



System of Rice Intensification

-
An emerging alternative



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SRI is neither a new variety nor a hybrid... It is only a method of rice cultivation.

System of Rice Intensification

- ✓ Less water
- ✓ Less seed
- ✓ Less chemical pesticides
- ✓ Less chemical fertilizers
- ✓ More yield in comparison to traditional cultivation



1. INTRODUCTION TO SRI

SRI is an acronym for « System of Rice Intensification ». This improved method of rice cultivation was developed in 1983 in Madagascar and has now spread to many parts of the world.

There is a notion that higher yields in rice come with high investments on seed, irrigation, high doses of fertilizers and pesticides. Contrary to this popular view, SRI method of cultivation produces higher yields with less seed and less water. SRI emphasizes on the need to shift from chemical fertilizers to organic manure.

SRI is not a new variety or a hybrid. It is only a method of cultivation. SRI is showing promising results in all rice varieties (local or improved).

SRI methods have been validated in 30 countries across a wide range of agro-ecosystems -- from the equator to temperate climates, and from sea level to 2700 meters above sea level. The number of countries where SRI has been proven and where it is expanding continues to increase.

The greatest spread of SRI is in the Indian state of Tamil Nadu. In the 2007/08 season, according to the Minister of Agriculture, the rice area cultivated with SRI methods reached 430,000 hectares (2,150,000 jeribs)

SRI method is now emerging as a potential alternative to traditional way of flooded rice cultivation in Afghanistan, with successful trials in Baghlan, Taloqan and Kunduz. It is also showing great promise to address the problems of water scarcity in downstream parts of irrigation canals' command areas.

SRI practices outlined in this booklet are based on farmers' practices and experiences in different fields of Baghlan and Takhar provinces. Some information and design were also inspired by the WASSAN-CSA SRI manual designed by Kishan Rao.

IMPORTANT FEATURES OF SRI:

✓ **Low seed requirement:**

... Since a single seedling is transplanted per hill at wider spacing, seed requirement is drastically reduced.

✓ **Low water requirement:**

... As there is no need to maintain standing water.



✓ **Transplantation of tender / young seedlings (8 – 12 days):**

... Transplantation of young seedlings at shallow depth results in quick recovery and establishment and production of more tillers.



✓ **Transplanting at wider spacing (25 cm x 25 cm):**

... Wider spacing allows enough sunlight to reach the leaves of each rice plant thus reducing competition for water, space and nutrients resulting in the spread of roots and healthy growth of plants (the distance can be increased depending on soil fertility).



✓ **Incorporating weeds into the soil while weeding:**

... Weeding with a simple hoe helps in replenishing the nutrients in the form of green manure. Working with a weeder helps to aerate the soil which in turns helps for vigorous root growth. The first weeding should be 10 days after transplanting and then a minimum of 3 weedings at 10-12 days interval.



✓ **Organic manures in place of chemical fertilizers:**

... Organic manures improve soil aeration and also microbial activity. This helps in decomposing organic matter into nutrients, essential for plant growth.

✓ **Pest management:**

... Normally, the incidence of pests and diseases is low as the plants are widely spaced and are healthier in SRI. Yet, due to lack of standing water, SRI fields in Afghanistan have seen the proliferation of cut worms which can damage roots. However, such pest can be very easily and cheaply removed with “Carbofuran 3G” pesticide.





2. SEED PREPARATION

- ✓ Only the best seed, with good density and formation, should be used.
- ✓ Choose common varieties which are best suited for the local conditions.
- ✓ Once the extent of land is decided, accordingly we chose the quantity of seed weight. (For example, 1 jerib requires no more than 1 kg).
- ✓ Seeds may not always be available in their purest form. Other varieties can be found mixed in a type. There are also half-filled and unfilled seeds which need to be separated from the good seeds.
- ✓ Note however, that after few years of SRI cultivation method, the quality of germinating stock of seeds will greatly improve, making the selection easier.
- ✓ The practice of soaking seed before broadcasting has been found to enhance the rate of germination and seedling emergence (see box on the next page).
- ✓ Experience has shown that for 1 jerib the farmer's tendency is to choose 2 kg of seeds prior to soaking. After soaking, farmers will keep only 1 kg of pre-germinated seeds for broadcasting in the nursery.

