



Evaluation Study:

Adoption and non-adoption of  
System of Rice Intensification (SRI)  
in Cambodia

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## EXECUTIVE SUMMARY

1. The System of Rice Intensification (SRI) is a set of innovative rice cultivation methods developed in Madagascar in the 1980s. In 2000, CEDAC first introduced SRI ideas to farmers in Cambodia. Twenty-eight farmers from 18 villages volunteered to test SRI. With the first success of this farmer-based experimentation, SRI began to spread throughout Cambodia. Currently, there are over 100,000 rice farmers from approximately 3,000 villages in Cambodia adopting SRI practices. Different evaluation studies have consistently shown that SRI contributes to increased rice production while reducing expenditure on inputs such as fertilizers, seeds and pesticides.
2. In order to have an in-depth understanding of the process of SRI adoption and the profile of farmers who adopt and who do not adopt SRI, CEDAC conducted systematic field research from November 2007 to March 2008.
3. The overall research team was composed of 9 researchers who were divided into 3 smaller research teams. Each team is composed of one team leader and two team members responsible for conducting a completed study in one village per week, including individual interviews with SRI-adopting and SRI non-adopting households; two group discussions, one with SRI-adopting households and one with SRI non-adopting households; village profile collection; and writing summary notes on each village. A CEDAC research coordinator was assigned to be responsible for the overall accomplishment of this research project.
4. A total of 21 villages were selected for this evaluation, of which 6 villages were in Kampong Speu province, 6 villages in Kampot province, and 9 villages in Takeo province.
5. The team found remarkable progress with SRI adoption, as on average, up to 46% of the households in each village studied are using SRI. However, the increase in the area of SRI plots is still slow, farmers encounter different constraints to apply SRI. The level of technical application seems to be going down after a few years of adoption, especially as farmers drop the more difficult practices, such as in-row transplanting, raised bed seed sowing, field leveling, etc.
6. To increase yield has been the main purpose of applying SRI, but there are some other less evident purposes for some farmers try to apply SRI very well and on very large area such as to provide demonstration field for other farmers and as well as for the purposes. Most of these farmers are involved in positions as key farmers or on committees of the farmer association, and so on. Some farmers just adopt some of technical principles to improve their rice production, but do not try to apply them well or on a large area.
7. Updates of the progress of SRI adoption are not so clear as there are different definitions of SRI set by different programs and farmers. It is the reason why some farmers adopt some SRI principles but just not in-row transplanting may consider themselves as SRI non-adopting farmers.
8. We have learned that there is much difference between the perceptions of SRI-adopting households and SRI non-adopting households on the perceived potentials and

constraints with SRI. SRI-adopting farmers understand well about the potentials of SRI and they identify very few constraints, whereas SRI non-adopting farmers report that they believe in the potentials of SRI but they perceive many serious constraints which is why they still have not adopting SRI so far.

9. From the results of constructing profiles of SRI-adopting and non-adopting farmers, we could learn that farmers' knowledge is a main influencing factor to decide on SRI adoption. On other hand, the possession of some household physical assets is also a determining factor for SRI adoption, mainly the location, situation and topography of the rice field which is suitable to be applied for SRI.

10. We could see that SRI brings much benefit to farmers, especially making changes in their social and economic conditions. SRI-adopting farmers can save seed, time and labour, and lower their cost of rice production, as well as receive higher yield. In contrast the social and economic conditions of non-SRI users seem not much changed. To some extent, they seem to think that there was some unfairness in the support or intervention in their village favoring SRI users. They expressed a feeling that despite project activity, they have not been adequately informed or supported so far.

11. So far, SRI adopting farmers have better performed than non SRI adopting farmers both in term of absolute and in term of percentage. It is also indicated that SRI adopting farmers is better living standard than non SRI adopting farmers. However, it is a present situation. We do not have data to explain how those SRI become better over the last evolution. We cannot answer whether before project started SRI farmers were the similar living standard as non adopting farmers or whether SRI adopting farmers have just become better since the collaborating with the project or whether project mostly attracts those are better living in the communities? It is noticed that most of SRI adopting farmers are the members of farmer association which supported by the CEDAC program. However, it is observed the percentage of household using chemical fertilizer and amount of chemical fertilizer uses are not much different amount SRI adopting and non SRI adopting farmers.

#### Summary on the Performance of SRI Adopting Farmers and non-SRI Adopting Farmers

No	Description of Variables	SRI Adopting Farmers	Non-SRI Adopting Farmers
1	Member of village-based farmer association	9.8%	2.7%
2	Own cattle (On average: Head/HH)	3.3	2.6
3	Owned land (On average: Ha/HH)	1.14	0.92
	Kampong Speu	1.18	0.99
	Kampot	1.17	0.84
	Takeo	1.10	0.94
4	Number of household selling paddy in percentage in 2007/08	38.2%	23.6%
	Kampong Speu	37.3%	20.8%
	Kampot	44.8%	23.0%
	Takeo	35.1%	25.8%
5	Amount of paddy sold in 2007/08 (in Kg/HH/Year)	796	587
	Kampong Speu	739	656
	Kampot	994	625
	Takeo	693	530
6	Number households having incomes from selling	35.1%	18.5%

	vegetable in percentage in 2007/08		
	Kampong Speu	42.7%	15.6%
	Kampot	28.7%	12.6%
	Takeo	33.1%	24.2%
7	Amount of incomes from selling vegetable in 2007/08 (Rield/HH/Year)	312,200	251,500
	Kampong Speu	465,400	335,400
	Kampot	191,200	107,300
	Takeo	228,800	270,300
8	Number households having incomes from selling chicken in percentage in 2007/08	62.1%	50.0%
	Kampong Speu	45.5%	41.6%
	Kampot	77.0%	56.3%
	Takeo	65.5%	50.8%
9	Cash incomes from selling chicken in 2007/08 (Rield/HH/Year)	280,400	142,000
	Kampong Speu	310,400	130,000
	Kampot	251,000	146,900
	Takeo	285,100	144,200
10	Number of household having non-farm incomes in percentage in 2007/08	77.0%	78.1%
	Kampong Speu	79.1%	79.2%
	Kampot	60.9%	65.5%
	Takeo	84.8%	85.9%
11	Cash incomes from non-farms in 2007/08 (Rield/HH/Year)	1,887,700	1,495,600
	Kampong Speu	1,725,000	1,243,100
	Kampot	1,432,800	1,314,900
	Takeo	2,186,700	1,729,200
12	Number of household having expenditure on long-term investment in percentage in 2007/08	16.7%	10.6%
	Kampong Speu	11.8%	6.5%
	Kampot	18.4%	10.3%
	Takeo	18.2%	13.3%
13	Amount of long-term investment in 2007/08 (Rield/HH/Year)	928,200	692,600
	Kampong Speu	2,306,900	734,000
	Kampot	568,125	834,400
	Takeo	508,800	605,300
14	Number of household having expense on chemical fertilizer in percentage in 2007/08	82.5%	87.0%
	Kampong Speu	80.0%	85.7%
	Kampot	82.8%	83.9%
	Takeo	84.1%	89.8%
15	Amount of chemical fertilizer usage in 2007/08 (Kg/HH/Year)	63	67
	Kampong Speu	59	56
	Kampot	57	66
	Takeo	70	73

11. Based on the successful experiences of SRI extension program in Cambodia, SRI will be further adopting and developed by farmers due its achievement of higher rice yield with reduced costs. We conclude that SRI will be more adopting by farmers over time and on more area of rice fields as well. An improved and expanded SRI extension program strategy is still needed to scale up and speed up of the adoption of SRI.

12. The following ideas should be considered:

- An SRI dissemination program should ensure that all rice farmers in Cambodia can learn about SRI ideas and can adapt these ideas to their own resource endowments and constraints to improve their rice production. This can be done first by identifying and selecting 'key farmers' from rice-farming communes all across Cambodia. There are now capable and motivated farmers willing to participate in such a program in almost all districts the country. Second, this initiative should support and enable 'key farmers' to establish demonstrations in all rice-growing communes throughout Cambodia and to conduct farmer-to-farmer training and extension activities.
- A nationwide community-based seed selection program should be implemented and supported to ensure that all farmers have access to good-quality, locally-produced seeds. This can be done by selecting a few farmers per village to be trained and specialized as community-based rice seed producers. Some of the preferred varieties will be current 'modern' varieties, but since SRI methods give very good results with consumer-preferred 'traditional' varieties, the seed production program should include also the latter.
- Promotion of a nationwide soil fertility management program is important, especially the promotion of green-manure cultivation during the early wet season; cultivation and use of nitrogen-fixing trees; and making and using compost on a wider scale. This can be done in integration with an SRI extension program. Where limitations on biomass supply constrain compost production, this program would support evaluations, demonstrations and promotion of biomass production to enhance soil fertility. This will benefit crops beyond rice.
- Development of small and medium-scale irrigation facilities and promotion of their participatory irrigation management, especially for supplementary irrigation in the wet season. While SRI reduces irrigation requirements, its results are greatly enhanced by improved water control that can apply small amounts regularly and reliably. The economic returns to such investment are very high. This program could be made attractive to donor agencies that want to help promote food security and poverty alleviation.
- Development of the local production of appropriate implements for SRI production, specifically soil-aerating mechanical hand weeders and roller-markers or other tools for establishing SRI crops in labor-saving ways. Local enterprises that fabricate these can enhance local employment while also improving labor productivity and incomes.

## I. INTRODUCTION

The System of Rice Intensification (SRI) is a set of innovative rice cultivation methods developed in Madagascar in the 1980s. In 2000, CEDAC first introduced SRI ideas to farmers in Cambodia. Twenty-eight farmers from 18 villages volunteered to test SRI. With the first success of this farmer-based experimentation, SRI began to spread throughout Cambodia. Currently, there are over 100,000 rice farmers in approximately 3,000 villages in Cambodia adopting SRI practices to an identifiable extent.

Different evaluation studies have consistently shown that SRI contributes to increased rice production while reducing expenditure on inputs such as fertilizers, seeds and pesticides. However, from CEDAC's regular field monitoring, it has been observed that differences exist among farmers in SRI adoption. There are farmers who have pioneered SRI adoption; there are farmers who do not adopt SRI even though they have seen positive results; and there are farmers who just adopt some SRI practices. Even when SRI is introduced to farmers in the same period, CEDAC has observed that SRI adoption behavior differs. For some villagers, the adoption rate is very high, while for other villagers there can be a low rate of adoption.

In order to have an in-depth understanding of the process of SRI adoption and a profile of farmers who adopt and do not adopt SRI, CEDAC conducted systematic field research from November 2007 to March 2008. Through previous studies, it is known that SRI helps in increasing rice yield, and villagers continue to adopt those methods. The outcomes of this research are expected to inform on how SRI can be better promoted and allow for more understanding of the perceptions and attitudes that villagers have towards SRI. The study should contribute to improvement of the development and dissemination of SRI methodologies in Cambodia. It will also serve as a platform where the results can be shared with other researchers and development practitioners involved in SRI around the region.

The research looked at following key questions:

a) **Process and trends of adoption**

- What is the process and what are the trends of SRI adoption in the village?
- What is difference in terms of rate of adoption from village to village, and why is there such difference?

b) **Profile of SRI users and non-SRI users**

- What are the characteristics of SRI users and non-SRI users?
- Why are there some farmers who use SRI, and some others who do not?
- Why are there some farmers who use SRI fully, while others use SRI methodologies only partially?
- What are the different perceptions of women and men farmers regarding SRI?
- What are the perceptions of younger farmers and elder farmers on SRI?

c) **Changes of social and economic condition of SRI users and non-SRI users**

- Are there changes in the social conditions of SRI users compared to non-SRI users?
- Are there changes in the economic conditions of SRI users compared to non-SRI users?

d) **Agro-ecological profile**

- What are the different rates of adoption or non-adoption of SRI in relation to the availability of proximity lands and the installment of house settlements (dense or scattered)?
- Does topographical landscape determine differences in SRI adoption and non-adoption with regard to water management, transportation of manure, etc.?

## **II. METHODOLOGY**

### **2.1. FORMATION OF RESEARCH TEAM**

The overall research team was composed of 9 researchers and divided into 3 smaller research teams. Each team was composed of one team leader and two team members, together responsible for conducting a completed study in one village per week, including individual interviews with SRI-adopting and SRI non-adopting households; two group discussions, one with SRI-adopting households and one with SRI non-adopting households; village profile collection; and writing summary notes for each village.

A CEDAC research coordinator was given the overall responsibility for this research project, including training for the 3 field research teams; preparation of pre-designed research tools and formats for the individual interviews and group discussions; contacts and coordination with CEDAC provincial program staff; facilitation of the bi-weekly reflection meetings among the research teams; and field support to the research teams.

### **2.2. TRAINING SUPPORT FOR RESEARCH TEAMS**

In-depth training support was organized by the research coordinator for the research teams in order to build their capacity related to research methodology and framework, pre-testing of the research tools, and a completed study of a pilot village. The training took many days, as was included with the field practice in order to enable field researchers to learn very well about full methodology of this research project.

