporting the harvest, or at times when the work needs to be completed within a limited period of time, as with transplanting and harvesting.

Despite the fact that SRI is considered by the farmers themselves as labour-intensive, the use of hired labour by the SRI respondents was comparatively low and was not used at all in the application of fertiliser or management of water. The low labour requirement for pest and disease control correlates with the low use of (and possibly little need for) this practice, as noted above. Similarly, the very low demand for labour in marketing appears to confirm an earlier conclusion that very little of the harvest is actually sold.

Figure 4: Sources of labour at different stages of SRI cultivation



Individual vs. collective activity

Of the 80 farmers practicing SRI, 50 are doing so as members of groups, in accordance with a methodology being promoted by OAus. The percentage of farmers using a group approach was slightly higher in Ampara, Polonnaruwa, Hambantota and Matara and lower in Kegalle and Anuradhapura. There is an average of five members per group in all districts.

Those who were members of groups were asked about their level of satisfaction with i) the sharing of workload, ii) the skill level of their colleagues, iii) the allocation of time, iv) the distribution of benefits, and v) the level of trust among group members. The responses show a very high degree of satisfaction, over 90%, on all counts, other than for the final distribution of benefits, where overall satisfaction was 78%. This latter figure is heavily influenced by a 50% satisfaction rating in Kegalle.

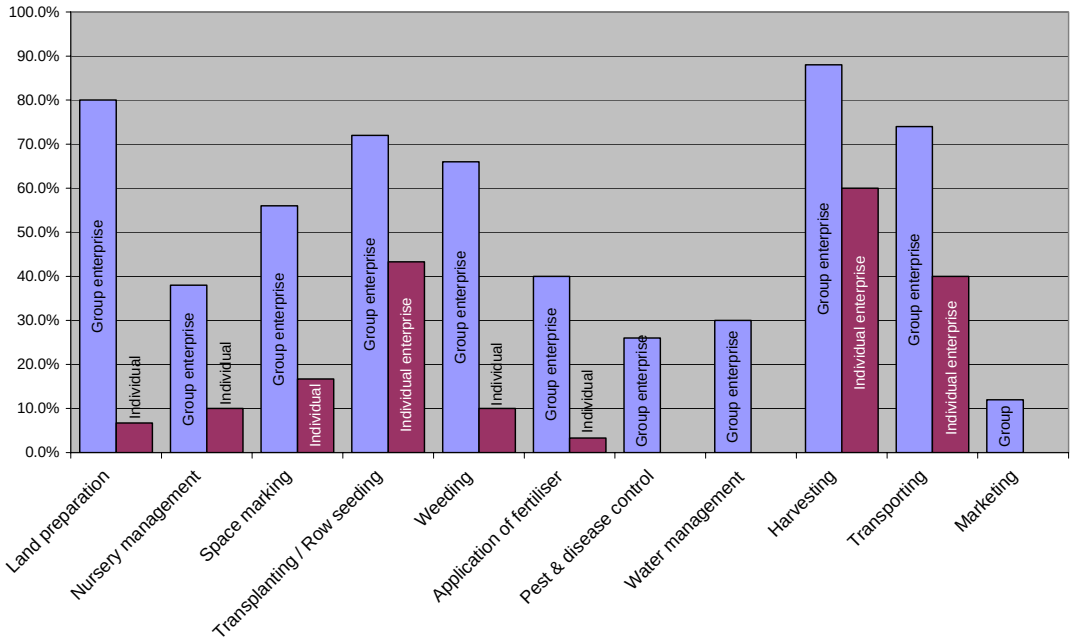
The survey also explored the influence of group membership on the use of exchange labour and hired labour at different stages in the growing cycle. The percentage of families using each labour source is set out in Table 10 below.

Table 10: Percentage of families using outside labour

Task	Exchange labour		Hired labour	
	Group enterprise	Individual enterprise	Group enterprise	Individual enterprise
Land preparation	80.0%	6.7%	18.0%	13.3%
Nursery management	38.0%	10.0%	2.0%	10.0%
Space marking	56.0%	16.7%	2.0%	0%
Transplanting	72.0%	43.4%	12.0%	26.7%
Weeding	66.0%	10.0%	4.0%	3.3%
Fertiliser application	40.0%	3.3%	0%	0%
Pest & disease control	26.0%	0%	2.0%	3.3%
Water management	30.0%	0%	0%	0%
Harvesting	88.0%	60.0%	28.0%	16.7%
Transporting	74.0%	40.0%	20.0%	13.3%
Marketing	12.0%	0%	4.0%	0%

The table above, and Figure 5 below, show that families who cultivate as part of a group are much more likely to engage in exchange labour than those who cultivate individually. For example, group members are more likely than individuals to make use of exchange labour during transplanting, a particularly labour-intensive activity, and less than half as likely to hire in labour. Also, while those cultivating individually limit their use of exchange labour to the periods of highest labour demand, e.g., transplanting and harvesting, and the transportation of their harvest, group members assist one another throughout. In fact, this increased use of exchange labour among group members was said during focus group discussions to be having a negative impact on the very poor families, who are missing out on paid labouring work as a result.