SRI

For 1 jerib



1 kg of seeds

Traditional method

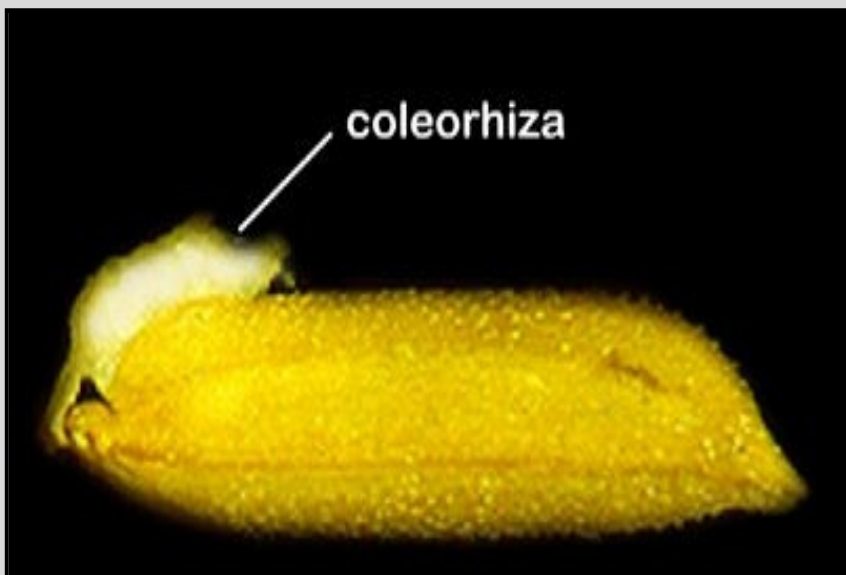
For 1 jerib



21 kg of seeds

Seed soaking method:

- ✓ Prepare a salty water solution into which you will later soak the seeds. To tell if the right amount of salt has been dissolved, such that the unfilled and half-filled seeds come floating up. Try an egg or a potato after dissolving each measure and if it comes floating up we know that we need not add more salt.
- ✓ Put the seeds in manageable amounts and stir it well in the salty solution. Empty and half-filled seeds will come floating up. Remove these seeds.
- ✓ The good seeds would deposit at the bottom. Wash the seeds thoroughly in fresh water to wash off the salt from the seeds.
- ✓ Then let these good seeds soak for 12 hours in fresh water.
- ✓ Then transfer wet seeds to a gunny bag. Leave it for 24 hours until the “coleorhiza” comes out. Indeed, within 24 hours white root called radical breaks open the outer coat and starts emerging out of the seed. At this stage the sprouted seed is taken to nursery bed for sowing.



Preparing salty solution for seed soaking.



The potato test



Empty seeds are coming at the surface of the salty solution. They can be removed easily!



Selection of good seeds which remained at the bottom of the salty solution.





Watering the seedbed.

3. NURSERY PREPARATION

3.1 Seed - bed preparation:

- ✓ In SRI method, utmost care should be taken in the preparation of nursery bed, as 8-10 days old seedlings are transplanted.
- ✓ For 1 Jerib, around 20 m² nursery-bed is sufficient.
- ✓ A bed with a width of 125 cm is ideal. Note that the width should not be too large such that watering by rose can/water sprayer becomes difficult as your hands may not be able to reach the inner areas of the seedbed.
- ✓ You should keep the seedbed closer to the field. This way time required for transporting the seed from the nursery to the transplantation site is minimized.
- ✓ If seeds are not moist enough they may not grow into seedlings. Therefore watering the seedbed is crucial.

Seed-bed layers:

The nursery bed is prepared with application of farm yard manure and soil alternatively in 4 layers:

1st Layer: 2.5 cm thick well decomposed farm yard manure.

Applying the first layer of compost. This is important because this ensures that soil matter above and below the compost do not interact and it's easier to remove seedlings at the time of transplantation. In the absence of manure a layer of ash or green manure can also do.

2nd layer: 3.8 cm soil.

3rd layer: 2.5 cm thick well decomposed farm yard manure.

Applying a second layer of compost on top of the nursery bed. This will prevent the soil from hardening, making seedlings amenable to easy removal, and also inoculate the seeds. They also serve as effective micro-environment for the seed once transplanted.

4th layer: 6.3 cm soil.

All these layers should be mixed well, as the farm yard manure helps in easy penetration of the roots. To prevent soil erosion, the bed on all sides should be made secure with wooden reapers/planks or paddy straw rope or anything of that sort. To drain excess water appropriate channels should be provided on all sides.

As the roots of 8-12 days old seedlings grow up to 7.5 cm deep, it is necessary to prepare beds of 12.5-15 cm height.