The training started with the initial introduction of the research project's framework and brief introduction on research methodology. Then the research team leaders were facilitated in conducting a field pre-test at Mkak commune, Ang Snuol district, Kandal province, with three initial questions:

- It is well-known that SRI enables farmers to increase rice yield, why there are still some neighboring farmers of the SRI-adopting households who do not adopt SRI method like their neighbors?
- Why, at the starting stage for SRI in each village, did some farmers decide to adopt SRI even when most of their neighbors decided not to adopt?
- And among farmers who have adopting and believed on SRI, why are there fewer SRI-adopting households who have expanded their SRI use to all their rice land area?

They explored these questions with methods of individual interview and group discussion.

Then the researchers were facilitated to make reflections on their findings on the three initial questions. Based on their initial findings and with support from research coordinator, they started to develop the study tools, including a questionnaire for individual interviews, a checklist for group discussion, and a checklist for village profile collection.

Pre-testing on the research tools has been conducted at a village in Tramkak district, Takeo province. The results from the pre-tests were used for the updates/validation of the research tools to make them better.

### 2.3. SITE AND SAMPLE SELECTIONS

It was decided to select 3 provinces, based on discussion with CEDAC provincial project coordinators, for conducting this study. The provinces included are Kampong Speu, Kampot, and Takeo. There are a total of 21 villages included in the study of which 6 villages are in Kampong Speu province, 6 villages in Kampot province, and 9 villages in Takeo province. Samples for individual interviews in each village were randomly selected based on the list of SRI-adopting households of the village which was provided by CEDAC project staff. In total, there are 292 SRI non-adopting households in the sample and 348 SRI-adopting households that have been randomly selected for individual interviews. On average, 16 to 17 SRI-adopting households and 14 SRI non-adopting households were interviewed in each village.

The villages of each province were as follow:

- Kampong Speu province: Damnak Trach, Trapaing Chumrov, Krasaing Takong, Trapaing Trakeat, Por Thom, and Trapaing CHHouk.
- Kampot province: Kcheay Khang Lech, Trapaing Mnoas, Trapaing Andong, Morn, Theay, and Totim.
- Takeo province: Romon, Moha Reach, Khvav, Trapaing Veng, Taso, Pak Bang Oang, Trapaing Sra Nge, Trapaing Pring, and Sra Nge.

#### 2.3.1. Profiles of the samples

In general, 68.7% of the respondents in SRI-adopting households and 74% of respondents in SRI non-adopting households were female. Respondents were on average 45 years old.

**Table 1: Size of samples for individual interviews**

Province	No. of studied villages	Total no. of HHs interviewed	SRI-adopting households		SRI non-adopting households	
			No. of respondents	% female	No. of respondents	% female
Kampong Speu	6	187	110	70.0%	77	64.9%
Kampot	6	174	87	66.7%	87	79.3%
Takeo	9	279	151	68.9%	128	75.8%
Total	21	640	348	68.7%	292	74.0%

**Table 2: Age of respondents**

Category	Mean	Minimum	Maximum	Total sample
SRI-adopting households	46	22	78	348
SRI non-adopting households	44	18	78	292
Overall sample	45	18	78	640

Concerning their roles in the villages, with pre-defined choices in the questionnaire, the majority of interviewed households are classified as farmers, 6.6% are members in the village-based farmer association committee; and 0.5% are village chiefs. 0.3% of them are farmer promoters in the local development program of CEDAC. Among SRI-adopting household respondents, 9.8% are members in the farmer association committee in their respective villages. However, there is also some members of association committee who did not apply SRI and they were also interviewed (2.7% of the total of SRI non-adopting households).

**Table 3: Roles of interviewees in the community and relation with NGOs**

Role of interviewee in the village	In total sample		SRI-adopting households		SRI non-adopting households	
	No. of HHs	% of total HHs	No. of HHs	% in respective roles	No. of HHs	% in respective roles
Member of village-based farmer association committee *	42	6.6%	34	9.8%	8	2.7%
Farmer	582	90.9%	305	87.6%	277	94.9%
Farmer-promoter	2	0.3%	2	0.6%	0	0.0%
Other roles: policeman, teacher, veterinarian, etc.	11	1.7%	5	1.4%	6	2.1%
Village chief or vice chief	3	0.5%	2	0.6%	1	0.3%
Total	640	100.0%	348	100%	292	100%

Note: \* These include roles such as assistant, leader, member, and treasurer of farmer association

### **2.3.2. Tools for data collection**

There are several tools initially developed by the research team with the support of the research coordinator, including: questionnaire for individual interviews, checklist for group discussion, checklist for village profile collection, and checklist for individual profile of SRI-adopting households interviewed.

### **2.4. FIELDWORK: ACTIVITIES AND ARRANGEMENT**

As mentioned above, there were 3 research teams, and each team was composed of 3 researchers for conducting this study. The field work was arranged so that one village was studied by a research team in each 1 week, with the following activities:

- Two group discussions, of which one is SRI group and another is non-SRI group. Each group discussion was attended by 8 to 10 farmers.

- A checklist of village characteristics was completed with the help of the village chief and farmer association leaders.
- Individual interviews were conducted with a total of 15 to 20 SRI-adopting households and 10 to 15 SRI non-adopting households per village.
- Village-based summary report was written by the respective team at the time.

The study took a total of 7 weeks for the completion of field work in the 3 selected provinces. The 3 research teams required 3 weeks for finishing the field work in Takeo, 2 weeks in Kampong Speu, and 2 weeks in Kampot. The teams were facilitated to have regular reflection meetings every two weeks at the CEDAC office in Phnom Penh.

## 2.5. WRITING UP FIELD NOTE AND DATA ANALYSIS

All village-based summary reports have been written by the team for the village study during the field work. There was a final reflection meeting facilitated by the research coordinator to write up the field notes (Aide-Memoires) after finishing the field work. Additionally, another brief report on the study has been also written by the research team at the request of CEDAC's president, Dr. Yang Saing Koma.

Data entries, data processing, and analysis of the data collected through individual interviews and village profile was been done by the research coordinator. The results of data analysis have been combined with the village-based summary reports and the field notes to be used for report writing.

## III. PROFILES OF THE VILLAGES STUDIED

The studied villages in the three selected provinces are located along the National Road number 3. We can say that the accessibility to other public facilities would be fine except this differs according to the distance of each village from the national road, and it was learned that most of the studied villages are located quite far away from the provincial center.

**Table 4: Distance from the village to main center and public facilities (in km)**

Village	Provincial Center	Health Center	Primary School	Secondary School	High School	National Road	Main Market
Totim	40	2	2	2	8	15	15
Theay	39	0	0	4	7	5	6
Damnak Trach	50	2	1	1.5	8	2.5	6
Trapaing Chomrov	73	1	1	1	4	1.5	2
Tropaing Pring	22	2	1	3	7	1	8
Sra Nge	23	2.5	0	2	2	0	7
Trapaing Sra Nge	23	8	3	9	9	6	8
Taso	24	0	0	6	6	3	9
Peak Bang Oang	19	0	3	5	5	14	5
Por Thom	84	2	0	2	4.5	4	8
Trapaing Trakeat	85	6	1	4	4	2	2
Khvav	41	0	0	0	0	4	4

Trapaing Mnoas	44	2	2	2	2	14	2
Kcheay Khang Lech	42	6	1	6	6	17	17
Romon	36	4	1	4	4	4	4
Krasaing Takong	82	3	0	10	10	6	9
Trapaing CHHouk	82	3	0	0	0	0	3
Trapaing Andong	42	2	0	3	3	2	2
Morn	55	4	4	4	4	8	8
Trapaing Veng	22	3	3	4	4	0	0
Moha Reach	13	3	2	2	2	2	15

As for the progress of SRI extension, on average around 46% of the total number of households in each village are using SRI methods. It is observed that there is not much difference of SRI adoption among the three provinces, as this number ranged from 40% to 50% of the households on average in each village using SRI methods.

The difference could be due to the fact that the duration of SRI extension projects in each province is different, with Kampot province being the shortest one. It is important to notice that the rate of farmers who stopped applying SRI is very low. On average, only 1 household in each village has stopped applying SRI.

**Table 5: Rice cultivated land in the villages studied (Hectare)**

Village	Total rice cultivated land (Ha)	Total households	SRI-adopting households		SRI-adopting HHs stopping applying SRI
			HH	%	
Totim	116	172	21	12	6
Theay	185.20	261	11	4	0
Damnak Trach	185.91	243	85	35	0
Trapaing Chomrov	64.50	128	26	20	0
Tropaing Pring	113	143	96	67	0
Sra Nge	95	241	172	71	2
Trapaing Sra Nge	80	113	75	66	0
Taso	250	158	103	65	10
Peak Bang Oang	162	276	197	71	0
Por Thom	52	127	86	68	0
Trapaing Trakeat	180	124	117	94	2
Khvav	127	266	22	8	4
Trapaing Mnoas	111	223	207	93	0
Kcheay Khang Lech	145.32	155	118	76	0
Romon	130	305	33	11	0
Krasaing Takong	83	122	41	34	0
Trapaing CHHouk	331.5	228	45	20	0
Trapaing Andong	389	289	280	97	0
Morn	119	174	28	16	0
Trapaing Veng	175	228	15	7	2
Moha Reach	88	235	37	16	0
<b>Average</b>	<b>152</b>	<b>201</b>	<b>87</b>	<b>46</b>	<b>1</b>

**Table 6: Demographical setting in the villages studied**

Name of villages	No. of total households	No. of woman-headed households	No. of population	No. of women
Totim	176	20	881	412
Theay	241	60	1,263	666
Damnak Trach	243	85	1,023	594
Trapaing Chomrov	128	18	618	332
Tropaing Pring	143	20	793	429
Sra Nge	113	20	574	315
Trapaing Sra Nge	241	30	1,177	597
Taso	158	27	701	354
Peak Bang Oang	276	45	1,114	649
Por Thom	127	21	710	325
Trapaing Trakeat	224	30	1,053	490
Khvav	266	24	1,615	836
Trapaing Mnoas	223	67	951	485
Kcheay Khang Lech	155	35	749	377
Romon	305	59	1,432	753
Krasaing Takong	122	13	659	351
Trapaing CHHouk	228	10	1,229	652
Trapaing Andong	289	-	1,416	744
Morn	174	44	814	428
Trapaing Veng	228	44	1,222	580
Moha Reach	235	57	1,762	890
<b>Average</b>	<b>205</b>	<b>36</b>	<b>1,036</b>	<b>536</b>

## IV. RESEARCH FINDINGS

### 4.1. SAMPLE PROFILES: SRI-ADOPTING AND SRI NON-ADOPTING HOUSEHOLDS

#### 4.1.1. Household backgrounds

Among interviewed households, 84% are headed by a married person and 15% by a widow or widower. Among SRI-adopting households, 86.5% are headed by spouse. In general, household heads are on average 46 years old, and the maximum age was 78 years old. Household heads as widows or widowers are older than married household heads.

**Table 7: Age of household head by family status**

Category	Age (years old)	Status of household head			Total
		Single	Married	Widow/er	
SRI-adopting household	Mean	45	47	52	47
	Minimum	25	18	25	18
	Maximum	61	78	74	78
	% among SRI-adopting households	0.9%	86.5%	12.6%	100%
SRI non-adopting household	Mean	19	44	50	45
	Minimum	18	18	30	18
	Maximum	20	78	76	78
	% among SRI non-adopting households	0.7%	81.2%	18.2%	100%

Concerning the literacy of household heads, there is little difference among SRI-adopting household and SRI non-adopting households in general, but some noticeable differences between groups by province. In Kampong Speu and Kampot provinces, literate household heads in SRI-adopting households were lower than in non-adopting households. On the contrary, in Takeo, literate household heads were higher among SRI users than among non-SRI users.

**Table 8: Education of household heads by province and SRI adoption**

Province	SRI-adopting households			SRI non-adopting households		
	Literate	Illiterate	Total HHs interviewed	Literate	Illiterate	Total HHs interviewed
Kampong Speu	83%	17%	110	87%	13%	77
Kampot	82%	18%	87	92%	8%	87
Takeo	90%	10%	151	85%	15%	128
Total samples	86%	14%	348	88%	12%	292

In the total sample, the number of household members was 5.4 on average, and 52% were female members. More than half of the household members (2.8 persons/HH) were full-time laborers, with ages from 19 to 60 years old. One-third of household members were between 6 and 18 years of age. Some of members in this interval were in school, and some are involved in economic activities, either in agriculture or non-agriculture.

Among SRI-adopting households, the average number of members was 5.7 persons per household, somewhat higher than in SRI non-adopting households. If considering members

aged between 6 to 18 years and over 61 years old as partly-dependent members, SRI-adopting household have more partly-dependent members and full laborers than that did SRI non-adopting households. However, the number of totally-dependent members (under 6 years old) averaged lower in SRI-adopting households than in SRI non-adopting households.

Small differences were evident among the studied provinces. In Takeo province, the total number of household members and fully-active members in SRI-adopting households was on average 6.2 and 3.5, respectively, a little higher than in the other province and higher than in SRI non-adopting households. In Kampot province, the total number of household members in SRI-adopting households was less than 5, but the fully-active laborers (19 to 60 years old) was the same as in Kampong Speu province (2.7 persons per household).