Figure 5: Effect of group membership on the use of exchange labour



However, a clear distinction is not apparent in the use of hired labour, and the low numbers of respondents involved make any conclusions questionable. By and large, individual enterprises need less outside help, either by way of exchange or hired labour, at all stages of the growing cycle, indicating sufficient family labour to meet most of their needs. However, the average size of land put under cultivation as an individual enterprise is 1.0 acres per family compared with an average of 1.57 acres for those doing it as a group activity. The availability of labour and the cost of hired labour may actually be more of a constraint for individual family enterprises than it is for families working as a group.

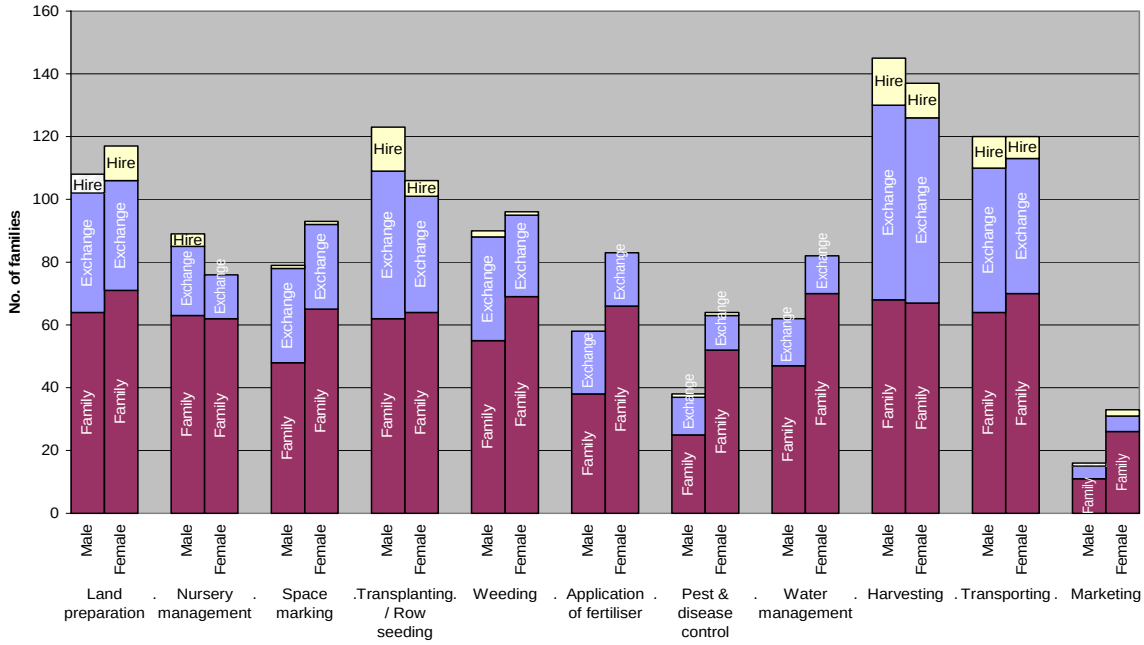
Gender Implications

The survey also explored the extent to which both men and women were engaged in the various activities, but again without trying to ascertain the actual amount of labour involved in each case. From Figure 6 below, it is clear that families rely more heavily on their womenfolk to provide the required labour than on their menfolk, with the possible exception of nursery management and harvesting, where the workload is evenly shared. This phenomenon is particularly noticeable in the areas of fertiliser application, pest and disease control, and marketing, where women can be up to twice as likely to be involved as men. This high participation by women is not necessarily a phenomenon of SRI cultivation and is certainly influenced by the way

that SRI has been promoted by OAus in Sri Lanka. Women have been specifically encouraged to form and work together in groups, as an act of solidarity and empowerment, and OAus has delivered the necessary resources and technical support to these groups.