3.2 Seed broadcasting:

- ✓ Precautions should be taken while bringing the pre-germinated seeds from home to the seed-bed, it should always be wet (soak before sowing) and never be exposed to the sun.
- ✓ It is important that just the “*coleorhiza*” is out. At that very instance the seeds should be broadcasted.
- ✓ To ensure uniform broadcasting, divide the whole seed pack into 4 parts (250 gr.) and broadcast four times (each part at a time). Seeds should be thinly spread to avoid crowding of seedlings. Care should be taken that no two seeds should touch each other.
- ✓ The seeds are not to be directly exposed to the sun. And one should ensure protection from birds and ants. Therefore, spread thinly some well decomposed farm yard manure, paddy straw or ashes over the sown seed to keep the seeds well protected. Straw can be removed once the seeds germinate.
- ✓ Depending on the requirement, watering can be done slowly with rose cans by controlling the flow with hand. Care should be taken to see that the seeds do not come out while watering. Usually, the seeds should be watered 2-3 times a day.
- ✓ It is better to broadcast in the evenings.
- ✓ The sown seeds growth is governed by the temperature. If it's cold, there will be lesser photosynthetic activity, thus leaf growth will slow down, while roots will continue to grow, because of the warmth in the soil. When it's hot, seeds can germinate rather quickly.





4. LAND PREPARATION

- ✓ With SRI, the land needs to be prepared within 10 days before marking and transplanting can begin. Baghlan and Taloqan farmers are not used to prepare the land in such a short time, as in traditional farming they have around 40 days.
- ✓ Deep ploughing is not suitable. For example, tractor (mould board) ploughs to the depth of 15-20 cm which is too deep. As the fertile top soil is buried down, while unfertile sandy/pebble soil is brought to the surface, young transplanted seedlings will not develop well in their early stage after transplanting.
- ✓ For rice plant 10 cm depth ploughing is enough.
- ✓ There is a type of tilling equipment called a puddler (with 9 or 18 pals) which can cut from 10 up to 15 cm.
- ✓ Oxen is also a good option for ploughing.
- ✓ With SRI, the field should be evenly leveled. This is very important for ensuring uniform irrigation. Meticulous leveling is not as critical with traditional rice cultivation method when a 10-15 cm water layer has to be maintained throughout the plot.
- ✓ Traditional leveling method by oxen (with wooden board) is a suitable option for leveling for SRI if it is done meticulously.



5. LAND MARKING

- ✓ With SRI method, seedlings should be widely spaced (25 cm x 25 cm) and only one seedling is transplanted per hill (while there are 8-15 seedlings per hill in traditional method).
- ✓ With SRI, uniform spacing is also required for easy weeding by implements.
- ✓ To maintain uniform spacing, farmers can make use of different types of markers which are being developed for this purpose.
- ✓ These markers need to be run over the prepared field lengthwise and widthwise in order to leave a grid pattern on the plot. Transplanting at the marked intersection gives the required 25 x 25 cm spacing. With this spacing there would be 16 plants / m² as against 20-40 hills / m² in conventional method.
- ✓ Markers need to be pulled at an even pace for proper marking. To have the lines straight, it is advisable to tie a rope and pull the marker along side the rope.
- ✓ For smooth transplantation, field operations like bunding, leveling and marking with marker should be completed one day before transplantation.

Marking is important to...

- ✓ ... place the seedlings at right intervals.
- ✓ ... provide a straight way for the weeder to be operated without harming the seedlings.





6. TRANSPLANTATION

6.1 Transplantation technique

- ✓ The correct stage of transplanting the seedling is when it has 2 leaves (when they are 8-10 days old). 3 leaves would mean we are too late.
- ✓ Care should be taken to prevent any harm to seedlings while pulling them from nursery or at the time of transplantation.
- ✓ With the conventional method, the practice is to pull the seedling by holding the plant. With SRI method, a metal sheet is inserted 10-12 cm below the seed bed and the seedlings along with soil are lifted without any disturbance to their roots.
- ✓ The seedling from the plate should be gently removed laterally and not vertically during transplantation. In addition, some of its soil stuck to the roots should be kept as it is critical to retaining the micro-environment of the seedling in the transplantation site.
- ✓ Just place the seedling, don't push it **down vertically** into the soil. This inverts their root tips upward which will delay resumption of growth after transplanting.
- ✓ During the transplantation, the nursery bed should be constantly watered so that removing the seedlings is easier, both from the bed and during transplantation.
- ✓ Transplanting should be done as quickly as possible, preferably within half an hour to minimize trauma with utmost care and concentration.

