

Evaluation Report for SRI Program Implemented by CHF in Governorate of Muthanna 2008

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1. Planting Paddy in Iraq

1.1. Overview

The growing of paddy/rice is known in Iraq from at least 3000 BC.¹ Grown in the summer season, it is one of the most important agricultural products in terms of production, planted area, and average yield, as seen in Figure 1. It constitutes a basic element in the diet of Iraqi nationals due to the food preferences of the population.

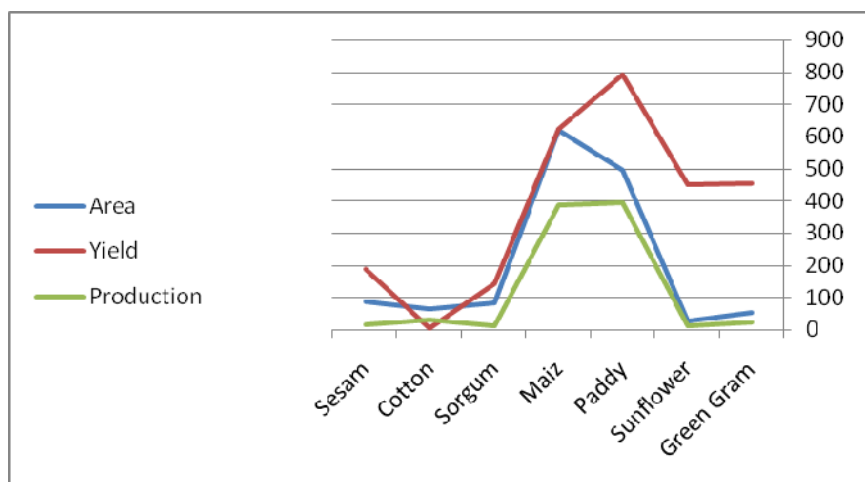


Figure 1: Planted area, average yield, and production of the most important summer season crops, 2007

Najaf and Diwaniya (Al Qadisiya) are the most important governorates for growing paddy. The planted area in these two governorates constituted almost 70% of the total area planted in paddy in Iraq in 2005. The production from

¹ In Iraq, 'paddy' refers to the grain after harvested from the field, while 'rice' is paddy that has been milled, which removes the husk and brightens and whitens the seed. According to archeological exploration in the ancient civilization of Ur, rice was called 'Shelbo,' as reported in the Al-Mishkhab Rice Research Station publication, *Applications on Rice Implementation with the SRI System for Rice Production*.

these two governorates was almost 80% of the total paddy production in Iraq in 2008. Al-Muthanna ranked sixth in area and production (Table 1 and Figure 2)

Table 1: Paddy cultivation in Iraq by governorates

Governorate	Yield (Kg/Donum)	Production (Ton)	Cultivated Area (Donum)
Diala	713.0	20,648	28,960
Al-Anbar	375.8	310	825
Babylon	675.2	3,671	5,437
Wasit	516.4	12,754	24,699
Al-Najaf	745.0	132,657	178,057
Al-Qadisiya	800.0	114,157	142,694
Al-Muthanna	606.5	5,728	9,444
Thi-Qar	407.4	7,519	18,458
Maysan	570.2	11,216	19,669
Total	720.8	308,660	428,243

Central Orgzn. of Statistics & Information Technology, *Annual Statistical Abstracts 2005-2006*

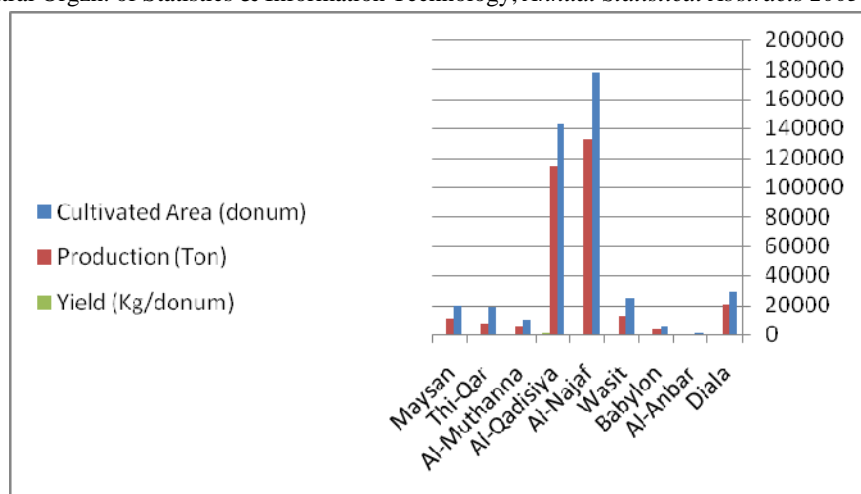


Figure 2: Planted areas, average yields, and production of paddy crop at the level of Governorates, 2005

1.2. Development of areas, average yields and production

The planted area fluctuates from one year to another (Figure 3), depending on the availability of water and economic circumstances. Highest levels were reached in 1992 (669,000 Donums – 167,250 ha). This was attributable to the embargo which was in effect and the state's encouragement of planting this crop. The lowest level was in 2001 (11,300 Donums – 2,850 ha), due to drought and shortage of water.² (Note: One Donum = 0.25 ha)

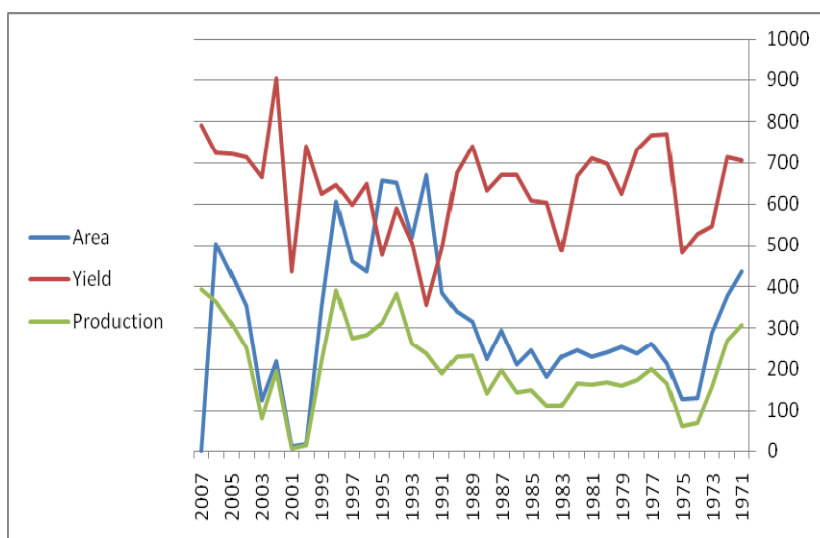


Figure 3: Planted area, average yields, and production of paddy for Iraq for the period 1971-2007

Average yields have also fluctuated, with the highest level in 2003 (902 Kg/Donum – 3.6 t/ha) and the lowest in 1992 (305 Kg/Donum – 1.2 t/ha). Due to fluctuation in the planted area and yield, annual national production has fluctuated too, reaching 392,800 tons in 2007, while in 2001, it was only 4,900 tons.