**Table 9: Household members by province**

Category	Variables	Mean by province			Average for total sample
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Total HH members	5.7	4.9	6.2	5.7
	% of female HH members	51%	50%	52%	51%
	Members over 61 years old	0.4	0.4	0.4	0.4
	Members from 19 to 60 years old	2.7	2.7	3.5	3.0
	Members from 6 to 18 years old	2.2	1.4	1.8	1.8
	Members under 6 years old	0.6	0.4	0.5	0.5
SRI non-adopting households	Total HH members	5.1	4.7	5.3	5.1
	% of female HH members	52%	55%	51%	52%
	Members over 61 years old	0.4	0.5	0.4	0.4
	Members from 19 to 60 years old	2.4	2.5	2.6	2.5
	Members from 6 to 18 years old	1.7	1.3	1.6	1.5
	Members under 6 years old	0.6	0.5	0.6	0.6

Among the total sample, the number of members fully involved in agriculture averaged 2.2 persons, and the majority of them were between 19 to 60 years old. The average number of household members partially involved in agriculture averaged 1.5 persons, and the majority of them were between 6 and 18 years old.

The differences seen between SRI users and non-SRI users was that the average number of members both fully involved and partly involved in agriculture was high among SRI-adopting households than in SRI non-adopting households. Members partly involved in agriculture were devoting part of their time to agriculture and part to non-farming economic activities or to studying, for those who are still in school.

Among SRI-adopting households, Takeo province had members fully involved in agriculture more often than in Kampot and Kampong Speu. Moreover, members partly involved in agriculture were higher in Takeo province than in Kampong Speu and much higher than in Kampot province.

**Table 10: Number of household members involved fully and part-time in agriculture**

Category	Variables (heads/HH)	Mean by province			Total average
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Total members fully in agriculture	2.2	2.3	2.4	2.3
	Total members partly in agriculture	1.7	1.2	2.0	1.7
	Members over 61 – full-time	0.1	0.1	0.1	0.1
	Members over 61 – part-time	0.1	0.2	0.1	0.1
	Members from 19 to 60 – full-time	1.7	1.9	2.0	1.9
	Members from 19 to 60 – part-time	0.4	0.4	0.8	0.6
	Members from 6 to 18 – full-time	0.3	0.3	0.3	0.3
	Members from 6 to 18 – part-time	1.2	0.6	1.2	1.0
SRI non-adopting households	Total members fully in agriculture	1.9	2.1	2.0	2.0
	Total members partly in agriculture	1.4	1.1	1.4	1.3
	Members over 61 – full-time	0.1	0.1	0.2	0.2
	Members over 61 – part-time	0.1	0.1	0.1	0.1
	Members from 19 to 60 – full-time	1.5	1.8	1.7	1.7
	Members from 19 to 60 – part-time	0.4	0.5	0.5	0.5
	Members from 6 to 18 – full-time	0.3	0.1	0.2	0.2
	Members from 6 to 18 – part-time	0.9	0.5	0.8	0.7

#### 4.1.2. Households' main physical assets

In the study, a number of households' main physical assets were observed. It is found that there is no differences for total average number of assets owned by SRI-adopting households and SRI non-adopting households for a number of assets such as television, radio, and cart loads. However, the total average number of motorbikes, bicycles, water pumps, water jars, and pond or well owned by SRI-adopting household is higher than SRI non-adopting households.

In Takeo province, households generally own more assets than households in the other two provinces, and SRI-adopting households own more assets than SRI non-adopting households inside the province, especially motorbikes, bicycles, water pumps, water jars, and pond or well.

In Kampot, households own fewer assets than in the other provinces, but there was not much difference between SRI-adopting households and SRI non-adopting households. In Kampong Speu province, SRI-adopting households owned more assets than SRI non-adopting households for most kinds of assets.

**Table 11: Households' physical assets**

Category	Average number of assets	Average by province			Total average
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Motorbike	0.6	0.2	0.6	0.5
	Bicycle	1.4	1.4	1.6	1.5
	Television	0.7	0.6	0.8	0.7
	Radio	0.5	0.5	0.6	0.5

	Water pump	0.2	0.2	0.3	0.2
	Cart load	0.5	0.6	0.3	0.4
	Water jar	2.5	2.3	3.4	2.8
	Pond or well	0.7	0.7	0.9	0.8
SRI non-adopting households	Motorbike	0.2	0.3	0.4	0.3
	Bicycle	1.1	1.3	1.4	1.3
	Television	0.6	0.5	0.7	0.7
	Radio	0.3	0.4	0.6	0.5
	Water pump	0.1	0.1	0.1	0.1
	Cart load	0.4	0.5	0.3	0.4
	Water jar	2.1	1.6	2.9	2.3
	Pond or well	0.5	0.7	0.6	0.6

Cattle and buffaloes are considered as important assets, raised for draft power rather than for income-generation purposes. It is important to note that there were no horses found to be owned by sample households in the studied villages. Buffaloes are also rarely found as seen in the table below. Only a few households in villages of Kampong Speu province have buffaloes.

On average, each household had 3 cattle. Households in Takeo owned more cattle than in Kampong Speu and Kampot provinces. In all studied provinces, SRI-adopting household have more cattle than SRI non-adopting household.

**Table 12: Animal assets**

Category	Average (head/HH)	Average by province			Total average
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Cattle	3.3	3.2	3.5	3.4
	Buffaloes	0.1	0.0	0.0	0.0
SRI non-adopting households	Cattle	2.6	2.5	2.7	2.6
	Buffaloes	0.0	0.0	0.0	0.0

#### **4.1.3. Status of housing**

The size of house was 37 square meters on average. There is almost no difference between SRI-adopting and SRI non-adopting household or among provinces.

**Table 13: House size by province and SRI adoption**

Category	House size (m <sup>2</sup> )	By province			Among total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean	38	37	37	37
	Minimum	12	4	7	4
	Maximum	72	93	80	93
SRI non-adopting households	Mean	36	36	36	36
	Minimum	10	10	12	10
	Maximum	72	82	84	84

According to the results, it is found that 79.9% of SRI-adopting household have wooden house construction and 18.4% have leaf or thatched house. 77.4% of SRI non-adopting household have wooden house. The data do not show us whether there was any change in housing construction after SRI adoption for the households that took up this innovation.

**Table 14: Type of house by province and SRI adoption**

Category	Type of House	By province			<i>Among total</i>
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Brick	1.1%	0.0%	0.6%	<b>1.7%</b>
	Leaf/thatch	6.9%	4.6%	6.9%	<b>18.4%</b>
	Wood	23.6%	20.4%	35.9%	<b>79.9%</b>
	Total sample	110	87	151	<b>348</b>
SRI non-adopting households	Brick	0.7%	0.0%	0.3%	<b>1.0%</b>
	Leaf/thatch	5.8%	6.2%	9.6%	<b>21.6%</b>
	Wood	19.9%	23.6%	33.9%	<b>77.4%</b>
	Total sample	77	87	128	<b>292</b>

**Table 15: Type of roof and wall**

Category	Wall of House	Roof of House				Total
		Fibro-cement	Leaf	Tile	Zinc	
SRI-adopting households	Brick	0.3%	0.6%	0.3%	0.0%	1.1%
	Leaf	2.6%	7.5%	8.3%	8.9%	27.3%
	Wood	3.2%	1.4%	59.5%	7.5%	71.6%
	Total	6.0%	9.5%	68.1%	16.4%	100%
SRI non-adopting households	Brick	0.3%	0.0%	0.3%	0.0%	0.7%
	Leaf	3.8%	11.6%	11.3%	11.6%	38.4%
	Wood	5.5%	0.7%	47.6%	7.2%	61.0%
	Total	9.6%	12.3%	59.2%	18.8%	100%

Concerning house condition, around 7% of both groups (SRI-adopting and SRI non-adopting households) have house considered good. 27.4% of SRI non-adopting households have houses in poor condition, while only 17.5% of SRI-adopting household have house in poor condition.

**Table 16: House condition**

Category	House situation	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting Households	Good	7.3%	4.6%	7.9%	6.9%
	Medium	64.5%	78.2%	82.1%	75.6%
	Poor	28.2%	17.2%	9.9%	17.5%
	Total sample	110	87	151	348
SRI non-adopting households	Good	10.4%	2.3%	7.8%	6.8%
	Medium	61.0%	69.0%	66.4%	65.8%
	Poor	28.6%	28.7%	25.8%	27.4%
	Total sample	77	87	128	292

#### 4.1.4. Land occupation

On average, households in the studied area own 1.04 hectares including residential land and agriculture lands. In the total sample, the average is not much difference between provinces. However, there is a little difference between SRI-adopting households and SRI non-adopting households. SRI-adopting households own on average 1.14 hectares, while SRI non-adopting household own 0.92 hectares.

**Table 17: Total owned land by province and SRI adoption**

Category	Total owned land (ha/HH)	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean	1.18	1.17	1.10	1.14
	Minimum	0.10	0.17	0.27	0.10
	Maximum	3.66	3.67	3.82	3.82
	Total sample	110	87	151	348
SRI non-adopting households	Mean	0.99	0.84	0.94	0.92
	Minimum	0.01	0.09	0.08	0.01
	Maximum	7.34	3.70	4.09	7.34
	Total sample	77	87	128	292

Table 18 shows in more detail the differences in land size by province, by type of land, and by SRI adoption and non-adoption. Regarding wet-season rice fields, SRI-adopting households own on average 0.93 hectares, more than SRI non-adopting household who own about 0.81 hectares. Only 0.3% of SRI-adopting household have dry-season rice fields, with 1 hectare size on average, and 0.7% of SRI non-adopting households have such fields, on average 0.55 hectares. 16.1% of SRI-adopting households and 10.6% of SRI non-adopting households own *chamcar* (i.e., polyculture) land, amounting to 0.28 hectares on average.

**Table 18: Land size by purpose of uses**

Category	Province	Variables	Size of land by types (ha/HH)				
			Residential land	Dry season rice	Wet season rice	<i>Chamcar</i> land	Other land
SRI-adopting households	Kampong Speu	Mean among total sample in the province	0.18	0.01	0.94	0.06	0.00
		Mean among HHs owning land	0.18	1.00	0.94	0.29	0.10
		Minimum	0.00	1.00	0.08	0.02	0.10
		Maximum	1.00	1.00	2.91	1.00	0.10
		% of HHs owning land	97.3%	0.9%	100.0%	20.0%	0.9%
	Kampot	Mean among total sample in the province	0.14	0.00	1.01	0.01	0.00
		Mean among HHs owning land	0.14	0.00	1.01	0.24	0.40
		Minimum	0.01	0.00	0.12	0.12	0.40
		Maximum	0.50	0.00	3.20	0.35	0.40
		% of HHs owning land	100.0%	0.0%	100.0%	2.3%	1.1%

	Takeo	Mean among total sample in the province	0.16	0.00	0.87	0.07	0.00
		Mean among HHs owning land	0.16	0.00	0.87	0.34	0.10
		Minimum	0.01	0.00	0.10	0.02	0.10
		Maximum	1.25	0.00	3.00	3.00	0.10
		% of HHs owning land	100.0%	0.0%	100.0%	21.2%	0.7%
	Total	Mean among total SRI-adopting households	0.16	0.00	0.93	0.05	0.00
		Mean among HHs owning land	0.16	1.00	0.93	0.32	0.20
		Minimum	0.00	1.00	0.08	0.02	0.10
		Maximum	1.25	1.00	3.20	3.00	0.40
		% of HHs owning land	99.1%	0.3%	100.0%	16.1%	0.9%
SRI non-adopting households	Kampong Speu	Mean among total sample in the province	0.14	0.01	0.81	0.03	0.00
		Mean among HHs owning land	0.14	0.60	0.83	0.20	0.04
		Minimum	0.00	0.60	0.04	0.01	0.04
		Maximum	0.70	0.60	6.00	0.70	0.04
		% of HHs owning land	96.1%	1.3%	98.7%	13.0%	1.3%
	Kampot	Mean among total sample in the province	0.12	0.00	0.71	0.01	0.00
		Mean among HHs owning land	0.12	0.00	0.71	0.56	0.00
		Minimum	0.01	0.00	0.03	0.12	0.00
		Maximum	1.00	0.00	3.50	1.00	0.00
		% of HHs owning land	95.4%	0.0%	100.0%	2.3%	0.0%
	Takeo	Mean among total sample in the province	0.15	0.00	0.75	0.03	0.01
		Mean among HHs owning lands	0.15	0.50	0.75	0.17	0.19
		Minimum	0.01	0.50	0.06	0.02	0.03
		Maximum	0.84	0.50	4.00	0.50	0.59
		% of HHs owning land	99.2%	0.8%	100.0%	14.8%	3.1%
	Total	Mean among total SRI non-adopting households	0.14	0.00	0.76	0.02	0.00
		Mean among HHs owning land	0.14	0.55	0.76	0.21	0.16
		Minimum	0.00	0.50	0.03	0.01	0.03
		Maximum	1.00	0.60	6.00	1.00	0.59
		% of HHs owning land	97.3%	0.7%	99.7%	10.6%	1.7%

## 4.2. HOUSEHOLD ECONOMIC ACTIVITIES AND INCOMES: SRI AND SRI NON-ADOPTING HOUSEHOLDS

### 4.2.1. Household cash income in 2007 and shares from various sources

The sources of cash income are grouped into two categories, namely primary sector and secondary and tertiary sectors (non-farming). Cash income from the primary sector is derived from three main sources: crops (rice and non-rice crops), livestock, and fish.

