



## The System of Rice Intensification (SRI): Assessment on SRI Farmers' Contribution to the Rice Markets

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**Abstract** One of the main reasons of food shortage in some areas of Cambodia is low productivity. Conventional farming practice is believed to cause the low yield. The System of Rice Intensification (SRI) proved to increase the yield has been introduced and practiced in Cambodia. Therefore, it is very interesting to research whether SRI farmers are able to share their contributions to the market since SRI can provide higher yields. This study aims to assess whether SRI farmers can contribute their products to the markets that are still immature and inaccessible. A households survey and field observations were conducted in three rain-fed villages in the southern part of Cambodia: two in Kampot Province and one in Kampon Speu Province. Findings revealed that besides the sufficiency of self-consumption, most of selected farmers are able to sell products to the markets and based on the expenditure on agricultural input and income analyses, farmer could earn profits although labor is the highest cost. It was also found that prices set by middlemen in the village are slightly cheaper than the one set on the market. However, farmers agree to sell to middle men because they would spend more on transportation and labor fee if they wanted to sell directly to the market. Importantly, collective sale in a large amount helps farmers to get higher prices compared to an individual sale. Results also indicate that practicing SRI positively increases the household's production and leads to the increase of village production, possibly also to national level production, therefore, the surplus can be contributed to the rice markets.

**Keywords** system of rice intensification (SRI), conventional practice, rice market, collective sale, farmers' contribution

### INTRODUCTION

Cambodia is known as an agrarian country, which heavily depends on its agricultural sector as the core of economic growth. According to records, since 1995 Cambodia produced a rice surplus (Hang Chuon and Suzuki, 2005) and has been able to export paddy to other countries such as Thailand, and Vietnam. However, most of the exporting activities are conducted in informal ways. The middle men or brokers determine the price and demand for products since farmers do not have adequate access to market information (CDRI, 2014). Although Cambodia could produce a rice surplus, it did not refer that all rice producing farmers could make themselves at subsistence level. Farmers are still facing shortage of food resulting from low production. IFAD in Cambodia (n.d.) said that 1.6 million rural households face seasonal food shortages every year and conventional farming practice causes low yields. In 2009 about 110,530 Cambodian farmers with area of 59,785 ha were practicing a new method that can improve their rice yields (Chhay, 2010). This renewed system is called the System of Rice Intensification (SRI). This technique can increase yields up to 15 to 20 t/ha when farmers can apply the methods well and improve the soil (Uphoff, 2004).

## OBJECTIVE

It is very interesting to know whether SRI farmers are able to share their contribution to the rice markets since SRI can increase the yields. Therefore, this study aims to assess whether SRI farmers can contribute their products to the markets that are still immature and inaccessible.

## METHODOLOGY

The fieldwork was conducted during February and March, 2014 in Kampot and Kampong Speu provinces of Cambodia. Farmers including SRI and Non-SRI Farmers were selected from each village (A1-A3, B1-B3, and C1-C3) for the household interviews. Farmers were selected randomly among other farmers assigned by village chiefs upon the requests of the author.

**Field observation and document review:** Village resources, farming land and the status of agricultural practices in the village can be noticed in order to create real images for the research. Journals and reports on SRI practices and promotion were also reviewed in order to understand the current SRI practices in Cambodia.

**Data analysis:** It was done by using both qualitative and quantitative approaches. Data are condensed and critically discussed in order to respond to the above-mentioned objective.

## RESULTS AND DISCUSSION

### Village Based Information

In village A (Trapaing Russey), six farmers of total household farmers are practicing SRI; while in village B (Khnheay Khang Lech) there are 86 out of 198 and 42 out of 84 households in village C (Mohaleap). Data on land use is not available in village B, even the village chief has still availed any confirmation from the upper level. About 50% and 94% of total area in village A and C, respectively, are used for agricultural activities. Selected farmers got the SRI trainings from same local NGO. Farmers in Village A and B started to practice SRI in 2004 or 2005; while farmers in Village C in 2006.

**Table 1 Village based information for 2013**

Description	Village A	Village B	Village C
No. of Total Household	181	200	86
No. of Farmer Household	181	198	84
No. of SRI Household	6	86	42
Area (ha)	216.9	-	193.8
Agricultural Area (ha)	132.9	-	145
Available Jobs	Farmers, businessmen, factory and construction workers, NGO staff, etc.	Farmers, businessmen, factory and construction workers, NGO staff, etc.	Workers, farmers, tailors, handmade craft makers, etc.