² Central Organization of Statistics and Information Technology, *Annual Statistical Abstracts 2005-2006*, data for the period 1971-2007. Data for the period 1953-1970 are available in the speech of Saqar Al-Ani on Iraqi Agricultural Geography, Baghdad University, 1976.

2. SRI Program:

Paddy crop is a big water consumer due to the way of cultivating it in Iraq, which is the irrigated method, and also due to its long growing period (about 6 months) during the hot summer months of June-November. The paddy soil has regressed in fertility through years because of the current agricultural system (paddy-wheat). This contributes to the permanent leaching of the soils, and as a result to loss of the fundamental and trace minerals of the soil. We have also the issue of weed control, as weeds have started to grow heavily on the cultivated area, and besides the costs of weed control the measures cause environmental pollution.

The Rice Research Station at Al-Mishkhab started to think about finding other ways for cultivating paddy which can avoid the negative features of the conventional way of cultivating this crop. It sought some different ways, for instance, for avoiding flooding of the soil. The SRI system (System of Rice Intensification) is one of such new method, which has been developed in the 1980s in Madagascar and then popularized by the Cornell International Institute for Food, Agriculture and Development (CIIFAD).³

Experiments using SRI started in Iraq in 2005,⁴ using wider distance between seedlings, less seeds, and early transplanting. In 2006, the experiments were spread to the three governorates having the biggest marshes. A commission has been formed for SRI in 2007 to implement the program of research and field demonstrations. In 2008, with the support of the Ministry of Agriculture and financed by CHF, the SRI

³ Khidhir Abbas Hameed (2007). "System of Rice Intensification (SRI), a new and practical agricultural system," *Al-Shaab* newspaper, no. 206, year 72 (in Arabic calendar).

⁴ Khidhir Abbas Hameed (2008). "System of Rice Intensification Performance in Iraq," Al-Mishkhab Rice Research Station, Najaf.

methodology was applied in 16 farmers' fields in Al-Muthanna province. One Donum (0.25 ha) was planted by SRI methods by each of the 16 farmers (who also planted with regular methods). The four administrative units were:

- Al- Rumaitha Qatha: 4 peasants
- Al-Warkaa Nahia: 4 peasants
- Al-Najmi Nahia: 4 peasants
- Al-Majd Nahia: 4 peasants

The implementation was preceded by practical applications in manufacturing organic fertilizer, arranging the plates for seedlings and preparing the transplants. After implementation, visitations by peasants and farmers were organized to the fields under SRI cultivation at different stages of crop growth.

2.1. The Goals:

The basic aims of cultivating paddy under SRI methods are:

1. Increasing production per unit area
2. Reducing production costs
3. Increasing the net income per unit area, and as a result, improving the income of farmer families. This can be achieved by:
 - a. Using the new way of transplanting
 - b. Reducing the amount of seed used per unit area
 - c. Saving irrigation water
 - d. Reducing the use of chemical fertilizers

- e. Manufacturing organic fertilizer from agricultural litter of the farm
- f. Reducing the number of weed plants in the unit area
- g. Abandon the use of herbicides to protect environment

2.2. **The Mechanisms of Implementation:**

- Planting paddy seeds on plates in the plant nursery
- Transport the plates from the nursery at the time when the first two leaves have appear from the first tiller (at age 8-15 days)
- Transplanting the seedlings singly at a distance of 25 cm x 25 cm, which stimulates many tillers from one plant. The amount of used seeds is 7 kg/ha (less than 2 kg/Donum) instead of 120-160 kg/ha (30-40 kg/Donum)
- Moistening the soil instead of flooding it (flooding for one day and then not flooding for two days) during the period from transplanting to flowering time, after which the field is kept flooded with a depth of 1-3 cm.
- Weeding by hand or by a simple mechanical tool.⁵ The first weeding is done 10-12 days after transplanting; the second is after 2 weeks and then 2-3 times weeding.
- Using organic fertilizer from the litter of the farm (hay, dung, leaves, etc.) and adding just 50% of the usually intended amount of chemical fertilizer, manufacturing their organic fertilizer by themselves.

⁵ The weeding machine was introduced into Iraq in 1960 having been developed in the International Rice Research Institute (IRRI) in the Philippines.

Year	International price (\$) ⁶	Price in Iraq (\$) ⁷
2005	217.8	541.67
2006	219.5	625
2007	272.3	750
2008	500 ⁷	750

Table 2: The official price of rice in Iraq (\$) and the international price during the period 2003-2008⁸

3. Paddy and Rice Prices:

Paddy is one of the strategic crops that is subsidized by the state, which guarantees farmers the sale of their whole production at profitable prices. These prices present a minimum guaranteed price for the peasants, who are free to market their product to the state or to the private sector in case of the prices on the market are higher than those offered by the state. This has never happened in past year, thus, there is no market price for paddy in the private sector.

Paddy is converted by milling into edible rice at a rate of a 65% from the paddy weight. Rice is a basic component in the public food ration system, wherein each Iraqi person gets 3 kg monthly, or 36 kg annually. The prices of the public food ration system are symbolic prices only, including the price for rice. Some part of the amount of rice

⁶ Average price of Thailand rice class A1 (Jan.-Dec.)

⁷ Average price of Thailand rice class A1 (Jan.-Nov.)

⁸ 1 \$ = 1200 ID

handled through the public food ration system slips into local markets and is sold with prices between 800-1,250 Iraqi dinars (ID) per kg (0.67-1.04 \$/kg). Imported rice is available in the private sector markets with prices that reach 3,000 ID/kg (2.5 \$/kg)

Table 2 and Figure 4 show the governmental prices for paddy and the international market price for rice. It appears from the table and figure that the governmental price, what the farmer receives for paddy, is much higher than the price of rice on the international markets.

