

Ecological System of Rice Intensification (SRI) Impact Assessment (2001-2003)

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Executive Summary

The Cambodian Center for Agricultural Studies and Development (CEDAC) has conducted an evaluation that tracks the experience of 120 farmers who have been using SRI for three years. In that time, their average area under SRI has gone 0.11 ha to 0.47 ha, while their total rice area has remained constant, with conventional rice cultivation area going from 1.38 ha before starting SRI, to 0.90 ha in 2003.

Increase in Income and Yields: Even with less than full adoption of SRI, gross household income has gone up from 460,700 riels/ha to 869,800 riels/ha¹, with SRI yields averaging 2.75 t/ha -- compared to 1.34 t/ha with conventional methods, a doubling.

Input Use: Compost use/ha has gone from 942 kg to 2,100 kg, while chemical fertilizer use has fallen from 116 kg to 67 kg. The number of households using chemical pesticides fell from 35 before SRI to 7 in 2003.

Costs of Production/ha: These have fallen from 231,300 riels before SRI to 113,140 riels in 2003. With gross income/household rising from 780,000 riels to 1,035,700 riels while costs of production/household declined from 330,000 riels to 155,900 riels, the gross margin (net income) per household went from 499,900 riels to 879,800 riels, a doubling even while still using SRI on less than 40% of their land.

Constraints on Adoption: Most of those identified were similar to those affecting rice production everywhere: flooding, drought, insects and diseases, and weeds, with lack of biomass for compost and distance of rice fields from home being more specific to SRI. Lack of water management facilities was also another limiting factor mentioned.

Differential Adoption: Most of the SRI techniques were adopted very quickly, according to the report. However, not all farmers plant in a square pattern, or plant just 1 or 2 seedlings per hill, or not very young seedlings. A separate evaluation found the average age of seedlings being used with SRI methods is 25 days, already a considerable reduction in seedling age, but not 15 days or younger. So there is still considerable yield potential with full SRI application to be utilized by Khmer farmers.

Ease vs. Difficulty of Adoption, and Sales: 55 percent of the farmers considered SRI to be *easier* to practice, citing reductions in labor required for transplanting and other operations, while 18 percent said it was more difficult because of requirements for water management and weeding; 27 percent said there was no real difference for them. The percent of households having a surplus of rice to sell has gone from 30% (selling 301 kg on average) to 50% (selling 785 kg average).

Diffusion: The 120 interviewees said that they had, all together, promoted SRI among 969 households in their own villages, and among 967 households in other villages. Thus, on average, each cooperating farmer had extended knowledge of SRI practices and

ⁱ 1 USD = 4000 riel

advantages to 16 other households. This helps to explain the rapid spread of SRI in Cambodia, from 28 farmers in 2000 to over 20,000 in 2004.

Future Plans: 80 percent of those interviewed said that they expect to expand their area under SRI further; only 7% said they would not do this. Also, 70 percent said that they will adopt more of the recommended SRI practices, and 75 percent said they would begin intensifying their farming systems to grow more trees, raise animals, use more compost, etc., utilizing the land, labor, water and capital that is freed up from rice production by increases in factor productivity.

I. Introduction

CEDAC is a Cambodian NGO founded in August 1997 with initial assistance from GRET, a French NGO. Since its creation, CEDAC has been working with small farmers and other organizations in Cambodia to develop and disseminate innovations in ecological agriculture, promoting rice-based farming systems in rainfed lowland areas. As part of its participatory technology development effort, CEDAC has been collaborating with farmers and NGOs to introduce and adapt the System of Rice Intensification (SRI) since 2000.

Since 2000, the number of cooperating farmers has gone from 28 households to 9,100 households in 2003, with four to five times more in 2004. Yield increases have been significant, with the average yield varying between 3 t/ha and 5 t/ha, compared with a national average less than 2 t/ha. For a comparison of SRI with conventional practice, CEDAC conducted an internal impact assessment study in its target areas such as Ta Keo, Prey Veng, Kandal, Kompong Speu and Kompong Cham provinces. The study aims to give a good understanding of the following points:

- Economic analysis of SRI adoption/adaptation;
- Challenges that farmers are facing and SRI's potential for improvement, and
- Scope of adaptation and dissemination.

II. Methodology of the Study

The SRI impact study was conducted in two stages, from November to December 2003, and from January to February 2004. The data were collected by farmer community facilitators in target project areas by using semi-structured interviews. Farmers collaborated with farmer community facilitators to complete the guideline questionnaire throughout the seasonal planting. In total, 280 households were interviewed. From these, to have a three-year data set, the 120 households who had started using SRI in 2001 and for whom we had complete data, were analyzed for this report, looking at their results from using both SRI and conventional methods. To verify the findings of the study, the results of the analysis were presented to farmers and community facilitators for feedback.

Table 1: List of provinces, areas and farmers covered in sample

No.	Province	District	Commune	Village	Number of farmers
1	Ta Keo	1	5	11	67
2	Prey Veng	2	5	13	40
3	Kompong Speu	2	3	4	3
4	Kompong Cham	1	3	4	8
5	Kandal	1	1	2	2
Total	5	7	17	36	120

III. Results of the Study

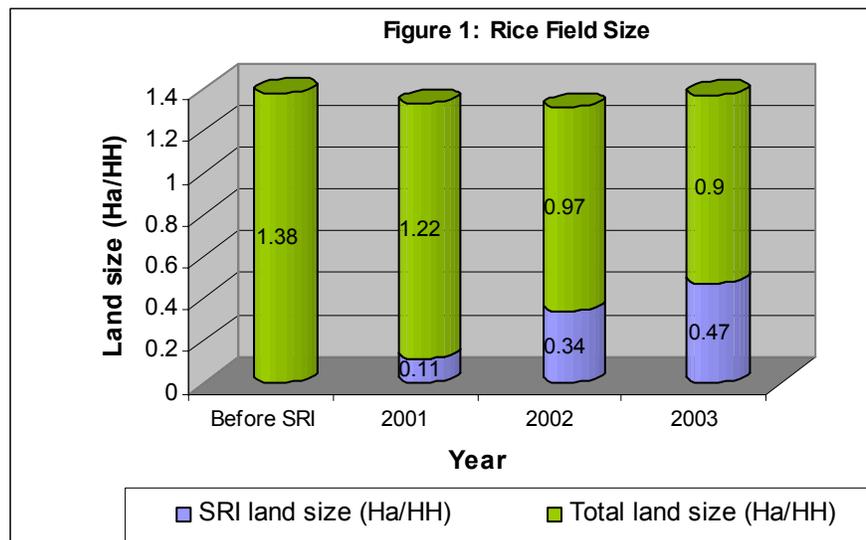
1. Production System Analysis

1.1 Cultivated rice area

The average total size of rice fields for each household is 1.33 ha, and the size has usually been steady, though some were reduced by land distribution to children or by sale to outsiders. Based on their success with SRI adaptation, farmers have increased their use of SRI within their production system. SRI plot size as gradually increased, from 0.11 ha/household to 0.47ha/ household. Figures on SRI plots and total rice field of each household are shown below:

Table 2: Size of rice field (hectares per household)

	Before SRI	2001	2002	2003
Total rice area (Ha/HH)	1.38	1.22	0.97	0.90
SRI (Ha/HH)		0.11	0.34	0.47
Total area (Ha/HH)	1.38	1.33	1.31	1.36



1.2 Yield and gross income

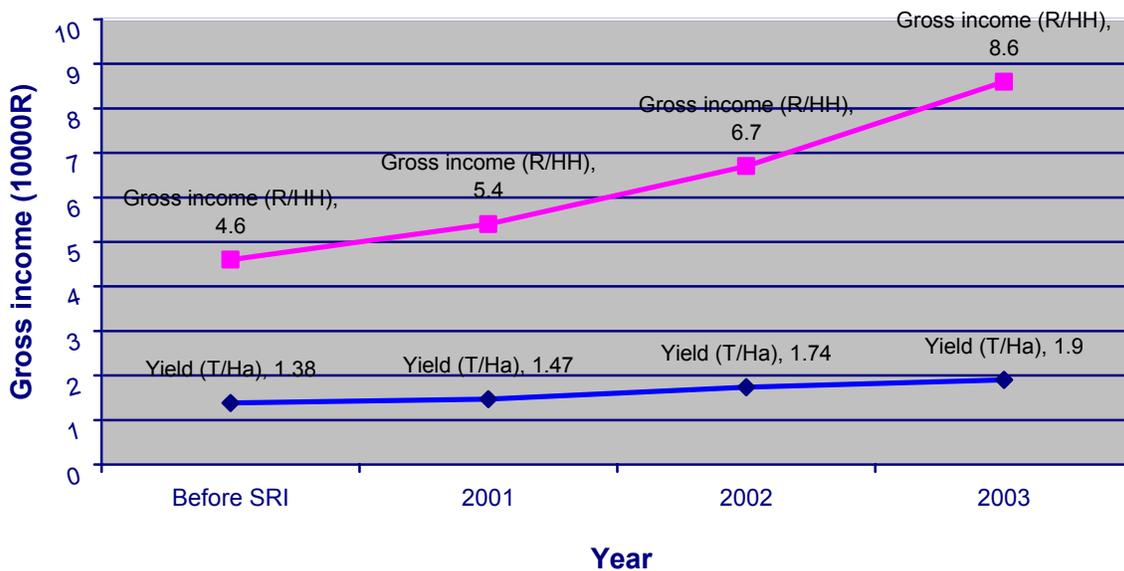
The yield and gross margin for households that applied SRI is higher than from conventional practice. In 2003, 89 percent of cooperating farmers got higher average gross income than with conventional practice, up to 409,00 Riels/HH.

Table 3: Yield and gross income

	Before SRI	2001	2002	2003
Land size (Ha/HH)	1.38	1.33	1.31	1.36
Total rice yield (T/Ha)	1.38	1.47	1.74	1.90
SRI yield (T/Ha)		2.70	2.74	2.87
Gross income (Riels/HH)	460,700	548,300	678,100	869,800

Note: Rice Price: 1Kg = 400R, 1 USD=4000 Riel

Figure 2: Yield and gross income



1.3 Fertilizer usage

Generally, farmers used chemical fertilizer and natural fertilizer to increase yield on their fields. By conventional practice, a small amount of farmers used organic fertilizer (cow manure) in their rice field, while 100 percent of rice farmers applied chemical fertilizer in rice field. They believed that only chemical fertilizer can increase rice yield. In 2003 after intervention of SRI project, the amount of chemical farmers has decreased. In this year, only 79 percent of farmers in the sample applied chemical fertilizer. Some farmers applied a small amount of chemical fertilizer in conventional plots, and the rest of them stopped using chemical fertilizer entirely.

The number of organic farmers has been increasing since they started to adapt SRI. They used compost, cow manure and other organic matter to apply in their rice fields. In all, 98 percent of cooperating farmers used organic manure in the rice field.

Table 4: Fertilizer used

	Before SRI	2001	2002	2003
Compost (Kg/HH)	1,300	1,870	2,300	2,800
Compost (Kg/Ha)	942	1,399	1,750	2,100
Chemical fertilizer (Kg/HH)	160	123	103	90
Chemical fertilizer (Kg/Ha)	116	92	78	67

Table 5: Chemical fertilizer and pesticide used

	Before SRI	2001	2002	2003
Chemical fertilizer (HH)	119	105	102	95
Chemical fertilizer (% of HH)	99	87	85	79
Chemical pesticide (HH of HH)	35	24	16	7
Chemical pesticide (%)	30	20	13	5

1.4 Production costs

In total there are various expenditures such as chemical fertilizer 40%, hired labor 38%, seed 15%, water 6%, and chemical pesticide 1%. All these expenses have been reduced, especially on seed, chemical fertilizer, and pesticide.