Traditional Method

30-40 days old seedlings are thrust into the puddled soil and the roots take a « U » shape, which means the tips of the roots face upward. Therefore the roots require time and energy to turn downward and establish in the soil.

SRI

Young seedlings are planted shallow and therefore establish quickly. Single seedlings with seed and soil are transplanted by using finger and thumb and gently placing at the intersection of markings.

Light irrigation should be given on the next day of transplanting.

Why start with young seedlings ?

Older seedlings, being larger, are easier to handle. However, about 15 days after seeds are sown in the nursery, seedlings lose some of their potential for tillering and root growth. The older seedlings become, the less of their original potential they retain. Young seedlings, when managed with the other SRI practices, can have 50 tillers and corresponding profuse root growth, or even up to 100 tillers or more, compared with the 5 to 10 or at most 20 tillers that 'normal' rice plants have, i.e., starting with seedlings 3 or 4 weeks old or even older.

Placing the seedlings at the intersection of the horizontal and vertical lines. Each person should ideally take four lines and transplant seedlings at every intersection.



6.2 Labor requirements

- ✓ With SRI, labor requirements during transplantation may appear more at first. But with experience and after mastering the new skill, it has been shown that the time and effort required for transplanting will reduce.
- ✓ It is advisable for farmers to start transplanting when the second leaf comes out. There is a gap of 3-4 days before the third leaf comes out, which should be enough for the transplantation to be carried out.

Seedling just after being transplanted with SRI method. Observe that each seedling has been carefully placed at the intersection of 25 x 25 cm pattern.



Seedlings should be handled with extreme care while placed into the soil.



Weeding allows green manuring.



Weeding allows nutrient availability and uptake.



Mandava Weeder.



7. WEED & PEST CONTROL

- ✓ The absence of standing water provides a congenial environment for weeds to proliferate in SRI.
- ✓ Through the weeding operation, the weeds are incorporated into the soil and serve as green manure. Weeding also ensure soil aeration.
- ✓ First weeding should be done 10-12 days after transplanting. Later, depending on the need, weeding can be done once every 10 days. It requires 1 person per jerib for one day.
- ✓ Before using the weeder, there should be a thin film of water - 1 to 2 cm water. Weeding should ideally begin with low-lying plots. Then drain it. Then move upwards.
- ✓ The weeder should be held lightly, and not pushed inside the ground. If necessary some weight can be added over the float, so that the weeder goes slightly deeper in the ground. One must not run while operating the weeder.
- ✓ The weeds in the vicinity of the hills that could not be reached by the weeder have to be removed by hand.
- ✓ After a certain development stage, once the tillers and panicles appear, weeds will hardly develop due to the induced shade.
- ✓ Due to lack of standing water, SRI fields have seen the proliferation of “cut worms” which can damage roots. However, such pest can be easily and cheaply removed with “Carbofuran 3G” pesticide (1Kg per jerib), widely available on the market (8Kg bag for 500 AFS).

Advantages of weeding

- ✓ Controls negative effects of weeds.
- ✓ Green manuring due to incorporation of removed weeds into the soil.
- ✓ Soil aeration.
- ✓ Increase soil biological activity, nutrient availability and uptake.
- ✓ Every weeding brings an additional yield of 1-2 tonnes per ha !!

8. IRRIGATION AND WATER MANAGEMENT

- ✓ Because of special anatomic features, rice can grow well even in standing water; but it does not require standing water as a rule. The practice of growing rice in inundated condition is mainly to control weed growth. But such conditions result in lack of aeration and consequent stunted root growth.
- ✓ In SRI, irrigation is given to wet the soil, just enough to saturate the soil with moisture. Subsequent irrigation is suggested when the soil develops fine cracks. This method helps in better growth and spread of roots.
- ✓ Regular wetting and drying of soil results in increased microbial activity in the soil and easy availability of nutrients to plants.
- ✓ Flooding irrigation with water draining out of the plot should be avoided because it would drain out top-soil nutrients out of the field.
- ✓ Once the tillering process is complete, standing water of 2.5 cm height may be maintained.



In traditional rice cultivation method, constant water flow is required in the field to maintain water layer.



With SRI, only light irrigation is required from time to time to keep the soil moist.



Left: Root growth with traditional rice cultivation method.
Right: Root growth with SRI method.



9. FREQUENTLY ASKED QUESTIONS ABOUT SRI:

The answers to these FAQs are provided by Norman Uphoff, from Cornell University.