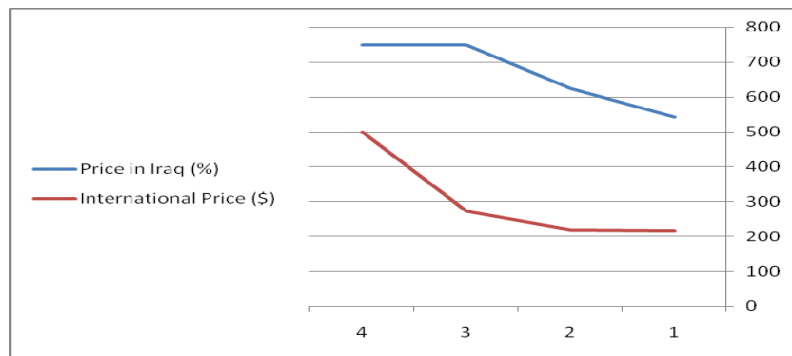


Figure 4: Prices of paddy in Iraq (\$) and the price of rice on the international markets

Considering the price level of 2005 as the standard price, the subsequent prices are shown in Table 3 and Figure 4. It shows that local market prices were higher than the international market prices during 2005-2007. This difference was because of the international food crisis which happened in the middle of 2008, so that the rice price has exceeded the paddy price from the local production.

The international price did not affect the price on the local markets, because the government monopolizes paddy purchases and maintains the public food ration.

Table 3: The fixed price of paddy in Iraq (\$) and the international price during the period 2005-2008, based on prices of 2005 for comparison

Year	International price (\$)	Price in Iraq (\$)
2005	100	100
2006	100.78	115.38
2007	125.02	138.46
2008	229.57	134.46

Calculated from Table 2

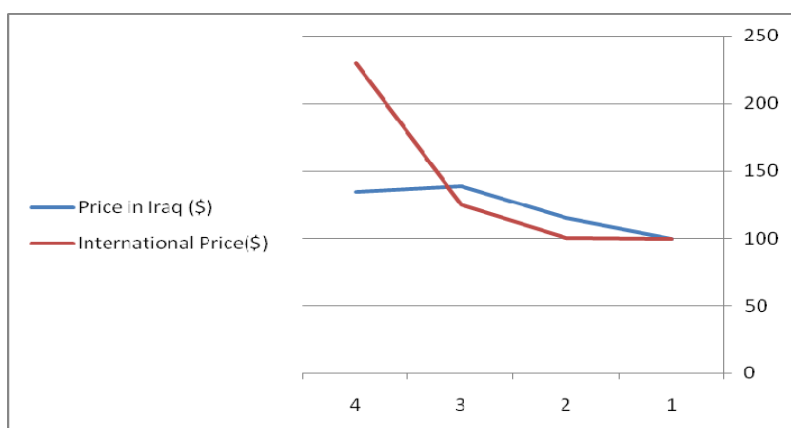


Figure 4: The fixed prices of paddy in Iraq (\$) and in the international prices of it during the period 2003-2008 based on prices of 2005.

4. Analyzing questionnaire data and making comparisons between farmers using SRI system and control farmers:

A questionnaire has been designed for the period before harvest for both categories of farmers surveyed:

- a. First category: Farmers who applied the SRI methods. These were 16 peasants. The questions directed to them addressed both their fields cultivated with SRI system and their fields under conventional agriculture.

- b. Second category: A similar number of farmers who had not applied SRI methods.

Another two questionnaires were designed for the period after harvesting for the two categories above, where data were collected from the first category using SRI system and the other category from fields using conventional practice.

MRRS agricultural engineer Khidhir Abbas Hameed, an expert in planting paddy under SRI system, supervised the collecting of data by questionnaires before and after harvest in cooperation with his supervisor associated with the farmers' fields under SRI system.

4.1. Calculating the Costs of Paddy Production:

The costs included what has been spent on the field until the end of paddy harvest, like buying production inputs, costs of using machinery, labor costs including workers from farmers' families, also costs of maintaining the irrigation and drainage network, for the rent of land, and fees for irrigation water.

4.1.1. Costs by using SRI system:

Appendix 5 contains details of the costs according to each farmer who used the SRI system.⁹ From this appendix, Table 4 and Figure 5 have shown that:

- The highest cost within the framework of costs is that of the labor costs, which constitute on average 61% of total costs. This means that introducing agricultural machines (like mechanical transplanting and mechanical harvester) could considerably reduce these costs and contribute to the

⁹ Note: in this report, the Appendixes (in Arabic) are not included as they contained individual data. The summarization here in tables and figures is what will be of more interest to readers outside Iraq.

expansion of using SRI system, based on reduced cost of producing paddy per unit area.

Table 4: Components of costs of cultivation of one Donum paddy under SRI system

Costs=1000 ID/Donum

	Total	Other Costs	Man-power	Machines	Purchased Inputs
Average costs ¹⁰	428.90	15	261.375	116.281	36.243
Rate (%)	100	3.5	60.94	27.11	8.45
Minimum costs ¹¹	298.93	4.25	100	62	16.18
Maximum costs	569.93	51.75	375	213	38.18

From appendix 5

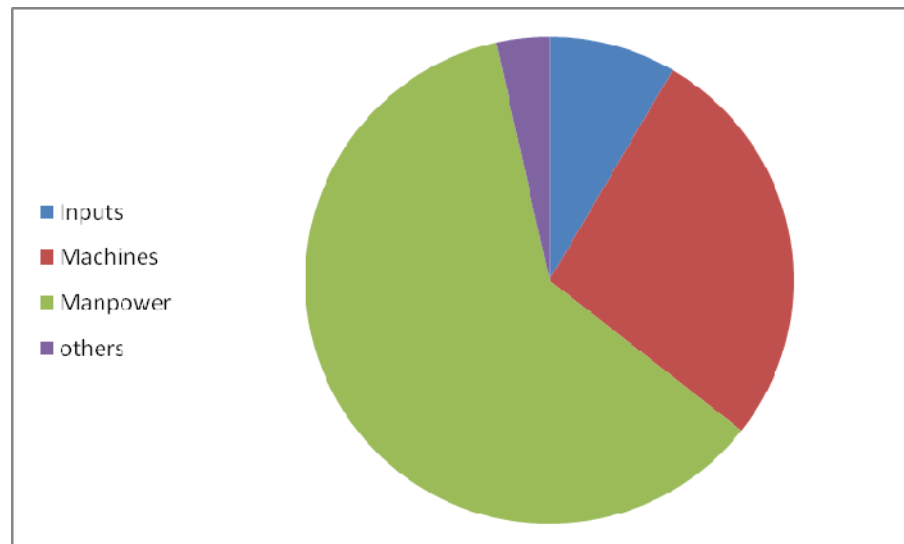


Figure 5: Components of the costs of cultivation for one Donum of paddy under SRI system

- The cost of the agricultural mechanization comes in second level, at a rate of 27%, which seems to be high

¹⁰ Average of 16 farmers

¹¹ The maximum and minimum data are depending to the cost to an individual farmer.

compared with the intensity of manpower and the limited use of machines.

- The cost of the purchased inputs is low due to the reduction of using seeds and chemical fertilizer in planting paddy with SRI system.