Table 6: Household expenditure for rice production

	Before SRI	2001	2002	2003
Seed (R/HH)	49,197	37,000	22,000	22,000
Chemical fertilizer (R/HH)	133,000	104,800	59,800	59,000
Chemical pesticide (R/HH)	2,800	1,300	200	200
Water (R/HH)	19,100	11,000	9,600	9,600
Hired labor (R/HH)	125,897	91,570	63,500	63,500
Total (R/HH)	329,897	245,600	155,200	155,200

Table 7: Rice production expenditure per hectare

	Before SRI	2001	2002	2003
Seed (R/Ha)	31,400	26,200	16,700	16,100
Chemical fertilizer (R/Ha)	92,400	73,600	45,600	43,300
Chemical pesticide (R/Ha)	3,000	1,500	150	140
Pumping (R/Ha)	13,700	8,100	7,300	7,000
Hired labor (R/Ha)	90,800	68,500	48,400	46,600
Total expense (R/Ha)	231,300	177,900	118,150	113,140

1.5 Gross returns

Gross returns also increased with the adoption of SRI. In 2003, the gross return including SRI was 879,800 riels per household, compared with the return from producing rice the year before adapting SRI of 429,900 riel per household. This increase of 95 percent was obtained from converting only part of their rice production to SRI methods. If and when they cultivate entirely with SRI, the profitability of their rice operations should be still greater.

Table 8: Gross return from household rice production

	Before SRI	2001	2002	2003
Gross income (riel/HH)	780,000	785,000	900,000	1,035,700
Total expenses (riel/HH)	330,000	245,500	203,700	155,900
Total expenses (riel/ha)	238,100	183,800	154,800	113,600
Gross return (riel/HH)	449,900	539,400	696,200	869,800
Gross return (riel/ha)	326,000	405,500	531,400	646,900

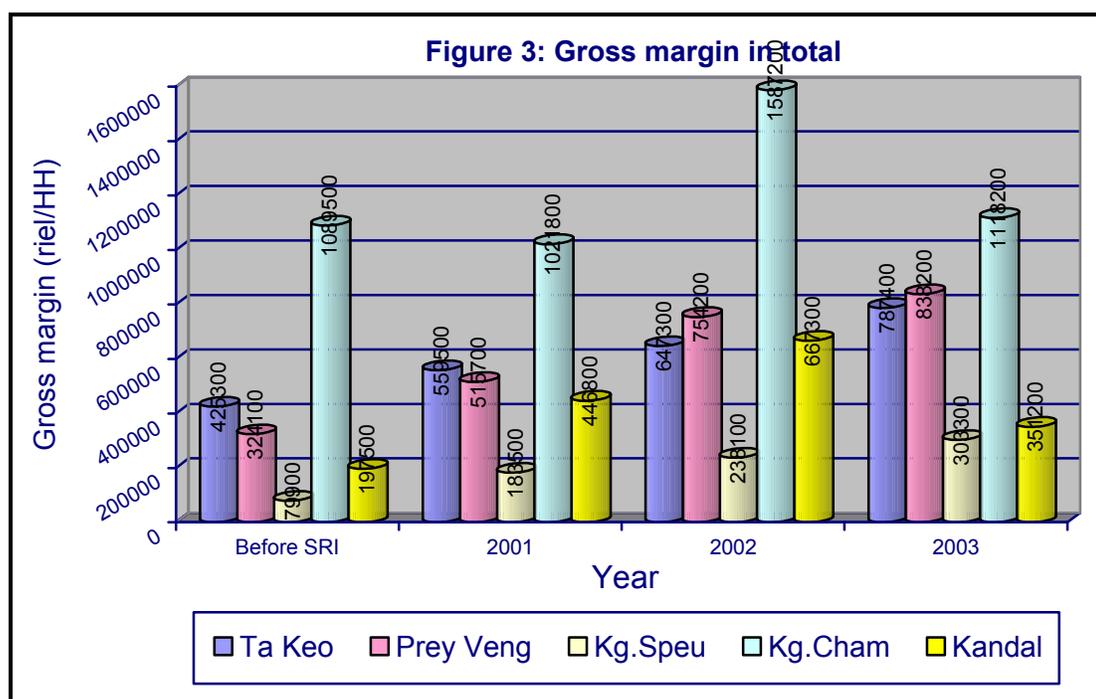


Table 9: Average gross return classification associated with SRI adoption (in riel)

Value	HHs	Before SRI	HHs	2001	HHs	2002	HHs	2003
-500,000 - 0	16	-2,380,800	1	-90,000	0	0	0	0
0 - 500,000	56	13,921,700	64	15,807,480	48	11,851,880	34	10,732,510
500,000 - 1,000,000	31	21,209,900	35	25,136,000	44	31,186,800	42	30,896,950
1,000,000 - 1,500,000	15	17,309,700	18	22,099,700	16	19,683,800	30	35,714,350
1,500,000 - 2,000,000	1	1,509,000	1	1,582,000	9	14,108,100	10	17,015,800
2,000,000 - 2,500,000	1	0	0	0	2	4,131,000	3	6,800,000
2,500,000 - 3,000,000	0	2,585,500	1	2,620,000	0	0	0	0
3,000,000 - 3,500,000	0	0	0	0	1	11,851,880	1	3,220,600
Ave. gross return	120	451,292	120	559,627	120	701,347	120	869,800

When we calculated the average for all 120 households, there were clear benefits. If we calculated by individual households, 6 households had made no profit before SRI, and 1 household that lost profit in the first year of SRI (2001). Reasons for farmers losing money in rice production were low yield and high expenditure on hired labor, buying chemical fertilizer, pumping water, and using more seed.

▪ **Gross returns in Ta Keo province**

Gross return has been increased since farmers here started to apply SRI. Comparing conventional practice with SRI in terms of gross return, we see that this has grown from 425,300 riels per household to 787,400 riels per household in 2003. The growth of gross return from conventional practice to SRI is 86 percent, or 362,100 riels per household.

Table 10: Gross returns in Ta Keo province

	Before SRI	2001	2002	2003
Gross income (riel/HH)	734,100	804,500	839,700	941,100
Total expenditure (riel/HH)	308,800	245,000	192,400	153,700
Total expenditure (riel/ha)	283,300	220,700	170,300	140,000
Gross return (riel/HH)	425,300	559,500	647,300	787,400

▪ **Gross returns in Prey Veng province**

Since the first year of adaptation of SRI, the gross return has increased steadily. In 2003, gross return was 838,200 riels per household with SRI practice, compared to 324,100 riels per household with conventional practice. The growth from conventional practice to SRI practice was 158 percent, or 514,100 riels per household.