Based on the field observation, there is a disparity between villages A and B and village C in terms of the location of residential houses. In villages A and B, houses are scattered far from one to another. There is a long distance between one house and another due to innumerable paddy fields in between. Farmers have their own personal small ponds. In village C, also a rain-fed area, residential houses are gathered in one place. Paddy fields are outside the residential areas. With few ponds in the village, rainfall is stored at the reservoir.

### Information on Selected Farmers

Majority of selected farmers have more than one farming plots. Therefore, some farmers can grow rice twice per year. It is impossible for a farmer possessing one plot to grow rice twice on the same

plot since water is available only in the rainy season. Normally, the main source of water is rainfall. The average plot size is about one hectare, which included both conventional and SRI practices. The production difference between SRI and conventional practices are shown in Table 2. Majority of SRI farmers are able to increase their yields after practicing SRI although some still get the same amount. It is believed that poor water management might be one of main constraints causing SRI yield having no significant different from the conventional yield. Proper water management is difficult to be conducted in these rain-fed areas where rainfall is unstable and there is no irrigation system. Still, at least SRI can help farmers increase their yields with their own adaptive conditions.

**Table 2 Information on selected farmers**

Farmer	Area (ha)	Varieties	Practice	Conv. Production (t)	2013 SRI Production (t)	Increased Production by plot in %
A1	(a) 0.70	LRV (Korchor Chab)	Conv.	2.50	-	-
A2	(b) 0.15	LRV (Car51)	SRI	0.32	0.32	0%
	(c) 0.10	LRV (Korhorm)		0.30	0.30	0%
A3	(d) 0.60	LRV (Korchor Chab)	SRI	1.00	1.30	+30%
	(e) 0.48	LRV (Korhorm)		0.60	0.80	+33%
B1	(f) 1.00	LRV (Korhorm)	Conv.	1.30	-	0%
	(g) 1.00	ERV (Jasmine)	SRI	1.00	2.00	+100%
B2	(h) 1.00	ERV (Jasmine)	SRI	0.80	1.00	+25%
	(i) 2.00	LRV (Korhorm)		2.00	2.00	-
B3	(j) 0.06	LRV (Korchor Chab)	SRI	0.10	0.20	+100%
	(k) 0.40	ERV (Jasmine)		-	0.80*	-
C1	(l) 0.88	LRV (Chhmarprum)	SRI	1.50	1.75	+17%
	(m) 1.98	ERV (Jasmine)		2.00	3.00	+50%
C2	(n) 1.00	LRV (Chhmarprum)	SRI	1.20	1.62	+35%
C3	(o) 0.50	LRV (Riangchey)	SRI	0.70	1.00	+43%
	(p) 0.50	ERV (Jasmine)		0.80	1.00	+25%

Source: Ches and Yamaji, 2014

LRV: Late Ripening Varieties; ERV: Early Ripening Varieties; Conv.: Conventional

\* No past data available because just started growing ERV in 2013

### Total Expenditure on Rice Growing in 2013

The main items of expenditure include seed, fertilizer, irrigation and hired labor. Seeds, local varieties exchanged among inside or outside villagers, have been stored from previous harvesting. Then, farmers do not spend on seeds. However, farmers spend more on hired labor; followed by chemical fertilizer and irrigation (Table 3). The cost of hired labor varies based on the working condition. The land preparation work costs about 20,000Riel to 30,000Riel and transplanting work costs from 10,000Riel to 15,000Riel per day per person. Harvesting work is paid based on the amount of the harvest. Farmers stated that the costs keep increasing due to less labor in the village. People leave the village for other non-farming jobs. The costs of hired labor can be negotiated. However, some farmers did not spend or spent less on hired labor cost because they could get help from neighbors or worked with their family members. Although water is important, most of the farmers did not spend money on it; they strongly depend on rainfall. The cost of irrigation was the expenditure on fuel for pumping machines. Water was pumped from small streams, reservoirs or from ponds nearby their farms or houses. In case of village C, acquiring water from the reservoir is limited because the same water source is also used for raising animals.