4.1.2. Costs Without Using SRI System:

Appendix 6 contains details of the costs for one Donum to cultivate paddy using the conventional way in the same categories for considering implementation of the SRI system. Appendix 7 shows the details about farmers who did not apply the SRI system. From the data in these appendixes, Table 5 plus Figures 6 and 7 have been constructed, which show that:

Table 5: Components of the costs of cultivation for one Donum of paddy under conventional way for farmers using or not using SRI system.

	Total Costs	Other Costs	Manpower	Machines	Purchased Inputs
a. SRI farmers					
Average costs	669.56	16.25	336.44	203.438	113.44
Rate (%)	100	2.43	50.25	30.38	16.94
Minimum costs	519.9	1.75	197	140	67.73
Maximum costs	807.52	71.75	427	308	236.25
b. Control farmers					
Average costs	600.01	16.08	304.31	181.03	98.57
Rate (%)	100	2.68	50.72	30.17	16.43
Minimum costs	529.6	1.75	226	133	68.70
Maximum costs	677.5	51.75	351	235	127.96

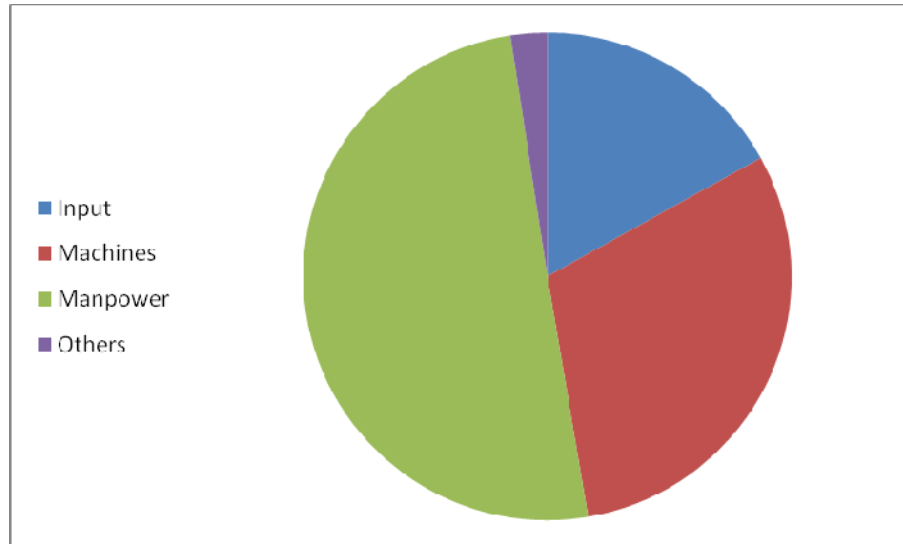


Figure 6: Components of the costs of cultivation of one Donum paddy under conventional way for the farmers with SRI system.

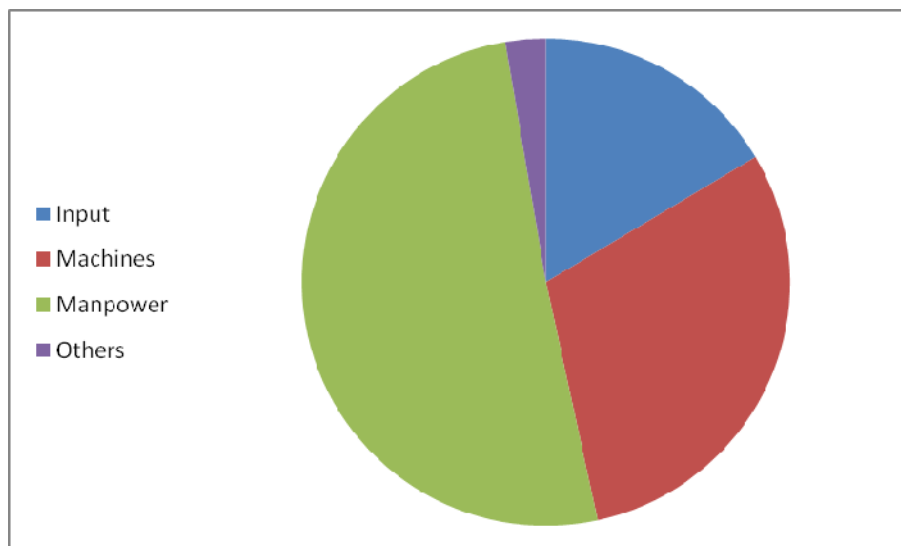


Figure 7: Components of the costs of cultivation for one Donum of paddy under conventional way for the control farmers

- a. Total costs (on average) to cultivate one Donum of paddy by the conventional way by farmers applying SRI system are a little higher than for the control farmers (about 10%), yet the two sets of costs are very close to each other in all their contents.

- b. Total costs (on average) to produce one Donum paddy by applying the SRI system are less -- by about the third (71.5% and 64%) -- than by the conventional way.
- c. Manpower costs are reduced to 50% comparing with cultivation by the SRI system which for which labor constitutes the highest part of the cost structure, while the levels of the other costs are increased.
- d. Reducing the cost of purchased inputs using SRI system is expected because of the reductions of the seed amounts and the fertilizer.

4.2. Calculating the incomes of the paddy farms:

The gross income of paddy from one Donum is the sale of paddy produced on that area and the value of its straw (*albow*), where farmers mainly sell their production of paddy to the marketing centers of the state at the official price. The straw value is estimated according to its use.

4.2.1. Yield from using SRI system or without using SRI:

The yields achieved during the 2008 season among farmers who tested the SRI system, applying it or not, and also among the control farmers who used their usual methods, shown in Appendixes 8 and 9, are summarized in Table 6. From this table and Figures 8 and 9, we conclude that:

- a. The yield of the paddy by applying SRI system surpasses very clearly the yield of paddy without using the SRI system among the farmers who applies both systems and compared to the yield of the control farmers.
- b. The SRI yield of paddy (average, minimum, maximum) for those farmers who tested the SRI system, applying it or

not, was higher compared to that of control farmers than to the non-SRI yield of the farmers testing the new system.