In contrast, men were marginally more likely to be involved in both exchange and hired labour at all stages of the process, with the exception of marketing where women still hold sway. It seems that women are primarily occupied in taking care of their family plots, leaving the men to work for and with other families.

Figure 6: Disaggregation of labour, by gender



Farmers were asked about the impact of women's involvement in SRI cultivation. Respondents, 40% of whom were women, invariably considered this to be positive, and most commonly provided the following examples:

- Community respect for women has increased.
- Criticism and ridicule in the beginning have changed to praise.
- Women are now contributing directly to the family income.
- Social interaction of women has improved.
- Recognition that women can work as ably as men.

These benefits, and the high participation rate of women in SRI cultivation, were also raised during focus groups discussions in each district. The ridicule that often accompanied suggestions that women could cultivate rice by themselves seems to be giving way to acknowledgement and appreciation of what these women are achieving. Of course, the workload and family responsibilities usually carried by women has an impact on the time they have available to work in the fields. This could partially explain the lower than average satisfaction rating given by group members to the sharing of benefits.

5.0 Conclusions and Recommendations

This study was undertaken for the purpose of learning more about why the uptake of SRI practices has been slow in Sri Lanka, in relation to most other countries where it has been introduced. The study draws on the responses to a questionnaire from 151 rice farmers, and views expressed during 41 semi-structured interviews and 14 focus group discussions with field officers and key informants. An examination of the survey sample reveals no significant bias in favour or against SRI practitioners. Respondents were on average of similar age, with a similar length of experience in rice cultivation. They were drawn largely at random from six different districts specifically chosen to cover the three climatic zones of Sri Lanka. Women comprised almost 30% of the sample, although this figure was higher among the SRI farmers.

However, an examination of family characteristics would indicate that SRI farmers are, by and large, poorer than those using conventional methods. In comparison with the conventional farmers, SRI farmers have significantly larger families, less land under cultivation, and even less that they own themselves. In turn, their disposable harvest (in excess of consumption needs) is less than half that of the conventional farmers. This bias reflects OAus's practice of targeting the very poorest families in its promotion of SRI.

Objective 1: *To ascertain the main motivators in the growing of rice and the perceived advantages of adopting SRI cultivation methods.*

The primary purpose of cultivating rice, regardless of method used, is family consumption. This was true across all districts and was confirmed during individual interviews and focus groups discussions. Despite the importance given to income generation and the lack of other income opportunities, it seems that very little of the harvest is actually sold. The subsidy on chemical fertiliser is also a significant incentive to grow rice, and the fact that farmers have picked up the necessary skills and knowledge to grow rice, but not necessarily other crops, from their parents.

There are no observable differences in the performance of both conventional and SRI paddy cultivation methods between the different climatic zones, although the average land holding among farmers in the wet zone is much less than in the dry and arid zones. The quantity and quality of paddy seed were identified by both SRI and conventional farmers as having the greatest influence on their harvest, in every district. Both the quality and quantity of the harvest is seen to be very dependent on the availability and use of good quality seed. The availability and presumably terms of credit are also very important to rice cultivation. These were closely followed by the cost of inputs, in the form of materials, machinery hire, and labour. Interestingly, health concerns are also among the more important factors in calculating the net benefits of growing rice.

At the other end of the scale, the size and safe storage of the harvest are of little importance, without relating this to the amount and cost of inputs. Markets and market prices are also not particularly influential in convincing a farmer to cultivate or continue to cultivate rice since, as we have noted above, so little of it is actually sold. Environmental factors, such as the availability of water, resistance to pests and diseases, resilience to climatic variations, soil quality, and the availability and impact of organic fertiliser are also of little concern.

In choosing to adopt SRI practices however, farmers prioritised the higher yield that could be expected. Although a higher yield was not borne out by the actual figures reported by respondents in this study, it was identified by these same farmers separately as a significant factor, and it has been substantiated in numerous empirical studies elsewhere and is possibly SRI's main 'selling point'.

The availability of organic inputs is a crucial factor, especially in areas where there are few cows. Organic fertiliser is, in itself, a reason to adopt at least some of the SRI practices as it is seen to have a number of benefits over chemical fertiliser. Organic fertiliser is believed to be cheaper and to produce both better tasting and healthier rice. It is also believed to be better for the environment and the soil. Those who are using it also claim that organic fertiliser produces higher yields, but presumably in conjunction with a number of other yield-improving SRI techniques.