1. With its different transplanting method do you think that SRI can also benefit farmers with large amount of land?

Initially, SRI was considered to be *too labor intensive* - requiring more labor input per hectare - for richer farmers to be able or want to use the methods on large holdings. However, as discussed below, SRI is often *labor-saving* once farmers or laborers gain skill and confidence with the methods. The principles can be extrapolated and practices adapted for larger scale use.

With good instruction and supervision of laborers, and possibly with mechanization of some operations, SRI methods can be beneficial for larger, richer farmers as well as for smaller, poorer ones.

There are experiences in other countries which show that it is possible to follow SRI on large land holding:

- Already in 2004, one large progressive farmer operating in the Cauvery Delta of Andhra Pradesh state of **India**, has used SRI methods on more than 40 hectares (more than 200 jeribs). With good training and supervision, he was able to attain a harvested yield of 11.15 t/ha (328 sers per jerib), more than doubling the usual yield with traditional method in his area.

- In **China** in 2007, 110,000 hectares (550,000 jeribs) of SRI rice were cultivated in Zhejiang Province and 120,000 hectares (600,000 jeribs) in Sichuan Province. According to their Provincial Departments of Agriculture, larger farmers have been quicker to take up SRI than were smaller ones because they found that SRI could not only enable them to reduce seeds, water and costs, but also *reduced labor*. The latter consideration is particularly attractive to many Chinese farmers because industrial development is reducing the supply of labor for agriculture.

2. Why such wide spacing? Why reduce plant numbers so radically?

When rice plants are crowded together, within hills of 8-15 plants packed together in a clump, with little space between hills, this reduces the amount of sunlight that can reach the lower leaves to support photosynthesis. This means that these leaves, instead of contributing to the plant's pool of energy, are taking energy from it, parasitically.

Moreover, we know that rice roots rely mostly on the plants' lower leaves for their energy supply, to support their metabolism. So crowding plants together impedes whole-plant photosynthesis and undermines the growth and functioning of root systems.

When there are fewer plants per square meter, all rice plant leaves are active in photosynthesis, and root systems are well-nourished by the lower leaves, which makes all of the plants more productive. Each plant has more tillers, with more grains, and heavier grains.

So the fact that you have more tillers, with more and heavier grains will largely compensate the fact that you have fewer plants in total!



3. Why use compost in preference to chemical fertilizer?

At its origin, SRI was developed with fertilizer being used as the source of supplementary soil nutrients. But when small farmers in Madagascar could no longer afford fertilizer, it was recommended to use compost. The reason is that in addition to macronutrients which can also be found in fertilizer, compost contains a host of micronutrients (iron, zinc, copper, molybdenum, etc.). It serves as a more balanced and more complete source of nutrients for soil organisms as well as for the plant itself. By better supporting soil organisms compost contributes to better soil structure and functioning. As a result both air and water can be well-distributed throughout the soil volume. This porosity enhances the soil's capacity to absorb and hold water, so rainfall does not just run off, carrying topsoil particles with it and eroding the amount and value of the soil.

4. Why use a mechanical hand weeder to control weeds?

Weeds can also be controlled or removed by hand weeding or use of herbicides, but these methods will prevent from the benefits of soil aeration that promotes root growth and the abundance, diversity and activity of beneficial soil organisms. The use of Mandava weeder to control weeds gives farmers a 'bonus' from **active soil aeration**, which enhances plants' health and crop yield.

5. Is transplanting needed? Is there another way for farmers who don't have too much time? Can rice crops be established by direct seeding?



SRI was first developed with and for farmers in Madagascar who had the habit of transplanting their rice. But there is nothing in SRI theory which requires transplanting. The principle is that rice roots, key to the plant's future growth, should be treated very carefully and should be protected from trauma and damage.

Farmers who have labor shortages that make transplanting difficult to utilize, have been adapting SRI concepts and methods to **direct-seeded** crop establishment methods, coupled with the other SRI practices. Their main objective is to reduce labor requirements. They will try to achieve this goal even if it means that their paddy yield may be somewhat reduced because they are most concerned with favorable economics, not just agronomics.