Table 6: Yields (average, minimum, maximum) for farmers testing the SRI system, with and without SRI, and for control farmers (yield =kg/Donum)

	Yields for control farmers			Yields for farmers testing SRI system		
	Difference	Control farmers	Compared to SRI	Difference	Without SRI	With SRI
Average	973.6	786.3	1,759.8	593.3	1,166.5	1,759.8
Minimum	650	600	1,250	475	775	1,250
Maximum	1,000	1,200	2,200	1,950	950	2,200

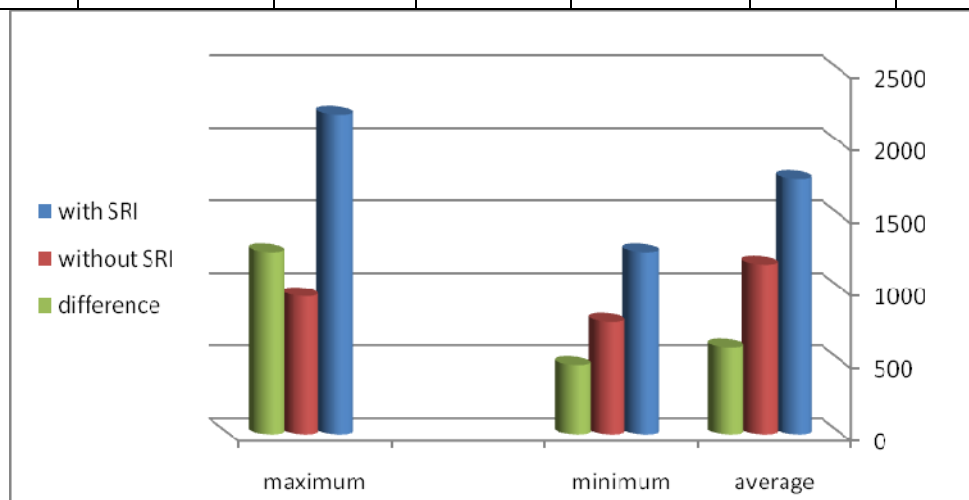


Figure 8: Yields (average, minimum, maximum) for the farmers who tested the SRI system, with or without the new methods

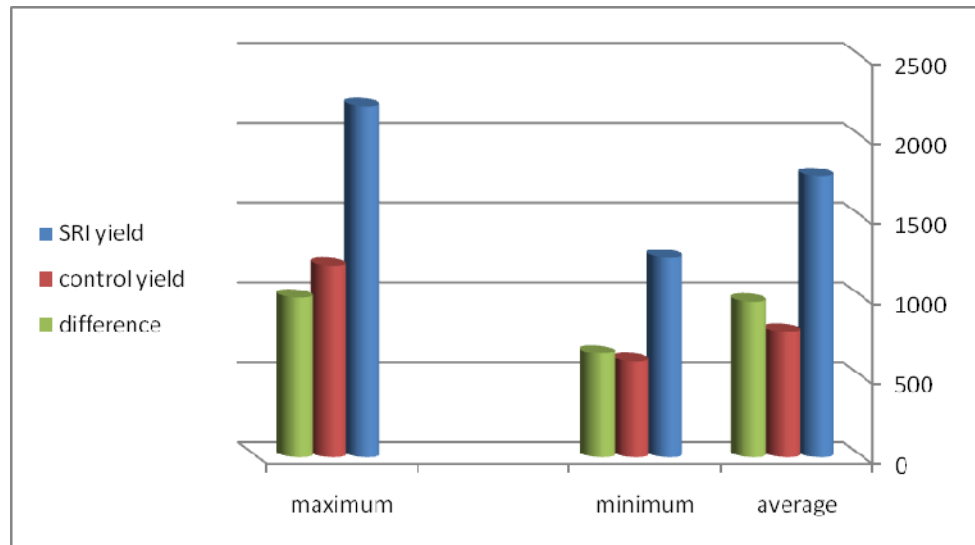


Diagram 9: The yields (average, minimum, maximum) by control farmers

4.2.2. Incomes of farmers:

- Paddy price for 2008 was \$750/ton (Table 2).
- Gross income from one Donum is the result of multiplying the yield (in tons) times the price (per ton).
- Net income from one Donum is the gross income minus the costs of production for one Donum

4.2.2.1. Farmer incomes from using SRI system:

The gross and net income for farmers applying SRI system was calculated. The details are in Appendix 10 (not included) with a summary in Table 7.

4.2.2.2. Farmer incomes not using SRI system:

Gross and net incomes were calculated for the farmers testing the SRI system on their own fields on their fields where the system was not applied. The details of this, given in Appendix 11, are summarized in Table 7.

Table 7: Gross and net income (1000 ID) for farmers testing SRI system, applying it or not, and for control farmers.

	Control farmers		Farmers not applying SRI		Farmers applying SRI	
	Net income	Gross income	Net income	Gross income	Net income	Gross income
Average	100	708	381	1,050	1,155	1,584
Minimum	-144	450	95	695	635	1,125
Maximum	420	1,080	755	1,370	1,466	1,980

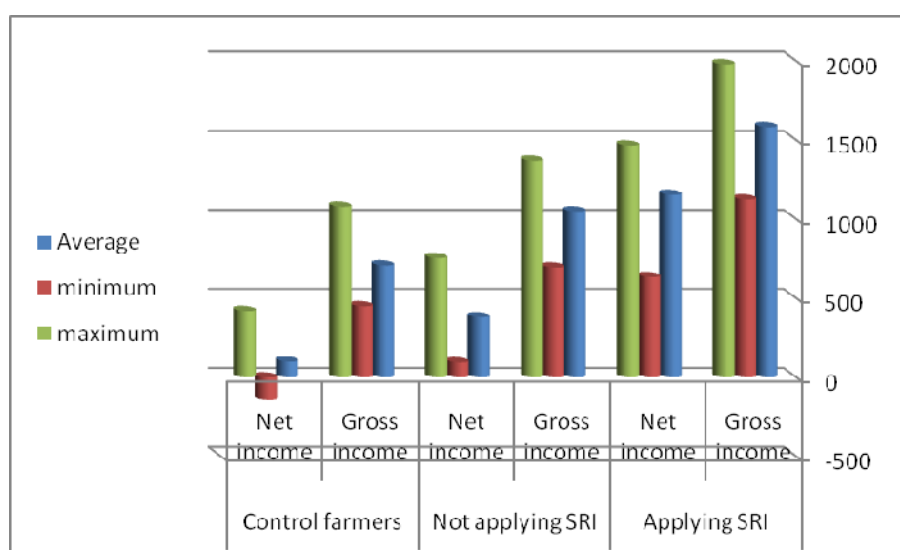


Figure 10: Gross and net income (1000 ID) for farmers testing SRI system, applying it or not, and for control farmers.

- Gross and net income has been calculated for the control farmers who did not use SRI system. Their details from Appendix 12 are also included in Table 7.
- It can be seen from Table 7 and Figure 10 that:
 - a. The average net income for the cultivation of paddy is greatly increased by applying the SRI system, which income reaches 1,155,000 ID/Donum compared with income from the conventional way that reaches 381,000

ID/Donum compared to farmers using the SRI system, and 100,000 ID/Donum by control farmers.