Credit facilities are given high priority in influencing a shift to SRI, followed by the cost of machinery and material inputs. Lowest priorities are assigned to the availability of adequate water, harvest storage facilities, quality of the soil and, almost by definition, reluctance to change from traditional methods. Resilience to climatic variations is of least importance.

Objective 2: *To identify the challenges faced in Sri Lanka to the promotion of SRI practices and to propose actions that can be realistically taken to overcome them.*

From research undertaken around the world and even the experiences of those using SRI practices here in Sri Lanka, there is little doubt that SRI does have a lot to offer the farmer. There are possibilities of higher yields with less costly inputs and better tasting rice that is also healthier for the consumer. However, many of the techniques are new and either unknown or misunderstood by farmers generally.

Findings from this study would indicate that training has been very effective in enabling and encouraging participants to adopt the various SRI techniques and that the benefits of using organic inputs are widely known. And yet the natural spread of these ideas appears to have been negligible, with less than 4% of the SRI farmers interviewed having adopted the practices without first attending training from OAus. As the receipt of training, from OAus or elsewhere, was incidental in the selection of respondents, it can be concluded that virtually all SRI farmers country-wide have only adopted SRI practices after receiving some form of 'formal' training.

It seems that farmers are reluctant to take a risk with new practices without first being trained. There is also great reluctance to try something new for fear of ridicule from neighbours. Interestingly, it is reported that women are less concerned about ridicule and hence are more likely to experiment with these novel ideas. However, a serious obstacle to learning from peers is that simply by asking for assistance or advice, a farmer is placing him/herself in a subservient position in relation to the other. The biggest obstacle to the spread of SRI practices in Sri Lanka could actually be cultural, not technical.

Recommendation 1: That OAus's SRI trainer offer 'training of trainers' and technical back-up to staff of other agencies, including government extension workers, who make an agency commitment to promote the SRI system in their areas of operation.

Recommendation 2: That OAus enter into an agreement with its partners to each identify or employ one staff member to be wholly dedicated to the promotion and technical support of SRI and that OAus train and fully fund these staff positions.

While an increase in yield from the use of SRI practices is not evident from this study, there is ample evidence in Sri Lanka and abroad to support this premise. But conventional farmers do not necessarily accept that SRI practices result in significantly better harvests - they don't read reports and justifiably question what others claim. Even if they see a difference in a neighbour's field, it is not possible for them to acknowledge this without admitting an inferior result for themselves. Then again, it is not always the size of the harvest that governs decisions, but the net benefit to a farmer. A neighbour may consider the additional labour that is required by SRI as a costly input and overlook the savings in other input costs when mentally calculating the net benefit. It may be necessary to engage farmers in regular monitoring of SRI fields in order to convince them of the net benefits of SRI.

Recommendation 3: The OAus, in conjunction with its partners, provide technical support and non-monetary incentives to current SRI farmers to host regular field days in their area. The locations of these model farms should vary from year to year.

A comparison of production levels with annual consumption indicates that rice farmers are producing well in excess of their immediate needs, at least in five of the six districts studied. And yet it seems that very little of this apparent excess is being sold. There is also ample evidence that most farming families are food-secure for only part of the year. The question arises as to where this excess is going. Anecdotal evidence would suggest that much of the harvest is paid to creditors in return for land rent, draught animal or machinery hire, agrochemicals, labour and subsistence loans during the growing season.

The availability of credit is identified as a major factor in determining the net benefits from growing rice in general and in the decision to switch to SRI. Currently, agrochemicals used in conventional farming practices are readily available on credit, making them more readily obtainable than organic inputs that require labour (and possibly some cost) to prepare. However, the extension of credit to SRI farmers would simply perpetuate this form of debt, still leaving the farmer with little excess harvest to cover their living costs. The practice of growing SRI as a group enterprise may offer opportunities to introduce in-kind (i.e., paddy) savings schemes at a group level from which farmers could draw down on during the growing season, when the sale price of rice is high, and replace at harvest when the value of rice is lowest.

So-called 'rice banks' are not new to Sri Lanka and elsewhere, and are technically feasible, but problems usually arise in the management of these banks when operated at a community level. Capture by 'elites', disputes over paddy quality, and defaults resulting from a lack of ownership have brought about the downfall of most such ventures. However, it may be worth trying this at a micro scale whereby each group manages its own 'bank'. But, rather than each group building its own storage facilities, paddy could be held by: i) each individual member, ii) by one member on behalf of the group, or iii) a local rice mill, possibly in exchange for the rice husk.