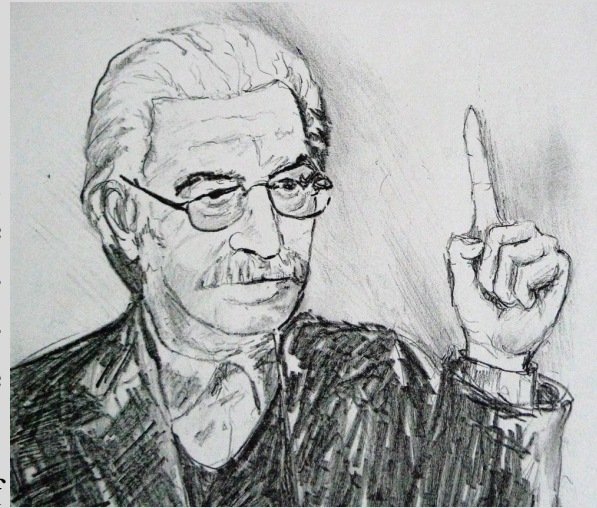
One method, developed by a Sri Lankan farmer (Ariyaratne Subasinghe) is based on broadcasting pregerminated seed on a muddy, leveled field. Ariyaratne uses about five times more seed than if he established his SRI crop with transplanted seedlings. This means he broadcasts seed at a rate of about 25 kg per hectare (5 kg per jerib) instead of establishing a nursery with 5 kg of seed per hectare (or 1 kg per jerib). When the young plants are 10-12 days old in the field, Ariyaratne simply 'weeds' it as if he had transplanted it with spacing of 25x25 cm. This 'weeding' radically thins the stand of rice, eliminating about 80% of the young plants. But it leaves them in a square geometrical pattern, with usually one plant at the intersections of the weeding passes, and sometimes two or even three. Occasionally there is no plant within this intersected space, but then adjoining plants grow larger to fill in any open space. The goal is to have a sparse, evenly and widely spaced plant population.

This methodology can reduce labor requirements for SRI by 40%, according to Dr. Ramasamy at TNAU, because there is no need to construct and manage a nursery, and also it eliminates the task of transplanting. All the farmer has to do is broadcast seed and then 'weed' the field just as he would have been done anyway after transplanting the crop. Ariyaratne says that he is confident of getting a yield of 7.5 tons/hectare. While this is perhaps less than from a more carefully managed field, he has many competing demands for his labor time, and this gives him a respectable harvest with a much reduced expenditure of labor.

This method has not yet been tried in Afghanistan, but might be an interesting alternative method for farmers (especially those doing single crop) who are concerned about labor requirement larger plots.

6. Can SRI concepts and practices be used also for other crops?

SRI is not a technology with prescribed fixed practices, but rather a set of principles to be applied to promote greater root growth and more abundant, diverse and active soil micro-organisms. Beneficial effects on resulting plant growth can be anticipated if SRI methods are suitably adapted for other crop production.



Here are examples of crops for which the principles of SRI have been applied successfully in other parts of the world:

Wheat:

This is a major cereal crop like rice and also like rice a grass-family species, so it should be amenable to SRI management practices. *People's Science Institute* (PSI), an NGO based in northern India, has tried SRI methods with two varieties of wheat. In 2006, it recorded with two different varieties in on-station trials, 28% and 40% increases in yield, plus an 18% increase in straw, very useful to farmers in its region as cattle fodder. In 2007, the yield increase for 25 farmers making comparisons was 95% with irrigated wheat production and 63% without irrigation.

Finger Millet:

Two Indian NGOs have been working with this cereal crop which is very important for many millions of poor households. They have achieved yield increases of 100-200% by adapting SRI concepts and methods: young seedlings, wide spacing, soil aeration, increased organic matter, etc. People's Science Institute had a 33% increase in finger millet yield with SRI methods for 5 farmers in 2007, and a 60% increase for 43 farmers in 2007. Recently we learned that an elderly woman farmer in Tigray province of Ethiopia, independently using practices very close to SRI for her finger millet crop, got a yield of 7.5 t/ha, many times the usual yield in her region (Dr. Sue Edwards, Institute for Sustainable Development, Addis Ababa, personal communication).

Beans:

People's Science Institute in northern India reports 5 farmers getting an average yield increase of 43% with SRI methods adapted for kidney beans, in 2006. With 113 using these methods in 2007, learning from the first year's experience, the average yield difference was 67%.

It is possible that the progress being made in other countries can be extended to Afghanistan as well.

7. Can SRI also benefit larger farmers?

Initially, SRI was considered to be *too labor-intensive* -- requiring more labor input per hectare -- for richer farmers to be able or want to use the methods on large holdings. However, as discussed earlier, SRI is often *labor-saving* once farmers or laborers gain skill and confidence with the methods. The practices can be adapted for larger scale use.

With good instruction and supervision of laborers, and possibly with mechanization of some operations, SRI methods can be beneficial for larger, richer farmers as well as for smaller, poorer ones.