Table 11: Gross returns in Prey Veng province

	Before SRI	2001	2002	2003
Gross income (riel/HH)	515,100	657,700	874,900	929,900
Total expenditures (riel/HH)	190,900	141,900	120,000	91,700
Total expenditures (riel/ha)	138,300	106,700	92,100	67,400
Gross return (riel/HH)	324,100	515,700	754,000	838,200

▪ **Gross returns in Kompong Speu province**

In 2003, the growth of gross return of SRI practice was 223,400 riels per household, or 279 percent higher than with conventional practice. The increase was caused by reducing purchase of chemical fertilizer and hired labor. In 2002 and 2003, the expenditure is higher than 2001 because of drought, and farmers needed to pump water.

Table 12: Gross returns for Kompong Speu province

	Before SRI	2001	2002	2003
Gross income (riel/HH)	168,000	195,200	256,000	322,600
Total expenditures (riel/HH)	88,100	11,700	17,900	19,300
Total expenditures (riel/ha)	88,500	11,800	18,100	19,500
Gross return (riel/HH)	79,900	183,500	238,100	303,300

- **Gross returns in Kompong Cham province**

Farmers in Kompong Cham province have larger sizes of rice field. Some of them have 4 ha of rice field per family. In 2002, average gross return was very high because farmers expended less for rice production and they had good soil fertility and enough rain water. In 2003, gross return decreased sharply because of water shortage, too late transplanting, and water pumping costs. Even so, gross return with SRI practice is still higher than with conventional practice by around 2 percent.

Table 13: Gross returns for Kompong Cham province

	Before SRI	2001	2002	2003
Gross income (riel/HH)	1,502,000	1,345,400	1,597,800	1,455,000
Total expenditures (riel/HH)	412,500	323,600	187,400	103,700
Total expenditures (riel/ha)	234,300	183,900	106,500	58,900
Gross return (riel/HH)	1,089,500	1,021,800	1,587,200	1,118,200

- **Gross returns in Kandal province**

In 2003, gross returns decreased because of drought and rat damage. The gross return still increased by 153,700 riels (78%). In 2002, comparison between SRI and conventional rice was increased by 469,800 riels (237 percent). Gross return was increased because of less seed, no use of pesticides and chemical fertilizer, and less labor cost.

Table 14: Gross returns in Kandal province

	Before SRI	2001	2002	2003
Gross income (riel/HH)	400,000	520,000	680,000	498,000
Total expend (riel/HH)	202,500	73,200	12,700	11,200
Total expend (riel/ha)	101,200	36,600	6,300	5,600
Gross return (riel/HH)	197,500	446,800	667,300	351,200

1.6 Quantity of rice sold

Besides consuming rice in the household, some households can sell or exchange rice to get money to support the family such as for daily food, school fees, medical expenses, festivals, etc. Other household do not sell rice but used some for rice wine production and animal feed. The number of farmers who sell to outsiders and the quantity of rice sold are increasing. A comparison of conventional practice (before SRI) and 2003 show nearly a double increase. There were initially 36 households which sold rice (30%), with a quantity of 301 Kg of rice per household; in 2003, 60 households sold rice (50%) and an average quantity of 785 Kg of rice per household.

Table 15: Quantity of rice that farmer sold

	Before SRI	2001	2002	2003
Number of HH	36	37	44	60
Quantity (Kg/HH)	301	316	437	785
Income (riel/HH)	120,100	128,600	201,100	314,000

2. Labor Requirements

The survey found 55 percent of cooperating farmers saying that for them, SRI is more profitable because it requires less labor and less seed, while giving higher yield. They considered SRI a simple technique and easy to practice, even for women and children. On the other hand, 18 percent of cooperating farmers said that the find SRI more difficult than conventional rice, because of the requirements for water management and for weeding and soil loosening. Finally, 27 percent said that SRI and conventional practices are the same for them, considering harvesting, natural fertilizer collecting, and weeding and soil loosening the most demanding aspects of SRI.

Table 16: Labor usage

Techniques	-5	-4	-3	-2	-1	0	1	2	3	4	5
Seedbed preparation	16	30	67	32	20	47	6	0	4	0	2
Sowing	28	56	60	40	24	22	2	6	3	0	0
Uprooting seedlings	36	51	72	39	16	6	15	4	1	1	0
Transporting them	63	98	40	22	7	7	0	2	1	0	0
Transplanting them	18	46	54	59	24	18	10	8	3	0	1
Water management	0	5	8	14	19	48	18	41	67	17	4
Weeding	1	1	5	6	4	39	30	46	58	41	7
Compost making	0	1	5	6	3	41	32	66	38	25	21
Harvesting	9	6	12	13	24	137	16	15	6	1	1
Total (score)	171	294	323	231	141	365	129	188	181	85	36
Percent of Total	11	14	16	12	2	18	3	2	2	2	18

Note: -5 = most decreased, 0 = the same, 5 = most increased

3. SRI adoption

SRI techniques were very quickly adopted by cooperating farmers, especially immediate transplanting, using young seedlings, transplanting them one by one, natural fertilizer use, weeding and soil loosening, large space for transplanting, seed selection, and land leveling. On other hand, some farmers did not adapt some of the SRI techniques, such as transplanting in rows, transplanting just 2 to 3 seedlings per hill, and young seedlings.

4. Diffusion

There were many farmers from different places who come to learn from SRI farmers. Among the 120 interviewees, they promoted SRI to other 969 households in their own villages and to 967 households in neighboring villages. This means that one cooperating farmer is promoting SRI to 16 households inside and outside their home villages.

5. Constraints

According to the results of the study, farmers faced certain problems with SRI practice, such as flooding, drought, insects and diseases, weeds, lack of natural fertilizer, and rice fields being far from home. Farmers complained that it was difficult to apply SRI because the lack of water management facilities. Many fields do not have their own access to water supply or their own control to be able to cut it off.

6. Farmer's impressions

SRI adaptation has played an important role in reducing the cost of external inputs such as seed, labor, chemical fertilizer, pesticide while getting high yield.

There are 80 percent of households which planned to expend their area of rice field under SRI. 7 percent of households do not expand their area of rice field under SRI because they are very old or employed in another job. Some households think that their rice field is too far from home so they can not give the supervision required for SRI. 70 percent of households said they will adopt more of the SRI techniques. 75 percent said they will begin intensifying and diversifying their farming systems by growing multi-purpose trees or fruit trees, using green manure, raising animals, and trying to collect more materials to make compost. 20 percent of households planned to dig a small canal to drain water.