- b. Among control farmers, there were some farmers who had negative net income, due to low yield of paddy and high costs of production.
- c. Despite some negative outcomes among the control farmers, they needed the by-products of paddy cultivation (straw or *albow*) to feed their animals or to achieve additional income by marketing it, which could produce from one Donum about 50% the value of paddy production.¹² The value ranged between 250 kg/Donum to 600 kg/Donum among the control farmers. If the price of *albow* equals 300,000 ID/ton, control farmers achieved an additional income ranging between 75,000 ID/Donum and 180,000 ID/Donum, which make their net income positive.
- d. By applying SRI system, *albow* is used to manufacture organic fertilizer which is used in fertilizing the paddy field under this system. Thus, it does not enter into the calculations of income.
- e. Farmers who applied the SRI system in one Donum of their field are achieving from the rest of their field (without using SRI system) some additional income from the sale of *albow*, whereas they produce on one Donum amounts of straw that ranged from 386-761 kg/Donum, with an average production of 583 kg/Donum, and an average income of 175,000 ID/Donum from the straw produced. The net income for these farmers would then be 556,000 ID/Donum.

¹² Dr. Abdul Hussein el-Hakim: "Calculating fodder amounts" (in Arabic).

5. Profit achieved by using SRI system and not using it:

Achieved profits, the net incomes listed in Table 7 by average, minimum and maximum, are as follow:

- The profit achieved by farmers using the SRI system ranged between 630,000 ID/Donum and 1,466,000 ID/Donum. The profit average for all 16 farmers from their SRI fields was 1,155,000 ID/Donum.
- Profit achieved by these same farmers when not using SRI ranged from 211,000 ID/Donum (95,000 ID/Donum from paddy, and 116,000 ID/Donum from *albow*) to 983,000 ID/Donum (755,000 ID/Donum from paddy and 228,000 ID/Donum from *albow*). Their average profit from land where they used their own methods was 556,000 ID/Donum.
- Profit achieved among the control farmers ranged from a loss of -69,000 ID/Donum (-144,000 ID/Donum from paddy and 75,000 ID/Donum from *albow*) to 600,000 ID/Donum (420,000 ID/Donum from paddy and 180,000 ID/Donum from *albow*) with a profit average for all control farmers (16) of 203,000 ID/Donum.

5.1. Analyzing additional income achieved by using SRI system:

To analyze the additional income achieved by applying SRI system comparing with conventional paddy cultivation, comparing results for farmers applying the SRI system and control farmers, we followed these steps:

- a. Taking the difference between the costs for applying the SRI system and applying conventional methods.
- b. Taking the difference between the achieved yield by applying the SRI system and when applying the conventional methods.
- c. To calculate the value of the difference in yield, we take:

The yield difference x the current price of paddy in 2008 (900,000 ID/ton). The value of *albow* was calculated at 300,000 ID/ton.

- d. The value of straw was added to that of the paddy produced when evaluating returns to conventional methods, as the value of *albow* produced with the SRI system is incorporated into the value of the paddy produced.
- e. Appendix 13 contains the details of these calculations which are summarized in Table 8.

Table 8: Components of additional income by implementing SRI system

Value =1000 ID

	Additional Income (control farmers)			Additional Income (farmers who adopted SRI system)		
	Total	Yield difference	Cost difference	Total	Yield difference	Cost difference
Average (%)	936.5734 (100)	758.2784 (80.96)	178.295 (19.04)	600.1659 (100)	359.0016 (59.82)	241.1644 (40.18)
Minimum (%)	186.17 (100)	75 (40.29)	111.17 (59.71)	288.05 (100)	165 (57.28)	123.05 (42.72)
Maximum (%)	1448.905 (100)	1117.125 (77.10)	331.78 (22.90)	1255.72 (100)	1016.4 (80.94)	239.32 (19.06)

5.2. Effects of Increasing Price of Rice in Local and International Markets:

- The state receives paddy from the farmers at official prices defined by production costs and a portion of feasible profit.
- The state distributes rice to its citizens by symbolic prices within the public food ration system. Some of these amounts flow off to the private market and are sold in it at prices subject to supply and demand.
- Iraq is importing most of its needs of rice and exporting a little of Anber rice (aromatic variety), that has a strong demand in markets outside Iraq because of its aromatic feature.
- The only effect on the market price for selling paddy is the price set by the state. Farmers can sale their entire production to the state by this price.

5.3. Effects of Increasing the Yield of Paddy:

Table 8 and Figures 11 through 14 indicate that:

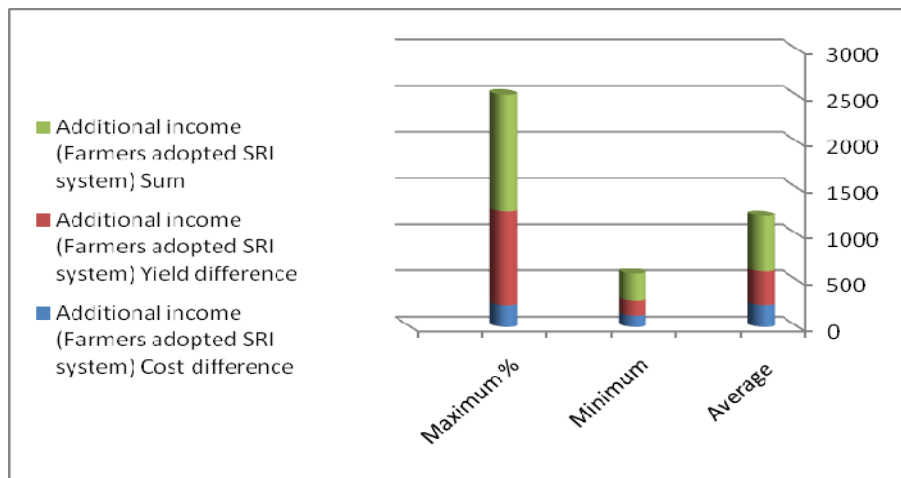


Figure 11: Combinations of additional income by implementing the SRI system for farmers who adopted this system

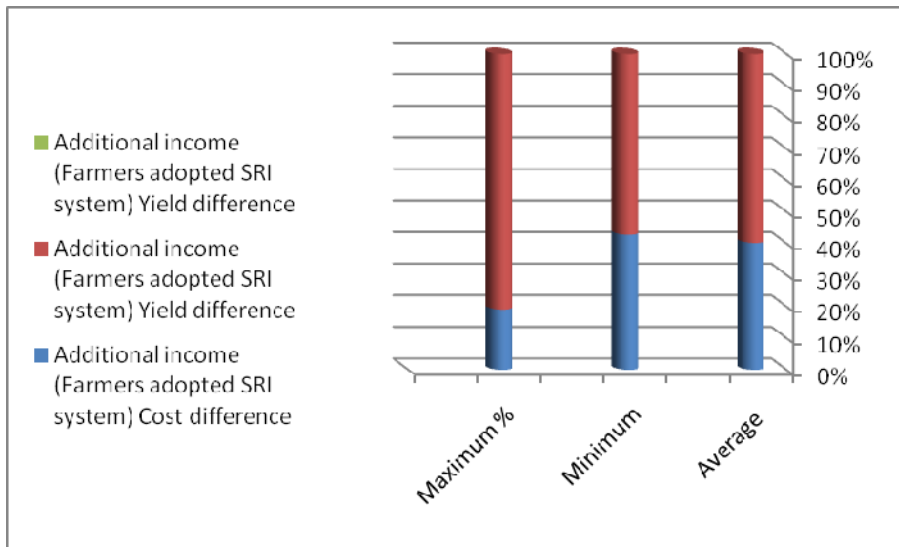


Figure 12: Percentages of the components of the additional income by implementing SRI system for farmers who adopted this system