Recommendation 4: That SRI groups be encouraged to establish 'savings banks' into which members can deposit paddy at harvest and withdraw and sell it to meet operational and living costs during the growing season.

The study revealed that farmers do not choose to grow rice with the intention of selling it, but they would switch to SRI if it resulted in a higher price for their paddy. If SRI paddy realised a higher price, then farmers would need less to repay debts incurred during the growing season and would even have the option of selling their harvest and buying cheaper conventional rice for personal consumption. The survey also reveals that health concerns are an important factor in the growing and, by implication, the consumption of rice, and that there exists strong agreement that organic fertiliser, synonymous with SRI, produces 'healthier rice'.

A clear finding from the survey was the importance given to the quality and quantity of seed in determining the net benefit from rice cultivation. The germination rate of the seeds and the vitality of the resulting plants are significant determinants in the quality and quantity of the harvest. SRI is recognised, at least by those with SRI experience, as producing higher quality seed. There is also widespread agreement that SRI rice actually tastes better than conventional rice.

SRI has a number of strong 'selling points' that would suggest a (slightly) higher selling price is feasible. However, this will depend on the willingness of other farmers or consumers to pay a little extra for their seed paddy or for healthier, better-tasting rice. The presence of such a market is the subject of a separate study currently being conducted by OAus. However, there must also be mechanisms by which the quality and authenticity of the produce can be certified to stop unscrupulous farmers and traders capitalising on an emerging market.

Recommendation 5: That OAus, in collaboration with its partners, agree on a recommended retail price for SRI rice, pegged to the market price of conventional rice, and capitalising on its selling points to promote SRI rice through regional campaigns and existing marketing networks.

Recommendation 6: That OAus, in collaboration with partners and other interested bodies, establish a mechanism to certify the quality and authenticity of SRI produce and have this officially recognised by the government.

A key principle of SRI is the use of organic inputs that are widely considered to be better for the soil, better for the environment and better for the health of the users. The result, according to this survey, is better-tasting rice that is also better (healthier) for consumers. SRI has clear environmental., physical and psychological benefits for society. The popularity of ayurvedic treatments and natural medicines would suggest that there is already a 'cultural' acceptance of organically-grown produce in Sri Lanka.

Recommendation 7: That OAus instigate separate but linked marketing campaigns that stress: i) the quality of the paddy as seed, and ii) the health properties of SRI rice for consumers, with a view to increasing demand for SRI produce.

A key principle of the SRI system is the replacement of all agrochemicals with natural., organic inputs. There is a strong belief, explained during both interviews and focus group discussions, that the SRI technique of plant spacing reduces the threat from rodents, and the vitality of the plants makes them more resilient to both disease and insect attack. This results in a reduction, if not total elimination, in the need for pesticides, organic (in the case of SRI) or chemical.

However, the greatest use of artificial inputs comes in the form of chemical fertiliser. This is seen to have a number of advantages over organic substitutes, by way of: i) being readily available, ii) being available on credit, iii) being easy to apply (no preparation needed), and iv) being promoted as the fertiliser of choice by most government Agricultural Extension Officers. But, in comparison with the widely-accepted benefits of organic fertiliser, none of these advantages of chemical fertiliser appear to be very substantive.

If organic fertiliser was produced and sold commercially, possibly by small local entrepreneurs, then the issues of availability and ease of application would be overcome immediately. This fertiliser could be made available to farmers on credit or, better still, the system of 'rice banks' suggested above might eliminate the need for credit altogether.

Recommendation 8: That OAus promote and offer technical support to the local production of organic fertiliser and guarantee a reasonable market price by subsidising the price initially and purchasing unsold production for use in training and support to new SRI farmers. An agreed phase-out plan for OAus support should be negotiated and agreed upon at the beginning.

However, the use of chemical fertiliser is further endorsed through the government's fertiliser subsidy which allows farmers to purchase at below market rate. Obtaining government endorsement of their effectiveness is possibly the greatest challenge to the spread of SRI methods in Sri Lanka. This will require a 'conversion' after years of scepticism. The process could begin with OAus encouraging and enabling extension officers to undertake clinical or farmer-based trials to validate for themselves the claims about SRI. A pilot research project is currently being undertaken by OAus, in conjunction with eight government extension officers, to verify the effectiveness of such trials in changing opinions.

There is possible value in advocating for a reduction, and eventual elimination, of the fertiliser subsidy, but this would also hurt small farmers and would be very unpopular with the electorate. Perhaps a more 'acceptable' solution would be an extension of this subsidy to organic fertiliser, thereby making commercial production of organic agro-inputs more viable and affordable.