Already in 2004, one large progressive farmer operating in the Cauvery Delta of Andhra Pradesh state of **India**, has used SRI methods on more than 40 hectares (more than 200 jeribs). Through good training and supervision, he was able to attain a harvested yield of 11.15 t/ha, more than doubling the usual yield in the area.

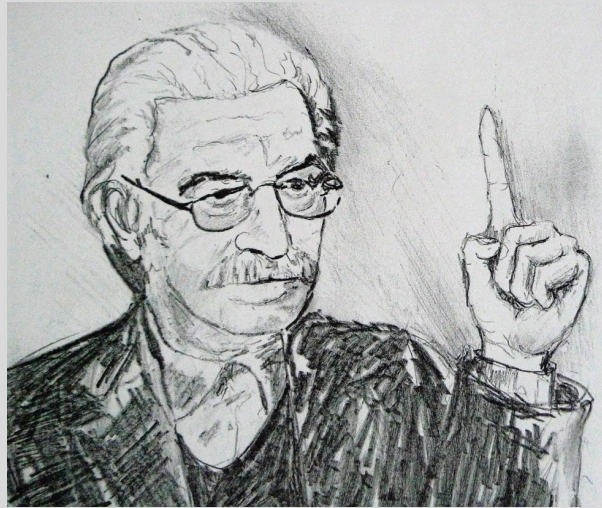
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From the evidence available to date, we see SRI methods **benefiting both rich and poor households** in absolute terms. Because poor households have greater need and demand for income increments and for greater food and economic security, this means that **relative benefits** are greater for the poor. But opportunities exist for richer households also to benefit.

8. How can SRI benefit the Poor?

SRI was purposefully developed to benefit poor, resource-limited, food-insecure households who needed to get the most productivity attainable from the small amount of land they manage and from available supply of household labor, with less water if possible, and without having to buy external inputs (new seeds, fertilizer, agrochemicals) that can push them (further) into debt.

By raising the productivity of the land, labor, water and capital invested in the production of rice without requiring the purchase of external inputs, SRI is unique among contemporary agricultural innovations. It is accessible to poor households because they need only to change their thinking and modify familiar practices.



How SRI can improve the lives of poor households has been reported from **Cambodia**:

In 2002-03, the NGO **ADRA** persuaded 100 farmers in a village near Siem Riep, whose average paddy yield was **1 t/ha (29 sers per jerib)**, to try SRI with the guarantee that ADRA would compensate anyone whose yield fell below this average. According to Roland Bunch of World Neighbors, these farmers averaged **2.5 t/ha (72 sers per jerib)** with SRI - and not a single farmer needed any compensation.

In 2006-07, a Family Food Production project of the **LDS Charities** in Kampong Chhnang province got 146 farmers who had been averaging **1.06 t/ha (31 sers per jerib)** to use SRI methods. Their average yield with SRI practices and reduced costs was **4.02 t/ha (116 sers per jerib)**, and all exceeded their previous yield. Such increases can transform the life chances of poor households.

In **India**, the NGO **PRADAN** introduced SRI into Purulia district of West Bengal state where just 4 farmers were willing to try the new methods in 2003. Next year, 150 farmers practiced SRI and almost 4,000 by 2007.

In northern **Myanmar**, the NGO **Metta Development Foundation** began introducing SRI in 2001 through farmer field school methods. Metta trained 5,000 men and women through FFS programs, providing hands-on training through each 'school' which lasted one season long. By the end of 2005, about 20,000 households were using SRI methods through farmer-to-farmer spread. On their own fields after training, even without using all the SRI methods, **farmer yields averaged over 4 t/ha (116 sers per jerib)**. Because their costs of production did not increase and rice production was little more than a break-even operation, farmers' **net income per hectare went up more than eight times**, from 296 kg/ha to 2,585 kg/ha. The number of SRI users in the region is now estimated at 50,000.

9. EXAMPLES OF RESULTS IN 2009

Haji Deen Mohammad
Chel Kapa village

SRI:
371 sers/jerib

Traditional Method:
57 sers/jerib

« At the beginning my neighbors didn't believe that transplanting such young seedling with such spacing will bring any results. I've put a donkey skull as a scarecrow in my field to chase the "bad eye". After 3 weedings, these neighbors were very impressed ».



Abdul Wakil
Qazi village

SRI:
400 sers/jerib

Traditional Method:
200 sers/jerib

« I was planning to do 2 jeribs of SRI this year but due to late wheat harvest I thought that I wouldn't get good yield with SRI, so cultivate only a small plot following SRI method. I made a mistake because this year my SRI plot got 2 times more yield than the rest of my land cultivated under traditional method. Next year I plan to expand my SRI plot! ».