IV. Conclusions and Recommendations

Generally, SRI adaptation can make more benefits for farmer to improve their livelihood system. SRI plots have been slowly enlarged from year to year as it has less cost but higher yield. Despite facing certain problems with natural disasters like drought and flood, gross margin has still increased. Moreover, SRI can reduce the use of labor, chemical fertilizer and pesticide, and the quality of rice produced is safer. SRI is also a step toward developing the farmer community, its orientation and attitudes. So, SRI is a suitable technique for farmers to improve their livelihood system and also conserve natural resources.

Most of various expenditures such as for chemical fertilizer, hiring labor and pumping water can be reduced, so we should encourage farmers to use natural fertilizer and to dig a small canal around the field for better water management. Moreover, farmers can utilize some of their rice field area for multi-purpose farming.

For promotion of other new techniques in the future, when introducing such techniques, regular and accurate monitoring should be in place from the very beginning of use, including baseline data. Availability of such information would help the process of evaluation immensely.

To maximize the advantages and minimize the disadvantages of SRI, the net impacts of each SRI technique should be assessed. This would require comparing the SRI and conventional approach with only a few techniques at a time, as one farmer's land is too small to have sufficient area for many combinations of techniques to be measured at one time.

On-going monitoring of SRI inputs and outputs needs to be maintained in order to observe the sustainability of SRI techniques

Appendix: List of households analyzed in evaluation

No	Na.farmer	Province	Size area of rice field (ha)				SRI size (A)			Yield (Kg)				SRI yield (Kg)			Total expenditure(riel per HH)				Gross margin (riel per HH)			
			Before	2001	2002	2003	2001	2002	2003	Before	2001	2002	2003	2001	2002	2003	Before	2001	2002	2003	Before	2001	2002	2003
1	Ngoun Hean	T.K	1	1	1	1	1	50	50	1800	1800	2100	2010	60	1050	1547	299400	279400	262400	53100	420600	440600	577600	750900
2	Mey Chring	T.K	1.5	1.5	1.5	1.5	2	20	70	2100	2400	3000	4100	130	750	3042	264200	204400	206400	53500	575800	755600	993600	1586500
3	Sao Rith	T.K	1.5	1.5	1.5	1.5	1	60	50	4200	4200	4200	3000	60	1800	1200	404200	326200	140900	82100	1275800	1353800	1539100	1117900
4	Long Yos	T.K	2	2	2	2	1	90	90	3600	3900	3000	2904	70	2000	2050	429000	235400	120400	115200	1011000	1324600	1079600	1046400
5	Din Ratana	T.K	1.1	1.1	0.9	0.9	1	23	25	1200	1200	1200	2160	60	720	850	466000	466000	223000	271000	14000	14000	257000	593000
6	Chheng Loan	T.K	1.3	1.3	1.3	1.3	5	30	50	2990	2870	2970	4111	150	1200	1548	471000	446000	384700	729000	725000	702000	803300	915400
7	Prak Nan	T.K	1.7	1.7	1.7	1.7	20	30	39	3900	3000	3000	1881	270	950	1206	724000	164400	110000	10000	836000	1035600	1090000	742400
8	Men Morn	T.K	1.5	1.5	1.5	1.5	2	45	50	3000	2120	3050	1911	120	1050	1040	179600	9000	7500	9000	1020400	839000	1212500	755400
9	Som Le	T.K	0.35	0.35	0.35	0.35	7	35	15	400	700	800	1080	200	1200	720	280800	158700	171600	79400	19200	141300	148400	352600
10	Orm Oun	T.K	1.5	1.5	1.5	1.5	5	30	50	2400	3380	4160	3200	150	900	1500	269800	250000	195900	228900	690200	1102000	1468100	1051100
11	Ngeth Von	T.K	0.5	0.5	0.5	0.5	1	4	4	1150	1150	1160	672	12	120	240	106000	106000	84000	20000	354000	354000	380000	248800
12	Sok Rin	T.K	0.7	0.7	0.7	0.7	2	4	27	650	442	728	2500	52	130	1020	179700	115700	100700	76200	80300	61100	190500	923800
13	Oak Khgne	T.K	4	4	4	4	2	4	15	4080	4320	5040	5760	48	180	720	1312600	1377600	1329600	1132600	319400	350400	686400	1171400
14	Nak Him	T.K	0.85	0.85	0.8	0.8	6	35	40	840	2550	2400	2600	180	1200	1500	426500	197500	187500	115000	-90500	822500	772500	925000
15	Chea Kuy	T.K	1	1	1	1	1	14	14	2000	2800	2600	2400	31	450	640	268000	260000	219000	67000	532000	860000	821000	893000
16	Kuchsom On	T.K	1	1	1	1	1	15	15	1920	1920	2560	2800	96	480	520	488500	482500	404700	336500	279500	285500	619300	783500
17	Ong Ying	T.K	1.12	1.12	1.12	1.12	10	100	100	1300	1621	1690	3360	400	3000	3360	342000	325000	222500	222500	178000	323400	453500	1121500
18	Chea Than	T.K	2.5	2.5	2.5	2.5	15	36	100	2600	3120	3120	3840	450	1800	3120	400000	375000	320000	140000	640000	873000	928000	1396000
19	Kong Meun	T.K	0.5	0.5	0.5	0.5	4	18	35	480	600	900	1176	160	620	1032	105000	105000	70000	45000	87000	135000	290000	425400
20	Om Sim	T.K	2	2	2	2	7	70	70	2100	3000	3600	3300	560	1750	2790	452000	290000	145000	80000	388000	910000	1295000	1240000
21	Som Heun	T.K	0.65	0.65	0.65	0.65	4	4	50	1200	1440	1200	2500	120	120	1458	313000	258000	190500	205500	167000	318000	289500	794500
22	Chhay Lim	T.K	1.17	0.78	0.78	0.78	3	3	12	2400	1680	1680	1700	120	130	500	338000	244000	198000	196000	622000	428000	474000	484000
23	Tep Khen	T.K	0.91	0.91	0.91	0.91	13	13	10	2352	720	600	800	600	600	420	289500	49100	49100	49100	651300	238900	190900	270900
24	Tep Muth	T.K	0.9	0.9	0.9	0.9	12	12	47	792	864	960	824	204	240	1002	200700	198300	230300	220300	116100	147300	153700	109300
25	Chom Heun	T.K	0.7	0.65	0.65	0.65	4	13	30	1200	1200	1200	1560	120	390	950	186000	152000	139500	107000	294000	328000	340500	517000
26	Chom Chhoun	T.K	0.75	0.75	0.75	0.75	7	55	60	960	1200	1800	1800	560	1300	1700	432500	412500	124500	49200	-32500	67500	595500	670800
27	Tim Roeun	T.K	0.5	0.5	0.5	0.5	3	22	50	480	816	1200	1400	96	552	1400	194500	194500	149000	126400	-2500	131900	331000	433600
28	Choub Chea	T.K	0.8	0.8	0.62	0.62	3	62	20	1320	1800	1320	2100	135	1320	810	165000	126000	116000	115000	363000	594000	412000	725000
29	Som Von	T.K	0.8	0.8	0.8	0.6	4	2	60	720	840	600	840	120	80	840	614500	192000	119500	60000	-226500	144000	120500	276000
30	Prak Ngim	T.K	1.5	1.5	1.5	1.5	11	40	40	4000	4500	4200	4800	390	1800	1200	218000	218000	158800	173000	1382000	1582000	1521200	1747000