Recommendation 9: That OAus encourage and support the participation of government extension officers in field-based trials of SRI, subject to the experience gained from the current trials, and that, as more government staff become advocates for the system, encourage the formation of an *ad hoc* body to lobby government to extend the existing fertiliser subsidy to also cover locally-produced organic alternatives.

As borne out by the survey profile, OAus targets very poor families in its promotion of SRI. This in itself could be an obstacle to the successful implementation of these ideas. By and large, very poor families have few income-generating assets and are often more accustomed to labouring for others. If they own or rent land, then it is often rain-fed and of the poorest quality, and some have little or no experience in actually farming for themselves. Most are wary of the risks involved in growing their own food and cannot afford to wait some months to reap the benefits of their labour. Very poor families often survive by constantly switching from one income opportunity to another, whereas farming success demands long-term commitment.

A lifetime of exploitation has taught the poor to distrust others, and especially other poor families, making group membership unpalatable. Often, poor families have many mouths to feed, but few members capable of working in the field. Poor families are highly vulnerable to financial shocks due to their lack of reserves and are therefore more susceptible to extortionate loans that can quickly force them off their land. Poor health and an inability to work hard for long periods can be both a cause and result of poverty. And finally, most farmers from poor families have had little or no education, making it particularly difficult for them to grasp new concepts and practices.

However, the promotion of SRI and the targeting of very poor families do not need to be at cross purposes. A greater the use of SRI techniques will eventually lead to greater demand for agricultural labour – it is the promotion of SRI as a group activity and the exchange of labour among group members that is reducing the demand for hired labour, not the promotion of SRI per se. OAus may choose to retain its policy of targeting only the very poor and promoting SRI as a group activity, but other agencies, including the government extension service, who join in the promotion of SRI will work in different ways and with different target groups.

As the numbers of SRI farmers increases, the feasibility of service industries such as the commercial distribution of quality-certified seed and production of organic fertiliser is enhanced, and the lobby for government support for these grows. An increase in the use of SRI practices across the country promises to have positive outcomes for all involved.

Recommendation 10: That OAus retains its current focus on the very poor but encourages other agencies, including the government extension service, to work with others in promoting SRI practices throughout the country.

Objective 3: *To better understand the social repercussions, particularly on gender relations, of adopting SRI practices.*

It is universally accepted that SRI practices are more labour-intensive than conventional techniques, and this is thought to be a major obstacle to the spread of these ideas. This is possibly validated by the importance given by respondents to the amount and cost of labour in determining the net benefits derived from rice cultivation in general. However, labour concerns are given much lower priority by SRI farmers themselves. The role of groups and the promotion of SRI as a group enterprise appear to have overcome much of the concern about increased labour requirements. Experience in other countries has shown SRI labour needs reducing over time, as experience with the methods is gained, so that it can even become labour-saving.

The exchange of labour among group members is high and covers most stages of the production cycle, whereas individual enterprises use exchange labour sparingly and mostly only at times of peak demand. The very high level of satisfaction with the functioning of groups is in stark contrast to (OAus's experience of) widespread reluctance by farmers to initially form groups. Continuous cooperation and mutual assistance among group members are also affording social benefits, such as the high degree of trust reported among group members.

A tentative finding of this study is that group members are each farming on average 50% more land than those working independently. Availability of exchange labour through group membership may enable group members to actually increase the land under SRI cultivation, sometimes made possible through the hiring of extra land.

Recommendation 11: That OAus continue to promote SRI as a group activity and encourage group membership from women and those who would otherwise be unable to cultivate rice alone.

However, this increased use of exchange labour, in which no money changes hands, is having a detrimental impact on very poor farm labourers who are thereby losing (desperately needed) income opportunities. Most poor SRI farmers also seek paid labour to supplement the meagre income/production of their farms. To mitigate this unwelcome side-effect, groups of landless farmers could be assisted to start income-generating activities to service SRI farmers, e.g., organic fertiliser production, machine hire, rice milling or marketing, or to hire (or redeem) land and to work this either collectively or cooperatively. Any expansion in the use of SRI practices, even by groups, will require increased labour, only part of which will be met by family and exchange labour.

Recommendation 12: That OAus continue to provide livelihood support to groups of very poor farm labourers, enabling them to farm for themselves or start other income-generating activities, and offer technical support to those embarking on unfamiliar activities servicing the production and marketing of SRI.