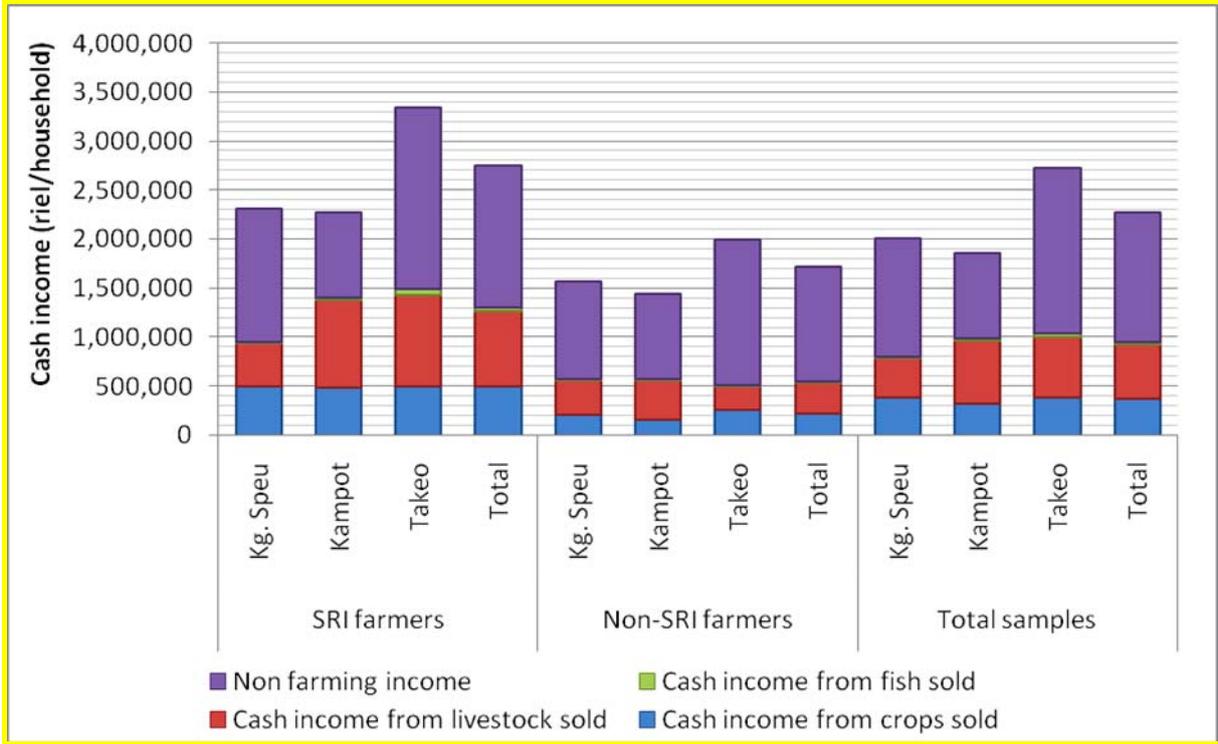
Among the total sample, total household cash income was on average 2.28 million riel per year (2007). The shares were: non-farming 1.32 million riel; livestock sold at 0.56 million riel; crops sold at 0.37 million riel; and very little from fish. (Note: ~400 riel = USD 1.00)

It is important to note that income from the primary sector as shown in Figure 1 is in fact lower than the total product value produced by farmers because that part of the production, for example, of rice, vegetables, chickens and fish, which is kept for home consumption is not included. Only products sold for cash income are included in the computation.

According to Figure 1, the total household average cash income for households in Takeo is higher than for other provinces. In general, the total average cash income for SRI-adopting households is higher than for SRI non-adopting households. When comparing within each province, we saw that SRI-adopting households had average cash incomes higher than SRI non-adopting household too.

SRI-adopting households in all provinces earned similar average cash incomes from crops sold, about 0.5 million riel, but there was much difference in cash incomes from livestock sold. In general, households earned a very small amount of cash income from fish, both raised/trapped fish and fish caught. This indicates that the livelihoods of people in the studied area are not depending on fish.

**Figure 1: Shares of household cash income.**



## 4.2.2. Household cash income from primary sectors

### A. Cash income from crops production

#### Rice crop production in 2007

In this analysis, we present data only on the number of households which did sell paddy, the amount of paddy sold, and the cash income earned from paddy sold in late 2007 or early 2008. The part of the paddy harvest kept for home consumption and for supporting livestock production is not included in our computation of cash income from rice production. The total paddy harvested in 2007/08 is reported in section 4.4. *on Conventional rice practices and level of SRI adoption.*

All interviewed household grow rice, but not all of them produce enough to be able to sell rice. According to the study, 31.6% of rice farmers were able to sell paddy last year, on average, 724 kg. They earned on average 541,800 riel in cash income from paddy sold.

38.2% of SRI-adopting households were able to sell, on average, 796 kg, more than SRI non-adopting households, of whom only 23.6% sold rice, with an average amount of 587 kg per household. Therefore, the average cash income from sale of rice for SRI-adopting households was 50% higher than for SRI non-adopting households.

By province, Kampot have more farmers able to sell paddy with a higher amount, followed by Kampong Speu and then Takeo for SRI-adopting households. For SRI non-adopting households, Takeo province had more farmers (25.8%) able to sell rice, followed by Kampot (23%) and then Kampong Speu (20.8%). However, the average amounts of paddy sold were in reverse order.

**Table 19: Percentage of households selling paddy and amount of paddy sold in 2007/08**

Category	Paddy sold last year		By province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	Total paddy sold (kg/HH)	Mean	739	994	693	796
		Minimum	36	48	50	36
		Maximum	3,000	4,000	4,000	4,000
	Total income from paddy sold (riel/HH)	Mean	579,555	790,354	499,696	609,545
		Minimum	32,000	40,000	40,000	32,000
		Maximum	2,250,000	4,000,000	3,600,000	4,000,000
	% of HHs selling			37.3%	44.8%	35.1%
SRI non-adopting households	Total paddy sold (kg/HH)	Mean	656	625	530	587
		Minimum	13	30	40	13
		Maximum	4,000	3,000	3,500	4,000
	Total income from paddy sold (riel/HH)	Mean	455,550	451,180	365,758	411,339
		Minimum	9,100	21,000	22,000	9,100
		Maximum	2,800,000	2,400,000	1,750,000	2,800,000
	% of HHs selling			20.8%	23.0%	25.8%

### **SRI paddy sold**

Among SRI-adopting households, some households grow good-quality rice varieties (e.g., Phkar Malis, Meang Minh) with SRI methods using only organic fertilizers. However, some households grow normal-quality rice with SRI methods and still use additional chemical fertilizer and pesticides. Some households grow both good-quality rice and normal-quality rice varieties in their various rice plots.

It is found that 13.5% of SRI-adopting households sold organic, good-quality paddy at 550 kg on average, while 20.7% sold SRI paddy of normal quality (758 kg on average) produced with additional chemical fertilizer and pesticides.

In Kampot province, the percentage of SRI-adopting household who sold both organic and non-organic SRI paddy was higher than other two provinces

It is important to note that there were households in Kampong Speu and Kampot provinces able to sell organic, high-quality paddy up to 3,000 kg maximum. In Takeo, there was the case of a household that sold non-organic, normal-quality rice up to a maximum of 4,000 kg.

**Table 20: SRI paddy sold and households selling in 2007/08**

SRI paddy sold last year		By province			Total
		Kampong Speu	Kampot	Takeo	
Organic, high-quality SRI paddy sold (kg/HH)	Mean	771	563	272	550
	Minimum	36	48	100	36
	Maximum	3,000	3,000	1,000	3,000
Organic, high-quality SRI paddy sold (riel/HH)	Mean	591,986	478,379	259,927	452,169
	Minimum	32,000	40,000	95,000	32,000
	Maximum	2,250,000	3,200,000	1,000,000	3,200,000
% of HHs selling		16.4%	16.1%	9.9%	13.5%
Chemical, normal-quality SRI paddy sold (kg/HH)	Mean	562	977	707	758
	Minimum	100	100	50	50
	Maximum	2,000	3,000	4,000	4,000
Chemical, normal-quality SRI paddy sold (riel/HH)	Mean	478,632	757,326	516,567	583,465
	Minimum	73,000	8,500	40,000	8,500
	Maximum	2,000,000	1,950,000	3,600,000	3,600,000
% of HHs selling		17.3%	26.4%	19.9%	20.7%

### **Conventionally-produced paddy sold**

In general, 15.5% of the total households interviewed sold normal-quality paddy (622 kg per household) produced with conventional practices with additional chemical fertilizer and pesticides. With conventional methods, only 1.1% of total households sold organic, good-quality rice, on average 618 kg.

Among SRI-adopting households, 9.5% sold non-organic, normal-quality rice, on average 724 kg, while only 0.9% sold organic, good-quality rice, with average amount of 505 kg. By province, the percentage of households in Kampot province selling rice was lower than other

provinces, but the average amount sold was higher than other provinces, both of organic and non-organic rice.

Among SRI non-adopting households, 22.6% sold non-organic, normal-quality rice, on average 571 kg, and only 1.4% sold organic, good-quality rice. The percentage of households in Takeo selling paddy was higher than other provinces.

With conventional methods, farmers were able to sell a maximum at 4,000 kg per household last year.

**Table 21: Conventional paddy sold and households selling in 2007/08**

Category	Conventional paddy sold last year		By province			Total	
			Kampong Speu	Kampot	Takeo		
SRI-adopting households	Organic, high-quality SRI paddy sold (kg/HH)	Mean	216	1000	300	505	
		Minimum	216	1000	300	216	
		Maximum	216	1000	300	1000	
	Organic, high-quality SRI paddy sold (riel/HH)	Mean	180000	700000	240000	373333	
		Minimum	180000	700000	240000	180000	
		Maximum	180000	700000	240000	700000	
	% of HHs selling			0.9%	1.1%	0.7%	0.9%
	Chemical, normal-quality SRI paddy sold (kg/HH)	Mean	536	1,057	696	724	
		Minimum	100	100	130	100	
		Maximum	2,000	3,000	2,520	3000	
	Chemical, normal-quality SRI paddy sold (riel/HH)	Mean	383,200	858,286	428,000	505697	
		Minimum	70,000	70,000	100,000	70000	
		Maximum	1,300,000	2,700,000	1,260,000	2700000	
% of HHs selling			9.1%	8.0%	10.6%	9.5%	
SRI non-adopting households	Organic, high-quality conventional paddy sold (kg/HH)	Mean	13	800	1,000	703	
		Minimum	13	800	500	13	
		Maximum	13	800	1,500	1,500	
	Organic, high-quality conventional paddy sold (riel/HH)	Mean	9,100	500,000	775,000	514,775	
		Minimum	9,100	500,000	350,000	9,100	
		Maximum	9,100	500,000	1,200,000	1,200,000	
	% of HHs selling			1.3%	1.1%	1.6%	1.4%
	Chemical, normal-quality conventional paddy sold (kg/HH)	Mean	699	616	484	571	
		Minimum	45	30	40	30	
		Maximum	4,000	3,000	3,500	4,000	
	Chemical, normal-quality conventional paddy sold (riel/HH)	Mean	485,313	448,611	328,750	398,838	
		Minimum	32,800	21,000	22,000	21,000	
		Maximum	2,800,000	2,400,000	1,750,000	2,800,000	
% of HHs selling			19.5%	21.8%	25.0%	22.6%	

### **Non-rice crops**

Besides rice production, rural household also grow vegetables, fruits and other cash crops either for home consumption or for income-generation purpose. However, the study did not focus on the total production of these crops produced by farmers but focused on only the cash income earned from these crops.

In general, 27.5% of total interviewed households sold vegetables and earned, on average, 293,600 riel last year. In Kampong Speu, 31.6% of households have earned 439,000 riel from the sale of vegetables, higher than household in the other two provinces.

The percentage of households who sold vegetables was high among SRI-adopting households, especially in Kampong Speu province. Considering the samples for each category, SRI-adopting households earned about double the cash income from vegetable sales compared to non-adopting households.

**Table 22: Cash income from vegetables sold and households selling in 2007**

Category	Gross income from own produced vegetables sold (riel/year)	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean among total sample	198,864	54,943	75,762	109,468
	Mean among HHs selling vegetables	465,426	191,200	228,800	312,254
	Minimum	15,000	20,000	20,000	15,000
	Maximum	2,000,000	750,000	800,000	2,000,000
	% of HHs selling vegetables	42.7%	28.7%	33.1%	35.1%
SRI non-adopting households	Mean among total sample	52,273	13,563	65,469	46,524
	Mean among HHs selling vegetables	335,417	107,273	270,323	251,574
	Minimum	15,000	20,000	30,000	15,000
	Maximum	2,000,000	300,000	1,000,000	2,000,000
	% of HHs selling vegetables	15.6%	12.6%	24.2%	18.5%

Cash income from fruit sold was 91,200 riel on average last year. Among the total sample, 32.7% sold fruits and earned on average 279,500 riel. There was the case of a household earning a maximum at 14 millions riel in Takeo province. There were 36.9% of households in Takeo selling fruit and earning about 376,800 riel from this on average, higher than in Kampong Speu and Kampot provinces.

There are more cases of household selling fruits among SRI-adopting households than SRI non-adopting households and also by province. 39.1% of SRI-adopting household earned on average 332,400 riel, while only 25% of SRI non-adopting household sold fruit and earned on average 180,900 riel.