31	Som Oun	T.K	1.5	1.5	1.5	1.5	18	15	70	3000	3500	2700	3600	300	600	2160	324000	242500	212500	133500	876000	1157500	867500	1306500
32	Pa Vith	T.K	1.1	1.1	1.1	1.1	2	30	30	3300	3500	3200	2560	150	1000	1200	127000	96000	71000	70500	1193000	1304000	1209000	953500
33	Soth Phalla	T.K	0.85	0.85	0.85	0.85	15	15	25	900	1050	1500	1700	300	550	850	49800	82300	64600	42300	310200	337700	535400	637700
34	Nob Hoeun	T.K	1.7	1.7	1.7	1.7	4	10	40	3000	3300	4200	4500	150	405	1800	192200	167400	149600	136200	1007800	1152600	1530400	1663800
35	Oum Phath	T.K	1	1	1	1	5	5	50	2100	2250	1950	1950	225	250	1040	174000	144000	174000	161000	666000	756000	606000	619000
36	Prak Chres	T.K	1	1	1	1	13	50	70	3640	3650	3700	4080	390	1292	2042	377500	359500	217300	134750	1078500	1100500	1262700	1497250
37	Keo Bun	T.K	1.8	1.8	1.8	1.8	7.5	50	60	3840	3860	1930	4560	144	1200	1300	512000	435000	193000	195000	1024000	1109000	579000	1629000
38	Sor Chanith	T.K	0.6	0.6	0.6	0.6	3	35	15	720	840	960	960	120	500	300	230000	175000	27500	70000	58000	161000	356500	314000
39	Prak Thy	T.K	1	1	1	1	2	20	35	2400	2400	1680	1680	200	600	840	504000	514000	504000	324000	456000	446000	168000	348000
40	Tim Chev	T.K	0.7	0.7	0.7	0.7	4.5	1	10	2640	3000	1920	2160	180	36	600	215000	220000	215000	285500	841000	980000	553000	578500
41	Em Tim	T.K	2	2	2	2	25	50	50	1920	2400	2664	3000	500	2000	2100	492000	358000	120000	73000	276000	602000	945600	1127000
42	Pa Vuth	T.K	0.44	0.68	0.68	0.68	5	12	22	1000	1500	1600	720	150	350	500	142000	138000	86000	39000	258000	462000	554000	249000
43	Ol Gnii	T.K	1.27	1.27	1.27	1.27	13	17	25	2048	2260	2568	3000	264	408	720	227000	347000	262000	137300	592200	557000	765200	1062700
44	Ngeth Phal	T.K	0.7	0.8	0.8	0.8	25	20	40	1080	1320	1512	2100	312	690	1020	211000	219500	254500	333100	221000	308500	350300	506900
45	Hort Neang	T.K	1	1	1	1	1	7	49	1392	1440	1680	1680	12	120	720	166000	166000	144500	73000	390800	410000	527500	599000
46	Chhorn Phalla	T.K	0.3	0.3	0.3	0.3	12	24	24	480	600	720	720	264	552	650	197500	69000	62000	58250	-5500	171000	226000	229750
47	Keo Som Ol	T.K	1	1	1	0.73	1.5	100	100	2100	2550	3000	2700	48	3000	2700	183500	112000	40500	77700	656500	908000	1159500	1002300
48	Tea Savy	T.K	0.8	0.8	0.8	0.8	10	7	40	960	1200	960	780	240	201	520	800000	227500	265000	132800	-216000	252500	119000	179200
49	Ang Loan	T.K	0.7	0.7	0.7	0.7	1	3	3	1200	960	1680	1440	12	241	241	588000	694000	664000	506000	-28000	6000	56000	70000
50	Mouk Sokrim	T.K	1	1	1	1	2	10	13	1680	1944	1920	1920	48	240	240	200000	203000	172200	80000	472000	574600	595800	688000
51	Som Houn	T.K	0.48	0.48	0.48	0.48	3	24	48	1440	960	960	1200	132	960	1200	211000	196000	206000	29320	413000	532000	678000	450680
52	Gnean San	T.K	0.5	0.5	0.5	0.5	20	20	30	960	960	912	1000	300	300	650	218000	62600	90000	149600	166000	321400	274800	250400
53	Pok Horn	T.K	1.5	1.5	1.5	1.5	10	15	32	2210	3250	3270	2400	255	312	672	218000	170000	144500	217500	666000	1130000	1163500	742500
54	Um Thy	T.K	2	2	2	2	4	20	12	1600	2400	3120	3600	144	720	360	532500	482500	407500	207500	107500	477500	840500	1232500
55	Keo Neang	T.K	0.7	0.7	0.7	0.7	2	3	9	500	600	1200	1300	48	96	338	129000	24000	24000	24000	71000	216000	456000	496000
56	Nut Lorn	T.K	1	1	1	1	2	40	100	1680	1720	3600	3600	480	1080	3600	374200	324400	211600	129200	297800	363600	1228400	1310800
57	Hun Meun	T.K	1	1	1	1	7	7	100	960	240	240	1500	168	168	1500	425500	80500	37500	6000	-41500	15500	58500	594000
58	Gnem Sokly	T.K	0.9	0.9	0.9	0.9	2	75	90	1440	1680	1920	2400	48	1920	2400	153000	265400	241200	251200	423000	406600	526800	708800
59	Oak Von	T.K	1	1	1	1	60	70	100	1760	2400	2100	2400	1440	1560	2400	278000	254400	277000	252800	426000	705600	563000	707200
60	Touch Yim	T.K	1.5	1.5	1.5	1.5	30	30	25	1960	2520	2660	2640	840	828	625	209000	196800	196800	216800	575000	811200	867200	839200
61	Sem Yeun	T.K	1.25	1.25	1.25	1.25	2.5	20	30	3600	3700	4000	3080	72	480	1000	338800	184400	185000	160000	1101200	1295600	1415000	1072000
62	Khun Sokha	T.K	0.9	0.9	0.9	0.9	1	20	90	2400	2400	2400	3300	48	440	3300	402900	273500	314000	90000	557100	686500	646000	1230000