The study shows that women are heavily involved in all stages of SRI production, usually more so than men within the family. To some extent at least, this reflects OAus's encouragement of women's participation as a vehicle for their empowerment. This participation by women has been positive and has brought them both admiration and respect within their communities, by exhibiting their willingness and ability to cultivate rice as effectively as men. Their ability to withstand criticism and ridicule, both in entering the traditional male domain of rice cultivation and then in using new and unfamiliar techniques, has identified women as potential change agents and innovators within their communities.

It is claimed that women have also gained status and respect within the household by contributing more to family income through their participation in paddy production. Their involvement in SRI cultivation, and particularly as members of groups, is also said to provide opportunities for greater social interaction among the women themselves. Certain advice, information and/or training should therefore be aimed specifically at women. Building knowledge, capabilities and opportunities of women is also tantamount to empowerment.

Recommendation 13: That OAus recognise the role of women in certain activities and target their messaging and assistance accordingly so as to maximise the effectiveness of the interventions.

However, this heavy involvement of women in SRI has undoubtedly added significantly to their workload. Promoting practices that improve productivity but further increase labour requirements can only exacerbate this load on women. Men should be encouraged to contribute more to activities where there is a clear gender imbalance, such as in weeding, fertiliser application, pest and disease control, and the management of water. Additionally, the development and/or promotion of labour saving technologies should be guided by who in the family stands to gain most from these inventions.

Recommendation 14: That OAus encourage men to participate more in those SRI activities currently carried out mostly by women, and that labour-saving techniques and devices focus on these same activities.

6.0 Areas for further study

This report of paddy farmers' perceptions of the factors influencing rice production in Sri Lanka forms part of a larger study into various aspects of SRI cultivation. A second report is currently underway on the results of a comparative study of the productivity of SRI and conventional cultivation practices. This will present the results obtained from controlled farmer-based trials of both production methods over the 2006/07 *Maha* season, involving eight farmers in four districts. OAus is also undertaking a exploratory trial in Kegalle district to look at the market potential of SRI as a higher priced alternative to conventional rice.

This study of farmers' perceptions has pointed to other areas for further work:

- An independent validation of the conclusions contained in this report that would add objectivity and weight to the document as a tool for advocacy.
- An assessment of the impact of other interventions by OAus into SRI cultivation, such as the exclusive targeting of very poor farmers, the promotion of mixed groups (by gender and ethnicity), the provision of group livelihood loans, and the redemption of pawned land.
- A literature review of other studies of conventional and SRI paddy cultivation in Sri Lanka to ascertain whether certain phenomena, such as production/consumption ratios, landholdings, productivity of different methods, and involvement of women, are present in rice production in general, are a function of SRI practices alone, or are specific to families who have been trained and supported by OAus.
- A more rigorous analysis of the factors promoting and retarding the spread of SRI practices in Sri Lanka, possibly requiring, in the first place, the design and implementation of a comprehensive baseline survey against which the impact of various interventions can be measured over time.

7.0 References

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Appendix A

Survey on System of Rice Intensification (SRI) – 2006

Surveyor's name:

Date of interview:

1. Personal information

a. Respondent Name:

b. Location:

District: DS Division: Village:

c. Household information

Name	Age	Sex	Marital Status	Occupation
1.				
2.				
3.				
4.				
5.				
6.				
7.				

d. How much rice does your family need/consume every month? ……..Kgs

2. Production details

a. How long have you been involved in paddy cultivation?

b. What is the total rice land that you are currently cultivating?

Cultivated area (Ha / Acre)	Own	Rent	If Rent (Rs./ Bushels/ Kg per season)

c. Yield details

	Last Season (Yala 2005)	This Season (Maha 2005/06)
Total yield (Kg/Bushel)		
Land size (ha/acre)		
No of Kgs / Bushel saved for family consumption		

d. Marketing details

	Last Season (Yala 2005)		This Season(Maha 2005/06)	
	Kg/ Bushels	Market Price	Kg/ Bushels	Market Price
1st stage				
2nd stage				
3rd stage				
Total				

3. Interest in the paddy cultivation

a. What are the main reasons why you grow rice?
Rank the following reasons from 1 (most important) to 9 (least important).

Reason	**Rank**
Family consumption	
Income generating activity	
Fertilizer subsidy	
Lack of other work to do	
Easy to do, less labour	
Lower inputs/costs compared with other crops	
Have the required knowledge and skills	
Able to get loans against next harvest.	
Other (specify)	

b. What are the most important factors in determining the profitability of rice cultivation?
Rate each of the following factors.