Juma Ghul
Qaradaka village

SRI:
331 sers/jerib

Traditional Method:
123 sers/jerib

« My land has been destroyed by spring flood two times after transplanting. I had to redo my nursery 3 times and my final transplanting was later than what I initially planned. But I still managed to get much better results than the traditional method I did in my other plot ».



Jawan-e-Shamali
Kabuliha village

SRI:
571 sers/jerib

Traditional Method:
214 sers/jerib

« This year I did more weedings (4) than last year (3). I think that even though I transplanted a bit late due to late wheat harvest, the weedings have allowed me to get even better results than last year (400 sers per jerib) ».



Hafizullah
Qaradaka village

SRI:
188 sers/jerib

Traditional Method:
143 sers/jerib

« My land was destroyed 2 times by flood like my resource person Juma Ghul and I had to do my nursery 3 times. I transplanted so late (5th of Saratan) that I didn't believe I would get any result. So I didn't even take good care of my SRI plot. I didn't use any fertilizer at all. But my yield is still slightly better than with traditional method! »



Charagh Ali
Chel Kapa village

SRI:
117 sers/jerib

Traditional Method:
57 sers/jerib

« At the beginning I tried the SRI method but after transplanting I was thinking that it wouldn't work so I didn't even do the weeding. But when I saw my resource person plot I realized that SRI could bring unexpected results so I started doing the weeding correctly but it was too late. So I didn't get good results. Next year I won't do the same mistake ».



Saed Mohammad
Kabuliha village

SRI:
343 sers/jerib

Traditional Method:
214 sers/jerib

« I was impressed that despite the fact that my transplanting was late (due to late wheat harvest) and the fact that it was my first time with this method, I managed to get better results than in my traditional plot ».



Saed Ahmad
Qulboraq village

SRI
274 sers/jerib

Traditional Method
126 sers/jerib

« At the beginning , the head of our village told me 'if you get anything out of this SRI method it will mean I can become young again'. After harvest he didn't become younger but at least he has hope that he could get wealthier by applying SRI method in his own field next year ».



Abdul Baqi
Abdul Hamid village

SRI
557 sers/jerib

Traditional Method
257 sers/jerib

« I did SRI as a single crop. I had less tillers per square meter with SRI than with traditional method, but each tiller with SRI had much more and heavier grains. I'm very happy about the results for my first year. Next year I'm planning to extend my SRI plot to 2 jeribs ».



Advantages of SRI

- Saving on seed, as the seed requirement is less.
- Saving of water, as the water requirement is less.
- Saving on chemical fertilizers & pesticides.
- More healthy rice with organic farming practices.
- Higher yield due to profuse tillering, increased panicle length and grain weight.
- Easy and effective seed multiplication, as a small quantity is required as seed.

Disadvantages of SRI

- Higher labor costs in the initial years.
- Patience and perseverance are required for acquiring the necessary skills.

Mohd. Azam, Khair Mohammad & Ali M. Ramzi at the Baghlan Agriculture Faculty research farm.



Root growth under traditional method (left) and under SRI method (right).



By Ali Mohamad Ramzi, Ghulam Hazrat, Fawad Hussain & Vincent Thomas

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Resource persons (experienced SRI farmers):

- 1 - Juma Gul - Qaradaka village - 0708173840
- 2 - Haji Deen Mohamad - Chel Kapa village - 0774209636
- 3 - Mohamad Alim (Dalam) - Chel Qapa village - 0772287863
- 4 - Abdul Wakil - Qazi village - 0799648206
- 5 - Jawan-e-Shamali- Kabuliha village - 0799667769
- 6 - Abdul Baqi - Haji Abdul Hamid village - 0775534173
- 7 - Haji Almas - Mollah Said Raim village - 0700559152
- 8 - Ghulam Sakhi - Baloucha village - 0707502353
- 9 - Saed Ahmad - Qulburaq village -
- 10 - Abdul Hadi - Dong Qushlaq village -



MEET SRI FARMERS FROM ALL OVER THE WORLD !

Iraqi farmer doing manual weeding.



IRAQ

INDONESIA



First rotary weeder developed in Iran.



IRAN

Research farm at the HARAZ Technology Development and Extension Center in Iran.



SRI demo plot in Senegal.



SENEGAL

SRI demo plot in Senegal.



Mechanical transplanter developed in Pakistan.



PAKISTAN

Mechanical weeder developed in Pakistan.