**Table 23: Cash income from fruits sold and households selling in 2007**

Category	Gross income from own produced fruits sold (riel/year)	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting household	Mean among total sample	68,500	58,621	215,709	129,905
	Mean among HHs selling fruit	188,375	170,000	493,515	332,404
	Minimum	10,000	10,000	12,000	10,000
	Maximum	1,600,000	500,000	14,000,000	14,000,000
	% of HHs selling fruit	36.4%	34.5%	43.7%	39.1%
SRI non-adopting household	Mean among total sample	58,374	28,414	48,750	45,229
	Mean among HHs selling fruit	299,653	117,714	168,649	180,915
	Minimum	4,800	10,000	10,000	4,800
	Maximum	1,600,000	800,000	1,000,000	1,600,000
	% of HHs selling fruit	19.5%	24.1%	28.9%	25.0%

Only 10% of the total sample sold other cash crops and earned, on average, 297,800 riel per household. Similar to fruit, Takeo province had more households selling and earning more income from other crops than in Kampong Speu and Kampot provinces.

In total, the percentage of households selling other crops was higher among SRI-adopting households than SRI non-adopting households, but the average cash income was lower than for SRI non-adopting household. Among SRI-adopting households, the percentage of households selling other crops was higher than SRI non-adopting households in Kampong Speu and Takeo, but lower in Kampot province.

**Table 24: Cash income from selling other crops and households selling in 2007**

Category	Gross income from own produce of other crop sold (riel/year)	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean among total sample	24,545	16,782	38,940	28,851
	Mean among HHs selling other crops	225,000	208,571	280,000	251,000
	Minimum	10,000	30,000	10,000	10,000
	Maximum	600,000	500,000	1,000,000	1,000,000
	% of HHs selling other crops	10.9%	8.0%	13.9%	11.5%
SRI non-adopting households	Mean among total sample	10,649	15,862	53,281	30,890
	Mean among HHs selling other crops	205,000	172,500	568,333	375,833
	Minimum	20,000	30,000	20,000	20,000
	Maximum	400,000	500,000	4,500,000	4,500,000
	% of HHs selling other crops	5.2%	9.2%	9.4%	8.2%

## B. Cash income from livestock production

Livestock production includes pigs, chickens, ducks, Muscovy ducks, cattle and buffaloes. However, there are only a few cases of Muscovy ducks, cattle and buffaloes raised for income purposes.

In total, considering all households in the sample, average income earned from livestock sales was 561,500 riel. Considering only households that made sales, 75.2% of the total households, these earned on average 747,000 riel, and the maximum was around 18 million riel. Once again, the percentage of households selling livestock was higher among SRI-adopting households than SRI non-adopting household in general and also by province.

For all SRI-adopting households, average cash income from livestock sales was 762,600 riel, and among those that actually made sales, it was 954,600 riel, higher than for SRI non-adopting households.

**Table 25: Cash income from livestock sales and households selling in 2007**

Category	Total income from livestock sold (riel/HH)	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean among total sample	434,782	891,937	926,821	762,570
	Mean among HHs selling	655,151	994,853	1,101,969	954,585
	Minimum	40,000	20,000	10,000	10,000
	Maximum	3,303,000	5,752,000	18,078,000	18,078,000
	% of HHs selling	66.4%	89.7%	84.1%	79.9%
SRI non-adopting households	Mean among total sample	355,286	403,238	246,410	321,847
	Mean among HHs selling	547,140	531,541	362,534	462,952
	Minimum	2000	1,200	5,000	1,200
	Maximum	5,300,000	2,300,000	2,400,000	5,300,000
	% of HHs selling	64.9%	75.9%	68.0%	69.5%

**Cash income from pig production**

37.2% of the total sample did sell fattened pigs, 3.9% sold sow pigs, and 10% sold piglets. In total, the percentage of SRI-adopting households selling fattened pigs was higher than for SRI non-adopting households, and this activity also earned an average gross income almost double that of SRI non-adopting households. Especially in Takeo province, fattening pig producers in the SRI-adopting households earned cash incomes triple those of SRI non-adopting household from this activity.

There were not big differences between SRI-adopting and SRI non-adopting households in Kampong Speu in term of cash income from sales of fattened pigs sold except for sow pigs and piglets, from which SRI non-adopting households earned more than SRI-adopting households.

**Table 26: Cash income from pig production and households selling in 2007**

Category	Income from pig production		By province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	Fattened pigs (riel/HH)	Mean	628,286	1,036,250	997,900	919,206
		Minimum	150,000	100,000	140,000	100,000
		Maximum	3,000,000	5,600,000	13,718,000	13,718,000
		% of HHs selling	31.8%	55.2%	38.4%	40.5%
	Sow pigs (riel/HH)	Mean	506,250	650,000	1,416,000	817,500
		Minimum	30,000	400,000	180,000	30,000
		Maximum	1,000,000	1,000,000	4,000,000	4,000,000
		% of HHs selling	7.3%	3.4%	3.3%	4.6%
	Piglets (riel/HH)	Mean	349,375	745,000	984,643	833,625
		Minimum	70,000	140,000	130,000	70,000
		Maximum	700,000	1,200,000	4,000,000	4,000,000
		% of HHs selling	7.3%	4.6%	18.5%	11.5%

SRI non-adopting households	Fattened pigs (riel/HH)	Mean	583,200	566,667	334,167	484,639
		Minimum	100,000	150,000	60,000	60,000
		Maximum	4,000,000	2,000,000	970,000	4,000,000
		% of HHs selling	32.5%	41.4%	28.1%	33.2%
	Sow pigs (riel/HH)	Mean	825,000	535,000	438,000	545,556
		Minimum	550,000	300,000	140,000	140,000
		Maximum	1,100,000	770,000	700,000	1,100,000
		% of HHs selling	2.6%	2.3%	3.9%	3.1%
	Piglets (riel/HH)	Mean	521,667	352,500	431,429	440,833
		Minimum	100,000	190,000	40,000	40,000
		Maximum	1,200,000	500,000	1,200,000	1,200,000
		% of HHs selling	7.8%	4.6%	10.9%	8.2%

In general, the majority of rural households raised chickens rather than ducks, because ducks require more water. Among them, 56.6% sold chickens and earned around 224,600 riel last year. Only 8.9% have sold ducks and earn on average 205,200 riel. 11% earn income from selling eggs, especially duck eggs at 261,500 riel on average. Very few households (1.6%) could earn from selling chicks or ducklings, and most of them were found in Kampong Speu and Takeo provinces. For cash income from chickens sold, SRI-adopting household earn twice as much (280,000 riel) compared with SRI non-adopting households (142,000 riel).

**Table 27: Cash income from poultry production and households selling in 2007**

Category	Income from poultry (chicken and duck) production	By province			Total	
		Kampong Speu	Kampot	Takeo		
SRI-adopting households	Chickens sold (riel/HH)	Mean	310,400	251,045	285,101	280,394
		Minimum	40,000	20,000	12,000	12,000
		Maximum	3,000,000	2,000,000	2,500,000	3,000,000
		N	45.5%	77.0%	65.6%	62.1%
	Ducks sold (riel/HH)	Mean	230,889	361,500	217,056	256,625
		Minimum	40,000	1,500	30,000	1,500
		Maximum	1,000,000	1,000,000	827,000	1,000,000
		N	8.2%	10.3%	11.9%	10.3%
	Chicks/ducklings sold (riel/HH)	Mean	150,000		1,023,750	849,000
		Minimum	150,000		15,000	15,000
		Maximum	150,000		3,850,000	3,850,000
		N	0.9%	0.0%	2.6%	1.4%
	Income from eggs (riel/HH)	Mean	248,600	170,333	505,000	343,410
		Minimum	3,000	15,000	10,000	3,000
		Maximum	600,000	1,200,000	7,300,000	7,300,000
		N	4.5%	17.2%	12.6%	11.2%
SRI non-adopting households	Chickens sold (riel/HH)	Mean	130,000	146,939	144,200	142,007
		Minimum	20,000	20,000	20,000	20,000
		Maximum	1,000,000	1,000,000	500,000	1,000,000
		N	41.6%	56.3%	50.8%	50.0%
	Ducks sold (riel/HH)	Mean	80,000	128,000	113,333	117,143
		Minimum	60,000	30,000	30,000	30,000
		Maximum	100,000	700,000	300,000	700,000
		N	2.6%	11.5%	7.0%	7.2%

	Chicks/ducklings sold (riel/HH)	Mean	45,667		12,500	32,400
		Minimum	2,000		5,000	2,000
		Maximum	100,000		20,000	100,000
		N	3.9%	0.0%	1.6%	1.7%
	Income from eggs (riel/HH)	Mean	185,000	186,085	89,063	161,694
		Minimum	30,000	1,000	20,000	1,000
		Maximum	350,000	1,080,000	328,500	1,080,000
		N	5.2%	23.0%	6.3%	11.0%

There were also 1.3% of households which sold other livestock such as Muscovy ducks and cattle. They earned on average 606,200 riel per household last year.

**Table 28: Cash income from other livestock and households selling in 2007**

Category	Income from other livestock	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean		150,000	1,600,000	633,333
	Minimum		100,000	1,600,000	100,000
	Maximum		200,000	1,600,000	1,600,000
	N	0.0%	2.3%	0.7%	0.9%
SRI non-adopting households	Mean	700,000		150,000	590,000
	Minimum	20,000		150,000	20,000
	Maximum	1,300,000		150,000	1,300,000
	N	5.2%	0.0%	0.8%	1.7%

### C. Cash income from fish

Cash income from fish include fish that farmers raised in their ponds, fish harvested from trapped ponds, and fish harvested from public open-access areas such as canals, rice fields, creeks, lakes and rivers. In total, 8.8% of the interviewed households earned income from fish sold, on average 278,500 riel a year. SRI-adopting households selling fish earned twice as much income as SRI non-adopting households. However, there were differences among studied provinces.

**Table 29: Cash income from fish sold and households selling in 2007**

Category	Total income from fish sold (riel/HH)	Province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean	99,545	280,000	468,000	323,293
	Minimum	50,000	100,000	40,000	40,000
	Maximum	300,000	600,000	4,100,000	4,100,000
	% of HHs getting income	10.0%	11.5%	13.2%	11.8%
SRI non-adopting households	Mean	87,500	466,667	60,000	156,000
	Minimum	10,000	100,000	20,000	10,000
	Maximum	400,000	1,000,000	100,000	1,000,000
	% of HHs getting income	10.4%	3.4%	3.1%	5.1%

There is no remarkable difference between SRI-adopting and SRI non-adopting households in Kampong Speu province in terms of percentage of household selling fish and the amount of money earned (less than 100,000 riel per household). In Kampot province, 11.5% of SRI-adopting households did sell fish but earned only 280,000 riel on average, while 3.4% of SRI non-adopting households earned up to 466,700 riel on average. In Takeo province, 13.2% of SRI-adopting households earned 468,000 riel on average from selling fish, while only 3.1% of SRI non-adopting households sold fish and they earned on average little as 60,000 riel.

Table 30 shows in more detail the amount of fish kept for home consumption and sold by sources. It presents also the percentage of households keeping and/or selling fish among total sample, for SRI-adopting and SRI non-adopting households. In general, about a quarter of the interviewed households collected fish for their own consumption, and while 8.8% sold fish for cash income.

**Table 30: Fish caught for home consumption and sold in 2007**

Category	Fish		By province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	Fish raised or trapped for home consumption (kg/HH)	Mean	45	81	46	53
		Minimum	4	10	5	4
		Maximum	360	548	365	548
		% HHs keeping	21.8%	25.3%	36.4%	29.0%
	Fish raised or trapped for sale (riel/HH)	Mean	107,500	342,857	247,333	241,250
		Minimum	50,000	100,000	40,000	40,000
		Maximum	300,000	600,000	800,000	800,000
		% HHs selling	5.5%	8.0%	9.9%	8.0%
	Natural fish caught for home consumption (kg/HH)	Mean	56	37	29	38
		Minimum	4	3	5	3
		Maximum	365	365	360	365
		% HHs keeping	20.9%	29.9%	27.8%	26.1%
	Natural fish caught for sale (riel/HH)	Mean	90,000	133,333	565,000	361,111
		Minimum	50,000	100,000	30,000	30,000
		Maximum	200,000	200,000	3,600,000	3,600,000
		% HHs selling	4.5%	3.4%	6.6%	5.2%
SRI non-adopting households	Fish raised or trapped for home consumption (kg/HH)	Mean	13	15	56	33
		Minimum	4	4	5	4
		Maximum	50	50	547	547
		% HHs keeping	22.1%	17.2%	20.3%	19.9%
	Fish raised or trapped for sale (riel/HH)	Mean	108,000	200,000	70,000	126,250
		Minimum	20,000	100,000	70,000	20,000
		Maximum	400,000	300,000	70,000	400,000
		% HHs selling	6.5%	2.3%	0.8%	2.7%
	Natural fish caught for home consumption (kg/HH)	Mean	16	27	28	26
		Minimum	2	5	1	1
		Maximum	50	80	180	180
		% HHs keeping	13.0%	10.3%	30.5%	19.9%
	Natural fish caught for sale (riel/HH)	Mean	40,000	1,000,000	56,667	166,250
		Minimum	10,000	1,000,000	20,000	10,000
		Maximum	100,000	1,000,000	100,000	1,000,000
		% HHs selling	5.2%	1.1%	2.3%	2.7%

### 4.2.3. Household cash income from secondary and tertiary sectors

In total, each household earned on average 1.32 million riel. However, some household has no income from non-farming activities. 77.5% of the total sample had income from non-farming, averaging 1.7 million riel a year. In Takeo, 85.3% could earn on average 1.97 million riel a year and a maximum up to 18 million riel. In Kampong Speu province, 79% could earn on average 1.52 million riel and a maximum of 24 million riel. Only 63.2% of the households interviewed in Kampot province earned income from non-farming activity. Their average income from non-farming sources in Kampot was low at 1.37 million riel. In general, SRI-adopting households had non-farming income higher than SRI non-adopting household, especially in Kampong Speu and Takeo provinces.