	Factor	**Very important**	**Important**	**Not so important**	**Not important**
1	Size of harvest				
2	Availability of organic inputs				
3	Market (selling) price				
4	Ability for find suitable markets				
5	Ownership of land				
6	Amount of labour needed				
7	Environmental considerations				
8	Health concerns (chemicals)				
9	Cost of labour				
10	Financial concerns (loan facilities)				
11	Hire cost of machinery				
12	Cost on inputs (fertiliser, pesticides)				
13	Resistance to climatic changes				
14	Quality of soil				
15	Post-harvest storage facilities				
16	Access to adequate water				
17	Resistance to pests & diseases				
18	Amount of seeds needed				
19	Quality of seeds				
20	Stick to known methods				
21	Other (specify)				

c. What are the benefits of chemical and organic fertiliser?
Indicate (√) which is better for each of the given factors.

Factor	Chemical	Organic
Improves soil quality		
Less cost		
Higher yield		
Better tasting rice		
Healthier rice		
Promoted by agriculture extension officers		
Easily available		
Less work involved (easier to apply)		
Better for the environment		
Able to get on credit		
Other		

d. Have you heard of the SRI method of rice cultivation?

If no, end the interview here.

……..

4. Knowledge and experience of SRI

a. Have you ever had any training on SRI? If so, when?

b. What are the main differences between the normal method and the SRI method of rice cultivation? List.

1.
2.
3.
4.
5.

c. Do you currently practice some of the SRI techniques on at least part of your field?
If so, which of the following techniques do you use?

SRI practices	Use (Y/N)	If not, why not?
Selection of suitable land		
Land preparation		
Organic fertilisation		
Nursery management		
Spacing		
Transplanting methods		
Weeding		
Application of fertiliser		
Pest and disease control		
Water management		
Method of harvesting		

d. Which planting method do you use, and why?

Planting method	Use (Y/N)	Why?
Direct broadcasting		
Single plant without harm to the soil		
Careless transplanting		
Raw seeding by machine		
Fixed spacing		

5. SRI production details

a. Yield details

SRI rice only	Last Season (Yala 2005)	This Season (Maha 2005/06)
Total production (Kg/Bushel)		
Land size (ha/acre)		
No of Kg/Bushel saved for family consumption		

b. Marketing details

SRI rice only	Last Season (Yala 2005)		This Season(Maha 2005/06)	
	Kgs/Bushels	Market Price	Kgs/Bushels	Market Price
1st stage				
2nd stage				
3rd stage				
Total				

c. How many days of labour are required at different stages of the SRI cultivation process?

Activity	Family labour		Exchange labour		Hired Labour	
	Male	Female	Male	Female	Male	Female
Land preparation (incl. organic fertiliser)						
Nursery Management						
Space marking						
Transplanting or row seeding						
Weeding						
Application of fertiliser						
Pest & disease control						
Water Management						
Harvesting						
Transporting						
Marketing						

d. How has the involvement of women changed in shifting to SRI cultivation?

Are these changes good or not for the family and the society?

e. Are you practicing SRI as a group? If yes, how many group members?

Are you satisfied with how your group functions in the following areas?

	Y / N	If no, why not?
Sharing of workload among members		
Skill level of other members		
Time allocation for working together		
Distribution of benefits		
Level of trust among members		

6. Benefits of SRI cultivation

a. Rank the following factors in terms of their importance in deciding whether to use SRI or conventional methods of rice cultivation, from 1 (most important) to 22 (least important)

Factor	Rank	Factor	Rank
Yield		Cost on inputs (fertiliser, pesticides)	
Availability of organic inputs		Resistance to climatic changes	
Market (selling) price		Quality of soil	
Ability for find suitable markets		Post-harvest storage facilities	
Ownership of land		Access to adequate water	
Amount of labour needed		Resistance to pests & diseases	
Environmental considerations		Amount of seeds needed	
Health concerns (chemicals)		Quality of seeds	
Cost of labour		Same as done by parents	
Financial concerns (loan facilities)		Problems with working in group	
Hire cost of machinery		Other (specify)	

b. What lessons have you learnt about using the SRI method?

7. Other crops

a. Are you interested in trying to grow field crops in addition to or instead of rice?

What are the reasons why you might shift to other crops, in order of importance, with 1 (most important) to 6 (least important)?

Reason	Rank
Greater food security through crop diversity	
Greater market value	
Reduce pest and disease damage	
Improve soil fertility	
Learn new skills	
Improve family health/nutrition	