63	Ven Kun	T.K	2	2	2	2	3	2	4	2400	3000	2500	1200	72	48	200	316000	235000	170000	105000	644000	965000	830000	375000
64	Khseth Gnah	T.K	1	1	1	1	30	70	100	2400	2400	2440	2800	720	1680	2800	164800	188800	105600	109600	795200	771200	870400	1010400
65	Som Horn	T.K	0.48	0.48	0.48	0.48	3	24	48	1440	960	960	1308	132	960	1308	207200	166820	80420	29320	368800	217180	303580	493880
66	Theung Soun	T.K	0.5	0.5	0.5	0.5	20	20	20	960	960	912	1820	300	300	1000	218000	62600	90000	149600	166000	321400	274800	578400
67	Mey Treal	T.K	1	1	1	1	1	10	29	1560	1820	2210	3200	24	300	800	211000	196000	206000	149000	413000	532000	678000	1131000
68	Sin Chrek	P.V	0.5	1.5	2	2	18	0.5	18	700	2555	2870	2000	655	135	400	195000	104000	105000	105000	85000	918000	1043000	695000
69	Boy Ren	P.V	2	2	2	2	2	40	40	1320	1980	2860	2550	60	1200	850	367000	283000	173000	115000	161000	509000	971000	905000
70	Prak Leak	P.V	2.4	2.65	2.65	2.9	25	121	32	750	3600	2100	2500	750	1425	960	844000	579500	488500	342000	-244000	860500	351500	658000
71	Thov Kunthea	P.V	3	1.5	2	3	4	15	60	3640	1365	5200	6825	102	456	1690	349000	601000	564000	524000	1107000	745000	1516000	2206000
72	Va Mean	P.V	0.25	0.25	1	1	4	17	9	450	500	1575	1950	375	675	345	121000	37500	166000	253750	59000	162500	464000	526250
73	Phan Sopheak	P.V	1.5	1.8	1.5	0.95	5	20	20	12	660	1120	1052	180	630	800	586000	548500	477000	219000	-140000	0	68000	201800
74	Boy Saban	P.V	2	0.6	0.5	2	22	22	22	600	600	960	2868	480	300	720	126000	88500	75000	115000	114000	151500	309000	1032200
75	Chhen San	P.V	5	3	1.8	4	10	50	167	2640	1920	1000	8864	144	1120	4719	580000	441000	304000	325000	476000	327000	96000	3220600
76	Sao Horn	P.V	2	2	2	1.1	23	23	28	1200	2500	4800	5760	900	960	1200	295000	168000	314500	194000	185000	832000	1605500	2110000
77	Put Cheun	P.V	2	2	1.5	3	60	60	60	3000	2500	3000	3200	1540	770	1200	327500	268500	257000	307000	872500	731500	943000	973000
78	Va Kol	P.V	3.5	3.5	2.5	2.2	3	35	25	600	1680	2880	2500	40	120	150	200000	292000	1183000	319400	88000	140000	150000	680600
79	Long Theun	P.V	2	2	1	2	10	100	100	720	1080	1920	4500	84	1920	3000	116000	136000	152000	188000	-87200	344000	808000	1612000
80	Long Ran	P.V	1	0.5	2	1.5	20	120	120	1100	1200	2400	3250	360	2000	3250	595500	564500	604000	197000	-230000	-90000	99200	1103000
81	Sok Khoy	P.V	4	3	1.5	2	15	15	15	500	564	1248	1200	564	1248	480	294000	111200	326100	104400	-270000	32800	537900	375600
82	Ky Samuth	P.V	2	0.77	1	1	1	27	100	500	936	2160	2880	60	1000	2880	411000	464500	317000	165000	1509000	1455500	1411000	987000
83	Khvan Hun	P.V	2.5	2.5	2.5	2.5	50	100	100	4800	4800	4320	3800	96	2160	2880	553500	288500	95500	199000	1366500	1151500	1536500	1321000
84	Meas Phon	P.V	2	2	2	2	4	150	150	2400	960	4500	4850	720	4000	4500	117000	64000	15000	15000	339000	1376000	1425000	1925000
85	Tea Noun	P.V	1.2	1.2	1.2	1.2	12	32	32	1140	3600	3600	3600	396	960	1060	287000	271500	229000	15000	865000	1264500	1771000	1425000
86	Lim Ry	P.V	2.4	2.4	2.4	2.4	70	70	16	2880	3840	5000	5000	1800	2500	560	307500	167000	225000	64000	692500	101800	575000	1936000
87	Chhay Mek	P.V	1	1	1	1	15	15	15	2500	672	2000	2200	72	432	520	361000	163000	150500	120000	1079000	753800	766300	760000
88	Him Yan	P.V	0.9	0.9	0.9	0.9	30	10	10	960	600	720	800	360	280	350	253400	344500	18000	15000	706600	375500	808000	305000
89	Chou Chon	P.V	2	2	2	2	50	50	50	960	240	240	3000	240	240	1500	252000	146000	111500	52000	548000	254000	368500	1148000
90	Bun Pao	P.V	2.8	2.8	2.8	2.8	43	43	40	3600	2292	2292	2200	792	1450	1500	57500	22600	22600	102500	326500	265400	438200	777500
91	Toun Loan	P.V	1	1	1	1	2	20	25	2000	1000	1000	1500	40	500	850	531800	11800	30400	100000	-291800	103400	209600	500000
92	San Kim	P.V	3.5	3.5	3.5	3.5	5	20	70	2000	1000	1200	2000	120	550	1300	232000	800	800	172000	920000	181600	66400	628000
93	Chea Tech	P.V	0.7	0.7	0.7	0.7	15	25	30	840	447	3000	3000	340	600	900	241500	54500	11000	14500	94500	124300	1189000	1185500
94	Kham Saveun	P.V	0.9	0.9	0.9	0.9	10	10	10	1680	960	1440	2340	288	500	600	110000	110000	81000	81000	562000	274000	495000	855000