**Table 31: Total non-farming income**

Category	Total non farming income (riel/HH)	By province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean among total sample	1,364,364	872,874	1,853,609	1,453,779
	Mean among HHs getting	1,725,057	1,432,830	2,186,680	1,887,743
	Minimum	50,000	50,000	5,000	5,000
	Maximum	24,000,000	12,300,000	18,000,000	24,000,000
	% of HHs getting	79.1%	60.9%	84.8%	77.0%
SRI non-adopting households	Mean among total sample	984,838	861,483	1,486,070	1,167,803
	Mean among HHs getting	1,243,156	1,314,895	1,729,245	1,495,607
	Minimum	30,000	30,000	3,000	3,000
	Maximum	5,200,000	7,200,000	9,600,000	9,600,000
	% of HHs getting	79.2%	65.5%	85.9%	78.1%

As seen in Table 32, the majority of both SRI-adopting and SRI non-adopting households have their own business or petty trade or have members working in a garment factory. In general, the majority of rural households are involved in non-farming or self-employed jobs.

**Table 32: Sources of non-farming income**

	Income from (in riel/HH)	Kampong Speu		Kampot		Takeo		Total	
		Mean	% HH	Mean	% HH	Mean	% HH	Mean	% HH
SRI-adopting HH	Work at garment factory	1,651,471	30.9%	1,840,833	13.8%	1,666,275	33.8%	1,682,680	27.9%
	Sell labor	611,000	9.1%	334,545	12.6%	944,762	13.9%	705,476	12.1%
	Work in construction sector	474,444	16.4%	933,333	3.4%	1,001,818	14.6%	776,279	12.4%
	Government worker	1,321,667	5.5%	605,714	8.0%	2,312,857	13.9%	1,786,471	9.8%
	Other employee (non gov't)	3,668,750	7.3%	3,187,500	4.6%	1,966,667	4.0%	2,994,444	5.2%
	Self-employed service	850,000	3.6%	1,387,500	13.8%	1,281,818	21.9%	1,272,449	14.1%
	Own business/petty trade	1,102,857	31.8%	858,125	18.4%	1,228,415	27.2%	1,116,250	26.4%
SRI non-adopting HH	Work at garment factory	1,398,696	29.9%	1,670,000	11.5%	1,794,595	28.9%	1,646,714	24.0%

Sell labor	627,778	11.7%	727,933	17.2%	572,353	13.3%	641,439	14.0%
Work in construction sector	609,412	22.1%	650,000	9.2%	941,935	24.2%	799,286	19.2%
Government worker	1,750,000	2.6%	1,825,000	9.2%	1,695,455	8.6%	1,750,000	7.2%
Other employee (non gov't)	20,000	1.3%	-	0.0%	900,000	2.3%	680,000	1.4%
Self-employed service	565,000	7.8%	342,000	5.7%	1,466,000	17.2%	1,131,879	11.3%
Own business/petty trade	864,271	31.2%	1,173,636	25.3%	802,179	30.5%	915,853	29.1%

The present non-farming income sources are as same as in the past 3 to 5 years for 46.6% of SRI-adopting households and 50.3% of SRI non-adopting households. The majority of the rest have little increase in their income, and followed by medium increase. Only 10.3% of the SRI-adopting households and 12.7% of SRI non-adopting households have decreased their income from non-farming sources.

**Table 33: Changes in non-farming income in the past 3 to 5 years**

Category	Change of income from non-farming income	Province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Strongly decreased	0.0%	0.0%	0.7%	0.3%
	Medium decreased	1.8%	2.3%	2.0%	2.0%
	Little decreased	11.8%	8.0%	6.0%	8.3%
	No change	37.3%	66.7%	41.7%	46.6%
	Little increased	24.5%	13.8%	31.8%	25.0%
	Medium increased	23.6%	8.0%	16.6%	16.7%
	Strongly increased	0.9%	1.1%	1.3%	1.1%
	Total sample	110	87	151	348
SRI non-adopting households	Medium decreased	2.6%	4.6%	2.3%	3.1%
	Little decreased	11.7%	4.6%	11.7%	9.6%
	No change	51.9%	63.2%	40.6%	50.3%
	Little increased	27.3%	20.7%	29.7%	26.4%
	Medium increased	6.5%	6.9%	15.6%	10.6%
	Total sample	77	87	128	292

#### **4.2.4. Household investments since 2006**

Responding to the question about where the household have made any investment exceeding 100,000 riel, around 14% in the total sample had done this since 2006. On average, they had invested 846,000 riel, with a maximum of 11 millions riel. However, the majority of the cases did their investment in 2007; some had invested in 2006, and a very few had done this in early 2008.

The main source of capital for investments was from own money in hand which they saved from non-farming income or from selling agri-produce. Another source of capital was loan

from saving groups, MFI (ACLEDA, AMRET), or a few from local money lenders. Few households got their money for investment from relatives.

Concerning with what they had invested in, some SRI-adopting households invested in buying productive assets such as a rice mill, water pump, or motorbike. Some others invested in buying breeding animals for raising, hiring labor for farming, or other production costs during the cropping cycle. For SRI non-adopting households, they bought assets such as loudspeakers (for selling a service), motorbikes or cattle. Some others bought piglets for raising.

**Table 34: Investments since 2006 (2006-2008)**

Category	Investments	Province			Total
		Kampong Speu	Kampot	Takeo	
SRI-adopting households	Mean	2,306,923	568,125	508,862	928,224
	Minimum	100,000	100,000	100,000	100,000
	Maximum	11,000,000	2,000,000	2,000,000	11,000,000
	% of HHs investing	11.8%	18.4%	19.2%	16.7%
SRI non-adopting households	Mean	734,000	834,444	605,294	692,581
	Minimum	170,000	100,000	100,000	100,000
	Maximum	2,000,000	4,000,000	2,500,000	4,000,000
	% of HHs investing	6.5%	10.3%	13.3%	10.6%

#### 4.3. SRI AS DEFINED BY FARMERS

Most farmers defined SRI methods based on the application of some of the 12 principles promoted by CEDAC and other agencies. Generally, farmers in some villages considered SRI practice to require the application of at least 3 of the 12 principles, and in some other villages, farmers defined SRI as based on the application of at least 5 of the 12 principles.

The most important requirements of SRI were defined as following (a) in-row transplanting, (b) single seedling transplanting, (c) use of young seedlings, (d) using organic fertilizer, and (e) leveling the rice field well (for good/minimum water application). The most difficulty that farmers reported in the application of SRI principles was (a) in-row transplanting and (b) field leveling. This means that sometimes farmers adopted just several of the 12 principles, and they did not consider themselves as 'SRI-adopting farmers' because they did not utilize in-row transplanting or were still using chemical fertilizer.

There is a difference between the villages where an organic rice producer group existed or did not. It is learned that the villages where an organic rice producer group existed adopted a much stricter way to define SRI as farmers there applied at least 7 of the 12 principles.

It is also important to note that the way farmers defined what constituted SRI practice was much influenced by the requirement of the project from which they learned the methods. This means that farmers seemed to follow the projects' instructions for defining SRI in their village. Generally, the projects were most strict on in-row transplanting, one seedling, and field leveling, etc. to define SRI. There was confusion among some farmers who defined a SRI-adopting farmer in terms of joining a farmer association or collaborating with the project.

#### 4.4. CONVENTIONAL RICE PRACTICES AND LEVEL OF SRI ADOPTION

Currently, interviewed households growing rice had an average area of 0.86 hectare, either cultivated by conventional practices or SRI methods. Last season they harvested about 1,583 kg per household or 2,053 kg per hectare. On average, SRI-adopting households grew rice in a bigger field (0.93 hectare) than SRI non-adopting households (0.76 hectare).

Comparing overall rice yield, SRI-adopting household get 2196 kg per hectare, 17% higher on average than SRI non-adopting households. In Kampot province, there is no remarkable difference between SRI-adopting and SRI non-adopting households in term of overall rice yield. SRI-adopting household in Kampong Speu and Takeo got overall rice yields 29% and 22%, respectively, higher than SRI non-adopting households.

It was reported that an SRI-adopting household could get a maximum yield at 5,300 kg per hectare in Takeo province, while one SRI non-adopting household could get up to 6667 kg per hectare in Kampot province. This latter case should be further investigated to learn how this farmer can obtain such a yield? Does he apply some of the SRI principles, and how does he define himself? As a SRI user or non-SRI user?

**Table 35: Rice production in general**

Category	Variables		By province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	Total cultivated field (ha/HH)	Mean	<b>0.96</b>	<b>1.01</b>	<b>0.87</b>	<b>0.93</b>
		Minimum	0.08	0.12	0.10	0.08
		Maximum	2.91	3.20	3.00	3.20
	Total paddy harvested (kg/HH)	Mean	<b>1,764</b>	<b>1,926</b>	<b>1,863</b>	<b>1,848</b>
		Minimum	83	100	260	83
		Maximum	7,440	9,000	6,000	9,000
	Overall paddy yield (kg/ha)	Mean	<b>2,065</b>	<b>2,067</b>	<b>2,365</b>	<b>2,196</b>
		Minimum	55	50	722	50
		Maximum	4,920	5,133	5,333	5,333
SRI non-adopting households	Total cultivated field (ha/HH)	Mean	<b>0.82</b>	<b>0.72</b>	<b>0.76</b>	<b>0.76</b>
		Minimum	0.04	0.03	0.06	0.03
		Maximum	6.00	3.50	4.00	6.00
	Total paddy harvested (kg/HH)	Mean	<b>1,155</b>	<b>1,300</b>	<b>1,312</b>	<b>1,267</b>
		Minimum	66	200	120	66
		Maximum	7,500	8,000	6,000	8,000
	Overall paddy yield (kg/ha)	Mean	<b>1,600</b>	<b>2,043</b>	<b>1,941</b>	<b>1,882</b>
		Minimum	400	500	720	400
		Maximum	4,800	6,667	4,800	6,667

Differentiating the performance between conventional practice and SRI method discussed below.

#### 4.4.1. Conventional rice practices

##### A. Rice production

Among farmers using conventional practices, 5.2% of the total interviewed household grow rice without chemical fertilizer and pesticides and generally use good rice varieties. With such practices, cultivating on average 0.42 hectare per household, they get a yield at 2,260 kg per hectare. There is not much difference between SRI-adopting and SRI non-adopting household in term of field size, rice harvest, and rice yield. They got yield maximum at 4,080 kg per hectare and minimum at 660 kg per hectare.

**Table 36: Organic and good-quality rice production with conventional practices**

Category	Organic and high quality rice production by conventional practices		Province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	% of HHs practicing		10.0%	5.7%	1.3%	5.2%
	Area (ha/HH)	Mean	0.37	0.60	0.18	0.41
		Minimum	0.03	0.20	0.10	0.03
		Maximum	0.80	1.40	0.25	1.40
	Harvested paddy (kg/HH)	Mean	762	850	500	758
		Minimum	96	512	400	96
		Maximum	2,000	1,500	600	2,000
	Paddy yield (kg/ha)	Mean	2,358	1,818	3,200	2,301
		Minimum	1,000	1,024	2,400	1,000
		Maximum	4,080	3,400	4,000	4,080
SRI non-adopting households	% of HHs practicing		5.2%	3.4%	6.3%	5.1%
	Area (ha/HH)	Mean	0.50	0.93	0.23	0.44
		Minimum	0.10	0.70	0.02	0.02
		Maximum	1.00	1.30	0.50	1.30
	Harvested paddy (kg/HH)	Mean	737	1,800	583	867
		Minimum	66	1,500	70	66
		Maximum	1,200	2,400	1,500	2,400
	Paddy yield (kg/ha)	Mean	1,395	1,955	2,713	2,210
		Minimum	660	1,846	1,440	660
		Maximum	1,920	2,143	3,750	3,750
Total	% of HHs practicing		8.0%	4.6%	3.6%	5.2%
	Field (ha/HH)	Mean	0.40	0.72	0.22	0.42
		Minimum	0.03	0.20	0.02	0.02
		Maximum	1.00	1.40	0.50	1.40
	Harvested paddy (kg/HH)	Mean	755	1,207	567	807
		Minimum	66	512	70	66
		Maximum	2,000	2,400	1,500	2,400
	Paddy yield (kg/ha)	Mean	2,101	1,869	2,811	2,260
		Minimum	660	1,024	1,440	660
		Maximum	4,080	3,400	4,000	4,080

With conventional practices, 66.7% of the total interviewed households grow rice with additional chemical fertilizer and pesticides for some. They cultivate on average on 0.74 hectare per household and got a yield at 1,882 kg per hectare.