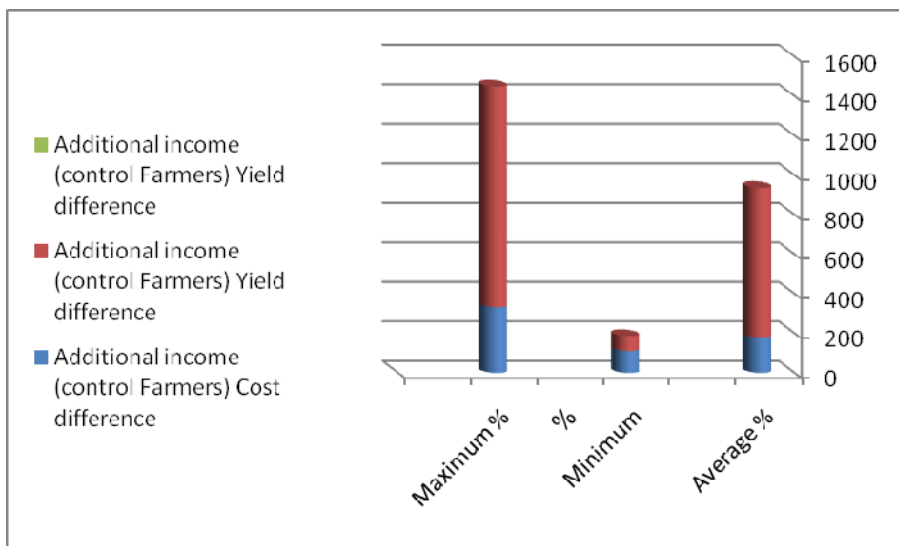


Figure 13: Combinations of additional income from implementing SRI system in comparison with conventional way for the control farmers

- a. The effect of increasing yield is very clear on the increase of farmer incomes when applying the SRI system compared with conventional cultivation, for both the farmers adopting the SRI system and the control farmers.
- b. The increase is due to significant increase in the number of grains that filled in the panicle. According to the available circumstances for growth, the suitable area for the plant,

the optimal utilization of light, and maximum absorption of available nutrients from the plant which are applied to increasing the production of grains.¹³

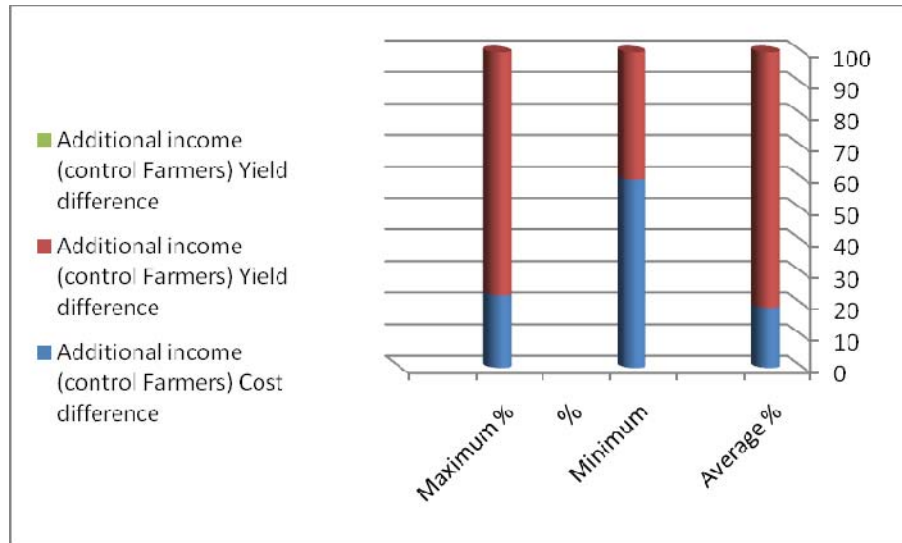


Figure 14: Percentages of the components of additional income by implementing SRI system in comparison with conventional way for the control farmers

- c. The average increase in income for farmers by increasing their yield under SRI system would be 359,002 ID/Donum for the farmers who tested the system, and 758,278 ID/Donum for the control farmers, whose normal yields are lower than the farmers who agreed to test SRI methods.
- d. The effect of increasing yield on additional income is more than 50%, and ranged between 57.28% and 80.94%, for the farmers who tested the SRI system, and it declines to less than 50% given the lower productivity per Donum among control farmers, being only 40.29%, while the highest level was nearly that of farmers testing the system (80.96%).

¹³ Shaher Fadous Nwehi, "Final report on planting rice project using SRI system, Muthanna, 2008."

- e. Whenever the effective rate of increasing yield was raised by formation of additional income, the productivity per Donum was higher, and it declined when the rate was lower.

5.4. The Effect of Reducing Costs:

From Table 8 and Figures 11 through 14 it can be seen that:

- a. The effect of reducing costs on increasing farmer income is also clear when farmers apply the SRI system compared to using the conventional way for both farmers testing the system and control farmers.
- b. The average increase in farmer income by reducing costs when applying the SRI system is 241,164 ID/Donum and 178,795 ID/Donum among these same farmers when planting the conventional way.
- c. The effect of reducing costs on additional income is less than 50% -- and ranged between 19.1% and 42.7% -- among farmers testing the SRI system. Getting more than half reflected declining productivity per Donum among the control farmers, which reaches 59.7%, while the effect at the maximum level on increase in income is approximate for the farmers applying the system that reaches 22.9%.
- f. Whenever the effective rate in decline, costs are offset by the formation of additional income; the productivity per Donum is higher, and it is raised when the rate was lower.

6. Mechanization of Paddy Planting:

The development of productivity per unit area calls for serious thinking about the mechanization of cultivation processes, especially with the SRI system based on careful

and precision transplanting as a fundamental feature in developing the processes of paddy cultivation.