Most of the farmers spent a lot of money on chemical fertilizers to add up on amount of the organic ones. Normally, chemical fertilizers are used during the land and nursery preparation. Some farmers did not spend on them because they used only organic fertilizers; compost which they produced by themselves or some farmers just collected and applied the animal wastes and leaves to the field. However, farmers have tried to reduce or kept the same amount of chemical fertilizers. They understand the adverse impacts of chemical fertilizers on the soil quality and on their health.

**Table 3 Total expenditures on rice growing in 2013**

Farmer	Plot (ha)	Items (Riel)				Total Expenditure	
		Seed	Chemical Fertilizer	Irrigation	Hired Labor	Riel	USD (Calculation)
A1	(a) 0.70	0	90,000	10,000	438,000	538,000	134.50
A2	(b) 0.15	0	15,800	0	138,000	153,800	38.45
	(c) 0.10	0	19,400	0	138,000	157,400	39.35
A3	(d) 0.60	0	0	0	0	0	0
	(e) 0.48	0	70,000	0	0	70,000	17.50
B1	(f) 1.00	0	155,000	0	0	155,000	38.75
	(g) 1.00	0	0	0	0	0	0
B2	(h) 1.00	0	0	0	50,000	50,000	12.50
	(i) 2.00	0	495,000	0	459,000	954,000	238.50
B3	(j) 0.06	0	0	10,000	88,000	98,000	24.50
	(k) 0.40	0	80,000	0	0	80,000	20.00
C1	(l) 0.88	0	174,000	45,000	257,000	476,000	119.00
	(m) 1.98	0	240,000	45,000	370,000	655,000	163.75
C2	(n) 1.00	0	360,000	0	255,000	615,000	153.75
C3	(o) 0.50	0	10,000	0	75,000	85,000	21.25
	(p) 0.50	0	0	0	75,000	75,000	18.75

Source: Household Interview; 1USD=4,000Riel (basic estimation)

**Table 4 Details of paddy price and sold amount**

Farmer	Plot (ha)	Varieties	2013 Production (t)	Sold Amount (Kg)	Price (Riel/Kg)	Total Income	
						Riel	USD (Calculation)
A1	(a) 0.70	LRV	2.50			<i>Self-Consumption</i>	
A2	(b) 0.15	LRV	0.32	300	1,200	360,000	90.00
	(c) 0.10	LRV	0.30			<i>Self-Consumption</i>	
A3	(d) 0.60	LRV	1.30	1000	1,000	1,000,000	250.00
	(e) 0.48	LRV	0.80			<i>Self-Consumption</i>	
B1	(f) 1.00	LRV	1.30	1000	1,000	1,000,000	250.00
	(g) 1.00	ERV	2.00	1000	1,350	1,350,000	337.50
B2	(h) 1.00	ERV	1.00	500	1,350	675,000	168.75
	(i) 2.00	LRV	2.00	1700	1,000	1,700,000	425.00
B3	(j) 0.06	LRV	0.20			<i>Self-Consumption</i>	
	(k) 0.40	ERV	0.80	800	1,600	1,280,000	320.00
C1	(l) 0.88	LRV	1.75			<i>Self-Consumption</i>	
	(m) 1.98	ERV	3.00	2400	1,200	2,880,000	720.00
C2	(n) 1.00	LRV	1.62	1000	930	930,000	232.50
C3	(o) 0.50	LRV	1.00			<i>Self-Consumption</i>	
	(p) 0.50	ERV	1.00	1000	1,400	1,400,000	350.00

### Incomes and Profits for Each Household

All selected farmers grow Jasmine variety for early growing season due to its popularity. Even farmers possessing single plot are able to sell some to the market such as Farmer B2. Farmers prefer to sell total amount of Jasmine paddy to the markets and keep the LRV paddy for consumption. Middlemen buy paddy directly from the farmers. Price set by middlemen is cheaper than the price set at the markets. However, farmers agree to sell; otherwise, they will spend more on transportation and labor costs if they were to sell directly at the market. Importantly, collective sale (some farmers put their products together in order to get a bigger amount of products) help farmers to get higher prices compared to an individual or one-time sale. Moreover, collective sale helps middlemen to save the time to buy the large amount of paddy. That is why; middlemen can set the higher price for farmers. For example, Jasmine variety (ERV) sells for 1,600R/kg if farmers can collect a big amount and sell. Otherwise, the price is only 1,350Riel to 1,400Riel per kg for single sale. The collective sale could happen due to two possible reasons: (1) the short distance between each household's house or plot where farmers easily gather their products and (2) good

relationship with the neighboring household. According to household interviews, farmers stated that their harvests for a year are enough for their family consumption and were able to sell the surplus to middlemen. This means that farmers could earn some profits from their farming activities. Total expenditure and incomes of each selected farmer are referred to Table 3 and Table 4 respectively. The Fig. 1 clearly illustrates that besides the sufficiency for self-consumption, farmers also could earn the profit by selling their surplus. The negative income as shown in Fig. 1 is the value of the paddy amount for self-consumption.