Among SRI-adopting households, 41.4% grow still continue grow some of their rice with conventional practices on an area of 0.7 hectare per household. They got a yield at 1,890 kg per hectare with conventional practices. 96.9% of SRI non-adopting households growing rice by conventional practices and using additional chemical fertilizers, on an average area of 0.76 hectare, got a yield of 1,878 kg per hectare, approximately equal to that of SRI-adopting households, although with more costly inputs.

In Kampot province, there were only 32.2% of SRI-adopting household which still continued to grow rice with conventional practices on some of their rice land.

**Table 37: Non-organic and normal-quality rice production with conventional practices**

Category	Chemical and normal quality rice production by conventional practices		By province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	% of HHs practicing		50.0%	32.2%	40.4%	41.4%
	Area (ha/HH)	Mean	0.69	0.75	0.69	0.70
		Minimum	0.07	0.09	0.10	0.07
		Maximum	2.25	2.90	1.95	2.90
	Harvested paddy (kg/HH)	Mean	1,080	1,152	1,202	1,146
		Minimum	100	120	40	40
		Maximum	2,820	3,000	2,880	3,000
	Paddy yield (kg/ha)	Mean	1,932	1,782	1,900	1,890
		Minimum	667	400	114	114
		Maximum	4,000	4,356	3,600	4,356
SRI non-adopting households	% of HHs practicing		94.8%	96.6%	98.4%	96.9%
	Area (ha/HH)	Mean	0.83	0.71	0.76	0.76
		Minimum	0.04	0.03	0.06	0.03
		Maximum	6.00	3.50	4.00	6.00
	Harvested paddy (kg/HH)	Mean	1,162	1,282	1,296	1,257
		Minimum	100	200	120	100
		Maximum	7,500	8,000	5,000	8,000
	Paddy yield (kg/ha)	Mean	1,611	2,046	1,921	1878
		Minimum	400	500	720	400
		Maximum	4,800	6,667	4,800	6,667

## B. General technical practices

It is observed that there was very much difference between the technical practices of conventional methods and SRI methods. The general technical practices for conventional rice cultivation are:

- Plowing and harrowing the field (sometimes trying to level); putting on basal fertilizer
- Uprooting seedlings at age of around 1 month, cutting leaves and keeping for 1 to 2 nights before transplanting

- Transplanting 5 or more seedlings per clump; triangular transplanting with about 15 to 20 cm space between clumps
- Chemical fertilizer is applied as a top-dressing after transplanting
- Farmers try to keep as much as water on the transplanted rice field as is available
- Weeds are not carefully controlled (only once per cycle)

It is difficult to achieve the intensification of productivity with these conventional methods.

#### 4.4.2. SRI adoption and its trends

With SRI innovations, 33.6% grow good-quality rice varieties and without using chemical fertilizer. They cultivated on average 0.44 hectare and got a yield at 2,748 kg per hectare. In Kampong Speu province, there was one case of a maximum yield at 9600 kg per hectare. However, there was also a household that got very low yield at 300 kg per household.

However, along with applying parts of the SRI technical package, 75.9% of SRI-adopting households are still using some additional chemical fertilizer on their SRI fields. In most cases, they grow normal-quality rice varieties in the deep field and use additional chemical fertilizer. With such practice, they got an average yield of 2,492 kg per hectare, lower than the yield of organic, good-quality SRI rice. It is important to note that with such practices, 0.9% could not harvest their rice because of some damage.

**Table 38: Rice production with SRI methods**

Variables		Average by province			Total average	
		Kampong Speu	Kampong	Takeo		
Organic, high-quality SRI	% of HHs practicing		45.5%	34.5%	24.5%	33.6%
	Area (ha/HH)	Mean	0.44	0.52	0.39	0.44
		Minimum	0.03	0.03	0.04	0.03
		Maximum	2.91	2.00	2.00	2.91
	Harvested paddy (kg/HH)	Mean	927	1,235	964	1,018
		Minimum	44	50	80	44
		Maximum	6,000	6,000	3,960	6,000
	Paddy yield (kg/ha)	Mean	2,425	2,856	3,095	2,748
		Minimum	300	1,250	333	300
Maximum		6,000	9,600	7,360	9,600	
Chemical, normal-quality SRI	% of HHs practicing		64.5%	74.7%	84.8%	75.9%
	Area (ha/HH)	Mean	0.59	0.75	0.58	0.63
		Minimum	0.03	0.10	0.04	0.03
		Maximum	2.30	2.00	3.00	3.00
	% of HHs harvesting		62.7%	74.7%	84.1%	75.0%
	Harvested paddy (kg/HH)	Mean	1,158	1,465	1,349	1,327
		Minimum	50	90	84	50
		Maximum	7,200	5,280	6,000	7,200
	Paddy yield (kg/ha)	Mean	2,393	2,143	2,724	2,492
Minimum		55	50	667	50	
Maximum		6,857	7,000	6,000	7,000	

There are some differences in the level of SRI adoption among the farmers considered to be SRI-adopting. Some farmers have applied SRI technical principles well and some others not so well.

Well applied	Medium applied	Not well applied	Just change some conventional practices
<ul style="list-style-type: none"> <li>- Good leveling of field</li> <li>- In-row transplanting</li> <li>- Use only organic fertilizer</li> <li>- Transplanting single seedling per hill</li> <li>- Transplanting of 12-15 day-old seedlings</li> <li>- Transplanting immediately after uprooting</li> <li>- Shallow transplanting</li> <li>- Wide spacing of transplanted seedlings (25 to 30 cm)</li> <li>- Lower density sowing</li> <li>- Taking much care of field and weeding several times</li> </ul>	<ul style="list-style-type: none"> <li>- Transplanting 1-3 seedlings</li> <li>- 15-25 day-old seedlings to be transplanted</li> <li>- Using much organic fertilizer with some chemical fertilizer</li> <li>- Transplanting immediately after uprooting</li> <li>- Wide spacing of transplanted seedlings (25 to 30 cm)</li> <li>- Lower density sowing</li> </ul>	<ul style="list-style-type: none"> <li>- Transplanting of 15-25 day-old seedlings</li> <li>- Transplanting 1-3 seedlings per hill</li> <li>- Transplanting immediately after uprooting</li> <li>- Wide spacing of transplanted seedlings (25 to 30 cm)</li> </ul>	<ul style="list-style-type: none"> <li>- Lower density sowing</li> <li>- 1-1.5 month-old seedlings to be transplanted</li> <li>- Transplanting 2-5 seedlings per hill</li> </ul>

#### 4.4.3. Production costs: chemical fertilizers and seeds

Table 37 indicates that 92.8% of SRI-adopting household applied some chemical fertilizers, on average 114 kg on their rice field in the last 3 years. The number of households using chemical fertilizer has decreased to 82.5% at present, and they apply on average 63 kg, i.e., 10% of SRI-adopting households have stopped using chemical fertilizer at present.

Among SRI non-adopting households, the percentage of household using chemical fertilizers reduced from 92.5% to 87%. The average amount used per household has been reduced from 90 kg in the last 3 years to 67 kg at present. So there are similar trends in both groups.

**Table 39: Chemical fertilizer application and expense among valid samples**

Category	Chemical fertilizer application		Province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	In the last 3 years (kg/HH/year)	Mean	113	94	125	114
		Minimum	10	5	15	5
		Maximum	500	300	400	500
		N	90.9%	90.8%	95.4%	92.8%
	In the last 3 years (riel/HH/year)	Mean	144,585	111,348	159,958	143,310
		Minimum	10,000	5,000	25,000	5,000
		Maximum	700,000	375,000	480,000	700,000

		N	90.9%	90.8%	95.4%	92.8%
	At present (kg/HH/year)	Mean	59	57	70	63
		Minimum	5	5	10	5
		Maximum	150	250	300	300
		N	80.0%	82.8%	84.1%	82.5%
	At present (kg/HH/year)	Mean	112,865	106,813	131,272	119,492
		Minimum	10,000	7,500	17,000	7,500
		Maximum	300,000	500,000	480,000	500,000
		N	80.0%	82.8%	84.1%	82.5%
SRI non-adopting households	In the last 3 years (kg/HH/year)	Mean	91	81	95	90
		Minimum	15	5	10	5
		Maximum	400	500	450	500
		N	89.6%	88.5%	96.9%	92.5%
	In the last 3 years (riel/HH/year)	Mean	120,457	107,760	122,254	117,661
		Minimum	30,000	7,000	13,000	7,000
		Maximum	450,000	600,000	630,000	630,000
		N	89.6%	88.5%	96.9%	92.5%
	At present (kg/HH/year)	Mean	56	66	73	67
		Minimum	3	5	5	3
		Maximum	200	250	250	250
		N	85.7%	83.9%	89.8%	87.0%
	At present (kg/HH/year)	Mean	104,477	127,781	139,120	126,859
		Minimum	6,000	10,000	7,500	6,000
		Maximum	300,000	500,000	500,000	500,000
		N	85.7%	83.9%	89.8%	87.0%

In the last 3 years, 12.5% of the total interviewed household spent on average 48,200 riel per season on rice seed. In 2007, only 0.5% of interviewed households spent 91,700 riel on average.

Among SRI-adopting households, 16.1% spent cash on buying rice seed. Recently, only 0.3% spent money on rice seeds. In other words, almost none of these farmers need to buy additional seeds for rice production at present, especially in Kampot and Takeo province.

Among SRI non-adopting households, the numbers of household who bought additional seeds also reduced from 8.2% in the last 3 years to 0.7% at present. It appears that the practice of using a reduced seed rate is spreading, even among farmers who do not consider themselves to be practicing SRI.

**Table 40: Annual expense in cash on rice seed in the last 3 years**

Category	Annual expense in cash on rice seed		Province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting households	In the last 3 years	Mean	42,576	59,670	40,422	48,946
		Minimum	4,500	8,400	2,500	2,500
		Maximum	151,000	420,000	160,000	420,000
		% HHs spending	22.7%	25.3%	6.0%	16.1%
	At present	Mean	200,000			200,000
		Minimum	200,000			200,000

		Maximum	200,000			200,000
		% HHs spending	0.9%	0.0%	0.0%	0.3%
SRI non-adopting households	In the last 3 years	Mean	63,493	30,133	20,129	46,675
		Minimum	5,000	16,000	3,000	3,000
		Maximum	420,000	45,000	28,400	420,000
		% HHs spending	18.2%	3.4%	5.5%	8.2%
	At present	Mean	15,000		60,000	37,500
		Minimum	15,000		60,000	15,000
		Maximum	15,000		60,000	60,000
		% HHs spending	1.3%	0.0%	0.8%	0.7%

Non-rice seeds bought included watermelon, bean, cabbage, chili, cucumber, eggplant and other vegetables. In contrast to rice seeds, expenditures for non-rice seeds are increasing at present. 1.9% of the total interviewed households spent money on non-rice seeds in the last 3 years, and this increased to 9.7% at present. The total average expense increased from 23,600 riel to 35,800 riel per household, an indication of diversified production.

Among SRI-adopting households, 2.3% spent money on non-rice seeds in the last 3 years and this increased to 11.8% at present. Meanwhile, 1.4% of SRI non-adopting households spent cash in the last 3 years on non-rice seeds, and this increased to 7.2% at present.

**Table 41: Annual expense in cash on seeds for non-rice crops in the last 3 years**

Category	Annual expense in cash on non-rice seed		Province			Total
			Kampong Speu	Kampot	Takeo	
SRI-adopting household	In the last 3 years	Mean	51,250		15,683	24,575
		Minimum	12,500		500	500
		Maximum	90,000		45,000	90,000
		% HHs spending	1.8%	0.0%	4.0%	2.3%
	At present	Mean	46,014	31,765	30,629	38,675
		Minimum	9,100	19,200	1,500	1,500
		Maximum	105,000	48,000	85,000	105,000
		% HHs spending	19.1%	6.9%	9.3%	11.8%
SRI non-adopting household	In the last 3 years	Mean	15,000	6,500	32,500	21,625
		Minimum	15,000	6,500	15,000	6,500
		Maximum	15,000	6,500	50,000	50,000
		% HHs spending	1.3%	1.1%	1.6%	1.4%
	At present	Mean	28,456	31,333	31,489	30,167
		Minimum	10,000	20,000	5,000	5,000
		Maximum	43,200	44,000	90,000	90,000
		% HHs spending	11.7%	3.4%	7.0%	7.2%

#### 4.5. PERCEPTION ON POTENTIALS AND CONSTRAINTS OF SRI ADOPTION

It was learned that there is a much difference between the perceptions of SRI between SRI-adopting and SRI non-adopting farmers even if they all realize that it can increase yield and save some resources. SRI non-adopting farmers still think that they are not able to apply SRI because there are many constraints for them to adopt SRI methods.