95	Phim Thoy	P.V	1.4	1.4	1.4	1.4	10	40	60	3600	3120	2640	3600	480	1550	1900	438000	350000	338000	286000	1002000	898000	718000	1154000
96	Chhim Neath	P.V	1.1	1.1	1.1	1.1	3	3	50	1200	1440	1200	3000	58	120	1450	180000	110000	72500	37000	300000	466000	407500	1163000
97	Chhim Yeng	P.V	2	1.2	1.2	1.2	4	7	50	1500	1500	2000	3976	203	280	1500	222000	170000	110000	147000	378000	430000	690000	1443400
98	Tim Sin	P.V	1	1	1	1	25	25	25	1420	1700	2040	1920	84	660	840	226000	205000	164000	210000	342000	475000	652000	558000
99	Pouch Run	P.V	0.5	0.5	0.5	0.5	14	32	32	1400	1440	1500	1200	330	1000	1000	83000	29000	29000	17000	477000	547000	571000	463000
100	Kith Savy	P.V	0.18	0.18	0.18	0.18	18	18	18	400	500	550	500	500	550	500	100000	76500	64500	64500	60000	123500	155500	135500
101	Chhim Sameun	P.V	0.8	0.8	0.8	0.8	17	17	17	1680	840	2500	2500	250	400	600	70000	64000	84000	113000	730000	536000	516000	887000
102	Pouch Yun	P.V	1.5	1.5	1.68	1.68	13	13	13	1800	2000	2000	4000	240	480	500	210500	110000	110000	265000	461500	226000	890000	1335000
103	En Chheum	P.V	1.7	1.7	1.7	1.7	18	18	15	3500	4000	4000	5310	336	850	650	150000	220000	220000	567500	570000	580000	580000	1556500
104	Thoung Kiet	P.V	0.4	0.4	0.4	0.4	2	40	40	480	60	720	720	60	720	720	90000	18000	10900	24000	210000	30000	5100	264000
105	Sou Saing	P.V	1	1	1	1.2	3	15	50	960	300	360	960	240	450	720	707000	567500	567500	24000	693000	1032500	1032500	360000
106	Hen Ry	P.V	2.5	2.5	2.5	2.5	20	20	20	2400	1800	2040	2300	324	450	550	47500	30500	27500	88000	144500	169500	260500	832000
107	Lay Samo	P.V	2.55	2.55	2.55	2.55	15	50	50	4800	3600	4080	2900	540	1500	1200	185000	169000	162500	93500	199000	111000	117500	1066500
108	Kimsok Khim	KSP	0.43	0.43	0.43	0.43	9	9	9	960	720	1152	1200	192	312	350	1123000	928000	717000	22600	920000	181600	66400	457400
109	Chey Sarem	KSP	0.45	0.45	0.45	0.45	8	8	8	600	288	600	720	240	240	280	1654000	1698000	632000	4000	326500	265400	438200	284000
110	Eam Men	KSP	0.115	0.115	0.115	0.115	11.5	11.5	11.5	288	456	450	500	456	450	500	413000	154000	102800	31500	-297800	103400	209600	168500
111	Van Korn	KCH	2	2	2	2	20	50	50	2400	5700	6800	2880	800	2050	1500	620100	669300	503300	796000	-20000	140000	260000	356000
112	Ry Thy	KCH	3.5	3.5	3.5	3.5	1	32	150	4800	5400	6900	6000	60	1250	4000	83000	25200	44000	821000	989000	90000	84000	1579000
113	Choun Chun	KCH	1	1	1	1	20	100	100	1200	1800	1900	2000	792	1900	2000	970000	88000	124000	102800	1430000	872000	1546400	697200
114	Mom Buntheun	KCH	0.5	0.5	0.5	0.5	50	50	50	960	720	1200	1200	720	1200	1200	774500	180000	160000	377300	2585500	2620000	3200000	102700
115	Mok Hy	KCH	1.6	1.6	1.6	1.6	5	7	100	2680	600	600	1920	288	320	1680	208500	37500	58000	33000	1231500	1402500	1542000	735000
116	Oum Koun	KCH	3.4	3.4	3.4	3.4	1	70	70	6000	2400	4176	3800	480	1680	2200	183500	24000	12000	309000	216500	496000	668000	1211000
117	Put Sarun	KCH	4	4	4	4	20	70	120	8400	7000	8400	6700	840	2400	4600	228500	122500	13500	196000	171500	397500	666500	2484000
118	Keo Hy	KCH	1.6	1.6	1.6	1.6	1	30	160	3600	3600	4000	4600	36	1200	4600	232000	800	800	59000	920000	181600	66400	1781000
119	Touch Hen	K..D	1	1	1	1	2	50	100	1000	1300	1700	1050	324	240	1050	178500	122500	13500	9000	216500	496000	668000	411000
120	Yann Yan	K.D	1	1	1	1	5	25	100	1000	1300	1700	1440	108	500	1440	233500	24000	12000	13500	171500	397500	666500	562500

Note:- T.K: Ta Keo province, - P.V: Prey Veng province, - KSP: Kompong Speu province, - KCH: Kompong Cham province, - K.D: Kandal province