When asking the farmers who evaluated the SRI system, they expressed unanimously preference for this system over the conventional planting in all its aspects: productivity, reducing cost, reducing the amounts of irrigation water needed, an agriculture friendly to the environment, etc. Yet the careful transplanting by hand is a tiring and time-consuming process, and its use cannot be expanded to more than one Donum. That is why it is very important to introduce agricultural mechanization in paddy cultivation: transplanting machines, harrows, harvesters, thrashing machines, and others.

6.1. Using Transplanting Machines:

For spreading the SRI system, it must be based on mechanical transplanting and using transplant machines of a riding type.¹⁴ Using such transplant machines makes the expansion of the SRI system possible. It would reduce the cost of manpower which if they were not less than the costs of using the transplanting machine then they are not more.¹⁵

6.2. Using Thrashing Machines:

From contacting with the paddy farmers and experts, asking them about the thrashing machine it is shown that:

- a. A thrashing machine is only used to get the paddy grains separated from the straw. The other processes are still done by hand.

¹⁴ Dr. Abdul Hussein El-Hakim, "Report of my visiting to the rice research station in Al-Mishkhab and the places of planting paddy within SRI program in Al-Muthanna in the period 30/8-1/9/2009."

¹⁵ From preparatory calculations: Hand transplanting costs about 80,000 ID/Donum (2 workers for 2 days paying 15,000 ID/worker/day), while the cost of the mechanical transplanting would not exceed 40,000/Donum.

- b. There is additional hand labor which is the transporting of the production from the harvest site to the thrashing machine, which leads to some increase in other labor costs besides separating the grains from the straw.
- c. The threshed paddy grains aren't intended to be used as seeds, because the thrashing machine by beating the paddy stalks when they enter the machine will damage the seed and its embryo.
- d. Rice produced from paddy processed by this machine contains a higher percentage of broken seeds than the rice produced by the conventional processing.
- e. The grain produced by thrashing machine is not less than hand work to shake out the grains since the family of the farmer is doing this job.
- f. Based on all of this, farmers are not considering this thrashing machine as a great technical development or as more economical than hand labor.

6.3. Using a Small Harvester:

Instead of using thrashing machines, we can introduce small harvesters to harvest the paddy (with a container having 750 kg capacity). Such harvesters reduce hand labor costs considerably.

7. Services of Agricultural Market Information:

In the market where market forces are interacting (producer, trader, dealer, consumer) according supply and demand, providing information about the market for all the participants is a very important matter. The producer can plan his production based on the duration of offer for agricultural goods, and the possibility for getting some relative advantage from being early or late in producing. He can also choose to sell in the market

where the demand is greater than the amount being supplied. The consumer can buy at relatively lower prices, and the trader can store and transport grain according to requirements and information of the markets to achieve the best possible profit.

Iraq does not have agricultural markets that are run by transparent market laws. The strategic crops, including paddy, are priced by the state which buys the entire production from the producers at the official price. Since the mechanisms of supply and demand are not operative, the benefits of market information are not as able to improve producer income, and the costs and risks of transport in Iraq make the transporting of agricultural products uneconomic or unattractive.

I have contacted many paddy producers and other producers and the agricultural officials of many governorates, asking them if there is any possibility to establish a firm or association for disseminating market information by coordinating with a cell phone company. The opinion was negative. Some of them see the service of market information at the present time as not necessary; others see that this idea is inapplicable in Iraq. Many of the farmers said that they don't need such services.

8. Farmers Opinion of the SRI System:

In the questionnaires allocated for the period after the harvest, some questions were asked about the SRI system and the farmers answered them. The summary of their answers is as follow:

8.1. Farmers Applying SRI System:

- 1. Positive Aspects: Q: Did the SRI program achieve positive aspects for you?** The answers of all 16 farmers were yes. When we asked them about positive aspects of SRI, their answers were:

- Saving of 50% for chemical fertilizer
- Improving the soil fertility
- Saving 75%-80% of seeds
- Saving 100% on plant protection agents
- Reduction of weed rate in the field by 75%-80%
- Saving 25%-30% of irrigation water
- Don't using mechanical spraying for plant protection
- Saving 30% on irrigation pumping
- Saving 30% of fuel and oil expenditures
- Improving the quality of the seeds, and reduction in the number of empty seeds.

2. **Additional Aspects: Q:** Did the SRI system have any additional effects? Their answers were:

- Need to build a complete nursery
- Increased working hours to set up the nursery for the seedlings
- Increase of 30% in working hours to prepare the land for good land leveling under water
- Increased costs of loading and unloading the production; this ranged between 10%-100%, due to the yield increase.

3. **Q: Will you apply the SRI program in the future?** The answers were 100% yes. The answer on the question: "**Will you apply the whole program?**" was 100% yes.

4. **Q: When we asked about farmers' suggestions, they answered:**

- Introduce mechanical transplantation to reduce hand work for transplanting process.
- Introduce mechanical rotary weed for clearing instead using manpower
- Provide a small harvester for easier threshing.

8.2. Control Farmers:

We have asked the control farmers about the SRI program:

1. **How do you evaluate the SRI system?** 11 farmers said excellent, and 5 said very good.
2. **Do you want to apply the SRI program in your field?** All of them said yes.
3. **What are your evaluations of the achievement of the SRI program?** They answer:
 - Reducing the costs by 20-40%.
 - Increasing the yield on average 30-75%
 - Increasing the income by 30-40%

9. Recommendations:

1. Since that the program has achieved successes in reducing the production costs, reducing water needed to irrigate the paddy fields, maintaining the environment, and increasing the productivity per unit area. To take advantage of the effort and money spent on applying the SRI program on 16 fields of farmers this year, the Extension Administration with the cooperation and supervising of Research Administration and

with leadership from an expert of the rice research center in Al-Mishkhab should adopt the SRI program and spread it in the coming years in Al-Muthanna and other paddy-producing governorates. Introducing mechanical transplanting by providing transplanting machines of a riding sort in every agricultural unit which plants paddy could teach farmers the mechanical transplanting method for paddy plants and train them on using the machines. There should also be intensifying of the extension programs for paddy farmers.

2. Approving and implementing mechanization and intensification of paddy cultivation of paddy crop with SRI practices should come within the Prime Minister's initiative for the year 2009. This project is consisting of:

- Subsidizing the price of machines and equipment at the rate of 75%. The subsidies will be covered by the funds allocated by the 2009 agricultural initiative and will be calculated in light of the numbers and prices of the machines by the Agricultural Supply Company in coordination with the Directorate of Planning and Follow-up.
- Farmers who are willing to buy the machines can take credit from the Credit Fund allocated for agricultural machines within the operative conditions of the Fund.
- The Extension Administration, with cooperation of Research Administration, should put on an active extension program (with films, demonstrative fields, field visits, training sessions, etc.) and present an estimate for the money needed to implement this project.