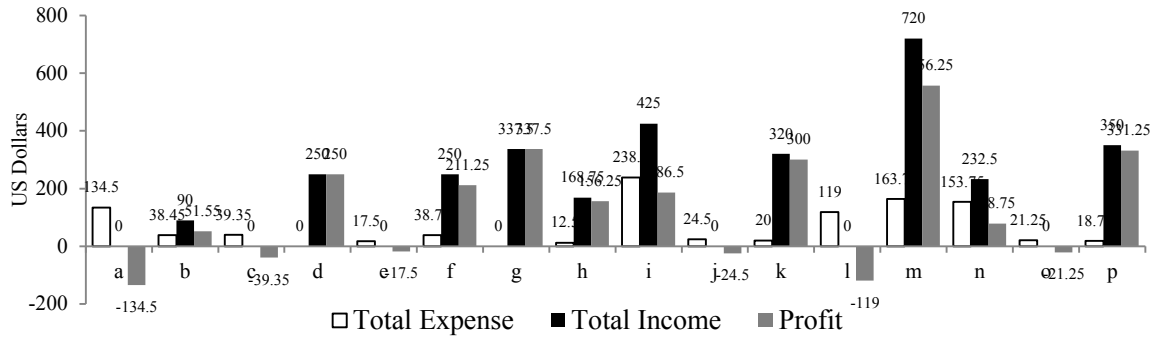


Fig. 1 Expenditure, incomes and profits for each household

Table 5 Surplus produced by SRI farmers in each village

Farmer	Increased Production by Family	Ratio of Increased Production	Average No. of SRI Household	Surplus Produced by SRI Farmers
A1	-			
A2	0%	+22.5%	3%	+0.68%
A3	+31%			
B1	+100%			
B2	+25%	+33.3%	43%	+14.3%
B3	+4.8%			
C1	+36%			
C2	+35%	+35.0%	50%	+17.5%
C3	+33%			

**Contribution to the Rice Markets**

Increased production in percentage for each family was the average of all plots that each farmer has. The ratio of increased production, derived from the increase of total production of selected families, in village A, B, and C is 22.5%, 33.3% and 35.0% respectively. As shown in Table 2, most of the selected farmers are practicing SRI and it led to increase in their conventional yield. It can be deduced from the study that SRI farmers contributed to increase in production in each village.

With the average number of total SRI household in each village, total surplus produced by SRI farmers in village A, B, and C is 0.68%, 14.3% and 17.5% respectively (Table 5). It can be concluded that practicing SRI positively increases the household’s production and leads to the increase of village production as a whole. Thus it can be explained that a village has more production to share to rice markets besides the sufficiency of self-consumption of each household in the village. Finally increase in the number of SRI farmers in each village will increase the village production. Possibly, increase the number of SRI also leads to the increase of national paddy production in Cambodia. Average of SRI yield in Cambodia was recorded as 3.48 t/ha (ranging from 2.7 to 4.2 t/ha) with SRI applied area of 59,785 ha in 2009 (Chhay, 2010). However, according to data from Ministry of Agriculture, Forestry and Fisheries (MAFF) the average national yields were 2.84 and 3.17 t/ha in 2009 and 2011 respectively. With these data, at least within the rice growing area of 59,785 ha, only in 2009 SRI could increase the rice production about 22.5%. Therefore, it can be concluded that increase the number of SRI as well the SRI

applied areas will increase not only the household production but also the country production. This will lead to the increase the paddy supply in the rice markets.

## **CONCLUSION**

As explained and discussed so far, most of the selected farmers can share their products to the rice market although selling and buying processes are happening indirectly via the middlemen. However, collective sales can help farmers to get better prices. Since the national paddy production is still low, increase in the number of SRI farmers as well as SRI applied areas can increase the household and village production as well as possibly lead to the increase of the country production and the surplus can be contributed to the rice market.

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