**Table 42: Perception on potentials and constraints of farmers on SRI**

	<b>Potentials</b>	<b>Constraints</b>
Perceptions of SRI users	<ul style="list-style-type: none"> <li>- It is well realized that SRI can help farmers increase their rice yield, especially for smallholder farmers.</li> <li>- SRI is not very difficult to apply, and it can help farmers reduce their labour needed for rice production. SRI just requires some technical knowledge and practice.</li> <li>- Most SRI-adopting farmers are those who collaborate with projects and can therefore get strong support from the projects.</li> <li>- SRI does not just increase yield, but also helps in reducing cost of production, including seed, chemical fertilizer and labour, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- It is hard to convince farmers to apply SRI at the beginning of an extension project; many wait until other farmers start applying SRI, preferring to just wait and see.</li> <li>- SRI requires some better possibilities for farmers to adopt, especially knowledge and some available physical assets.</li> </ul>
Perceptions of non-SRI users	<ul style="list-style-type: none"> <li>- It is realized that SRI methods can enable farmers to increase their rice yield.</li> <li>- With SRI methods, farmers can save some seed, time, and cost of chemical fertilizer.</li> </ul>	<ul style="list-style-type: none"> <li>- It is hard to apply SRI as it is very different from conventional practices, and farmers will require more time and labour, especially SRI requires doing weeding many times.</li> <li>- SRI method is very risky when one transplants only one seedling.</li> <li>- Transplanting in-row and leveling the field will take more time and makes more difficulty for farmers.</li> <li>- SRI methods can be applied if farmers have better conditions, such as the rice field is near the house, farmers have enough organic fertilizer, and they are able to control water in the rice field.</li> <li>- Projects strongly support only those farmers who collaborate with them.</li> </ul>

**V. DISCUSSIONS: ADOPTION AND NON-ADOPTION OF SRI**

In responding to the research questions, the ensuing data-gathering, discussions and analysis elaborated both qualitative and quantitative findings. These also raised other questions for further study.

**5.1. PROCESS AND TRENDS OF SRI ADOPTION**

Generally, SRI has been started in each village based on the support of an SRI extension project, from the government, a development project, or an NGO. There are usually around 5 to 10 households who started experimenting SRI in each village, and after the first year results, some other farmers followed to adopt SRI as well. After 3 to 4 years of experience with SRI adoption in each village, the progress increases to where around 50% of households in each village are using SRI methods.<sup>1</sup>

The process is started from a very suitable rice field which has been selected by farmers for experimenting with SRI methods in the first year. Then after successful experience, the size of the rice area for applying SRI is increased year by year. However, the speed of increasing the size of the rice field for applying SRI seems still very slow, and it has differed by the purposes of each farmer as they are mainly applying SRI on their demonstration rice fields.

There is also a trend that in the applications of SRI methods in the first year, farmers try to apply many technical principles to experiment and see how SRI may benefit them as well as to show their strong collaboration with the projects. Then after a few years, farmers drop some of the difficult practices, such as in-row transplanting, field leveling, or making raised bed for sowing seed, etc.

It was observed that the progress of SRI adoption in each village differs by how long the projects worked and supported the villages. This means that in villages which were supported by projects for more years, the progress of SRI adoption is also higher. Other factors like geographical setting, physical assets, and livelihood systems also determine the difference of progress in SRI adoption from village to village as well.

**5.2. PROFILE OF SRI USERS AND NON-SRI USERS**

The differences in profiles of SRI users and non-SRI users are as follows:

SRI Users	Non-SRI Users
- Have more knowledge and experience in	- Are not so interested in testing new innovation

<sup>1</sup> Note: In northern Myanmar, where an NGO, the Metta Development Foundation, has used more intensive ‘farmer field school’ methods for training in and dissemination of SRI, a four-year evaluation of SRI spread and impacts showed almost 100% adoption with practically no disadoption. Humayun Kabir and Norman Uphoff, ‘Results of disseminating the System of Rice Intensification (SRI) with farmer field school methods in northern Myanmar,’ *Experimental Agriculture*, 43:4 (2007).

<p>agriculture</p> <ul style="list-style-type: none"> <li>- Are interested in applying new innovations</li> <li>- Are active and committed to farming activity</li> <li>- Collaborate with projects or are joining in the farmer association</li> <li>- Are rice-based households</li> <li>- Have more suitable physical and human capital including labour, proper field, organic fertilizer, and plowing facility, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- Take less interest in farming activity</li> <li>- Use much chemical fertilizer</li> <li>- Poor knowledge and experience in agriculture</li> <li>- Are not collaborating with projects</li> <li>- Non-farm activities are the main household economic activity</li> <li>- Lack of labour for farming activity</li> <li>- Not much or enough physical capital</li> <li>- Some SRI non-adopting farmers think that SRI could give them much benefit, but this is not necessary while their production is good enough</li> </ul>
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It was learned that most farmers who are members of a farmer association or committee or are the farmer trainer in the village always try to apply more technical principles of SRI as they are expected to make demonstrations for other farmers.

The distance from the rice field to the farmer’s house is a factor determining the size of the rice field on which SRI is applied for each household. The most preferable rice fields for applying SRI are located nearby farmers' house as they think that it is very difficult to take care of the field properly if SRI is applied on rice fields very far away from their house.

**5.3. CHANGES IN SOCIAL AND ECONOMIC CONDITION OF SRI USERS AND NON-SRI USERS**

The changes in social and economic conditions of SRI users are related to:

- The opportunities to be involved with other social occasions and activities, like some farmers have joined a savings group or farmer association or organic producer group.
- Collaboration in the village is remarkably improved according to the project's support, especially promoting a culture of experience sharing.
- Apparently, SRI could make much profit for farmers, such as saving seed, labour and time, reducing/eliminating the use of chemical fertilizer, as well as getting higher yield. Moreover, organic rice producers can get a higher selling price than for normal rice. They also improve their household investment capacity through the accessibility to the small credit services of their savings group as well.

On the contrary, the social and economic conditions of non-SRI users seem not much changed. On the contrary, they seem to believe that the SRI users have benefited from project support or intervention that is unfair in the village. They have expressed the idea that in spite of a few years of project activity, they have never been informed or supported so far.

**5.4. AGRO-ECOLOGICAL PROFILE**

Regarding the availability of proximate lands and the installment of house settlements as well as the topographical landscape of the rice field, we have learned that:

- Adoption partially depends on the suitability of the location of the rice field. Farmers much prefer to apply SRI on rice fields where they are able to control water, that are level, and nearby the house.

- In villages where the house settlements are dense, the progress of SRI adoption seems faster than with scattered house settlements. This could be due to the fact that farmers can more easily share their experiences with each other.

### 5.5. SYNTHESIS ANALYSIS ON THE COMPARISON OF SRI ADOPTION AND NON-ADOPTION

Table below has shown that almost all variable indicators, SRI adopting farmers have better performed than non SRI adopting farmers both in term of absolute and in term of percentage. It is also indicated that SRI adopting farmers is better living standard than non SRI adopting farmers. However, it is a present situation. We do not have data to explain how those SRI become better over the last evolution. We cannot answer whether before project started SRI farmers were the similar living standard as non adopting farmers or whether SRI adopting farmers have just become better since the collaborating with the project or whether project mostly attracts those are better living in the communities?

It is noticed that most of SRI adopting farmers are the members of farmer association which supported by the CEDAC program. However, it is observed the percentage of household using chemical fertilizer and amount of chemical fertilizer uses are not much different amount SRI adopting and non SRI adopting farmers.

**Table 43: Comparison on the Facts and Performance of SRI Adopting Farmers and non-SRI Adopting Farmers**

No	Description of Variables	SRI Adopting Farmers	Non-SRI Adopting Farmers
1	Member of village-based farmer association	9.8%	2.7%
2	Own cattle (On average: Head/HH)	3.3	2.6
3	Owned land (On average: Ha/HH)	1.14	0.92
	Kampong Speu	1.18	0.99
	Kampot	1.17	0.84
	Takeo	1.10	0.94
4	Number of household selling paddy in percentage in 2007/08	38.2%	23.6%
	Kampong Speu	37.3%	20.8%
	Kampot	44.8%	23.0%
	Takeo	35.1%	25.8%
5	Amount of paddy sold in 2007/08 (in Kg/HH/Year)	796	587
	Kampong Speu	739	656
	Kampot	994	625
	Takeo	693	530
6	Number households having incomes from selling vegetable in percentage in 2007/08	35.1%	18.5%
	Kampong Speu	42.7%	15.6%
	Kampot	28.7%	12.6%
	Takeo	33.1%	24.2%
7	Amount of incomes from selling vegetable in	312,200	251,500

	2007/08 (Rield/HH/Year)		
	Kampong Speu	465,400	335,400
	Kampot	191,200	107,300
	Takeo	228,800	270,300
8	Number households having incomes from selling chicken in percentage in 2007/08	62.1%	50.0%
	Kampong Speu	45.5%	41.6%
	Kampot	77.0%	56.3%
	Takeo	65.5%	50.8%
9	Cash incomes from selling chicken in 2007/08 (Rield/HH/Year)	280,400	142,000
	Kampong Speu	310,400	130,000
	Kampot	251,000	146,900
	Takeo	285,100	144,200
10	Number of household having non-farm incomes in percentage in 2007/08	77.0%	78.1%
	Kampong Speu	79.1%	79.2%
	Kampot	60.9%	65.5%
	Takeo	84.8%	85.9%
11	Cash incomes from non-farms in 2007/08 (Rield/HH/Year)	1,887,700	1,495,600
	Kampong Speu	1,725,000	1,243,100
	Kampot	1,432,800	1,314,900
	Takeo	2,186,700	1,729,200
12	Number of household having expenditure on long-term investment in percentage in 2007/08	16.7%	10.6%
	Kampong Speu	11.8%	6.5%
	Kampot	18.4%	10.3%
	Takeo	18.2%	13.3%
13	Amount of long-term investment in 2007/08 (Rield/HH/Year)	928,200	692,600
	Kampong Speu	2,306,900	734,000
	Kampot	568,125	834,400
	Takeo	508,800	605,300
14	Number of household having expense on chemical fertilizer in percentage in 2007/08	82.5%	87.0%
	Kampong Speu	80.0%	85.7%
	Kampot	82.8%	83.9%
	Takeo	84.1%	89.8%
15	Amount of chemical fertilizer usage in 2007/08 (Kg/HH/Year)	63	67
	Kampong Speu	59	56
	Kampot	57	66
	Takeo	70	73

## **VI. CONCLUSIONS AND RECOMMENDATIONS**

### **6.1. OPTIMISTIC FUTURE OF SRI ADOPTION IN CAMBODIAN**

Base on the successful experiences of the SRI extension program in Cambodia, SRI will be further adopting and developed by farmers due its enabling of higher rice yield with reduced water requirements and lower cost. We conclude that SRI will be more adopted by farmers and on more areas of rice field as well. More than 100,000 Cambodian farmers may be involved in using SRI methods at present. But the SRI extension strategy still needs to be scaled up and speeded up for the adoption of SRI.

### **6.2. CAN WE DO SOMETHING MORE IN ORDER TO BRING MORE BENEFIT FROM SRI POTENTIALS TO FARMERS?**

The following ideas should be considered:

1. An SRI dissemination program should ensure that all rice farmers in Cambodia can learn about SRI ideas and can adapt these ideas to their own resource endowments and constraints to improve their rice production. This can be done first by identifying and selecting 'key farmers' from rice-farming communes all across Cambodia. There are now capable and motivated farmers willing to participate in such a program in almost all districts the country. Second, this initiative should support and enable 'key farmers' to establish demonstrations in all rice-growing communes throughout Cambodia and to conduct farmer-to-farmer training and extension activities.
2. A nationwide community-based seed selection program should be implemented and supported to ensure that all farmers have access to good-quality, locally-produced seeds. This can be done by selecting a few farmers per village to be trained and specialized as community-based rice seed producers. Some of the preferred varieties will be current 'modern' varieties, but since SRI methods give very good results with consumer-preferred 'traditional' varieties, the seed production program should include also the latter.
3. Promotion of a nationwide soil fertility management program is important, especially the promotion of green-manure cultivation during the early wet season; cultivation and use of nitrogen-fixing trees; and making and using compost on a wider scale. This can be done in integration with an SRI extension program. Where limitations on biomass supply constrain compost production, this program would support evaluations, demonstrations and promotion of biomass production to enhance soil fertility. This will benefit crops beyond rice.
4. Development of small and medium-scale irrigation facilities and promotion of their participatory irrigation management, especially for supplementary irrigation in the wet season. While SRI reduces irrigation requirements, its results are greatly enhanced by improved water control that can apply small amounts regularly and reliably. The economic returns to such investment are very high. This program could be made attractive to donor agencies that want to help promote food security and poverty alleviation.
5. Development of the local production of appropriate implements for SRI production, specifically soil-aerating mechanical hand weeders and roller-markers or other tools for

establishing SRI crops in labor-saving ways. Local enterprises that fabricate these can enhance local employment while also improving labor productivity and incomes.

### **6.3. WHAT ARE NEXT SRI QUESTIONS? DO WE NEED TO ANSWERS THOSE SRI QUESTIONS AND WHY?**

From the results of the study, we would come up with further SRI questions as follow:

- What is the difference in term of net benefits if farmers apply only some of the technical principles of SRI compared with applying all of the recommended practices?
- What is the difference in term of benefits if farmers apply in-row transplanting vs. triangle transplanting?
- There are still some farmers who complain that they will get less rice straw if they apply SRI. How can this be true if SRI produces more tillering?
- Do the attitudes and skills of extension project or staff performance influence the level of SRI adoption?
- Should the technical principles of SRI be consolidated to be more suited to farmers?
- Should the definition of SRI in Cambodia be consolidated or defined for public use?