What is S.R.I. ?

It has become difficult to increase production from traditional rice farming. It needs extra labour and a lot of compost. Farming with modern methods is also expensive in outside inputs. With conventional methods, only by using expensive chemical fertilisers, pesticides and hybrid seed can farmers increase their production.

It is increasingly difficult for ordinary farmers to afford all these things. It is also known that using chemicals is harmful to the environment

A clump of rice grown with the SRI method. This has grown from a single seed.

So here we are demonstrating a new method of growing rice which can use local seed and organic compost, while still increasing rice production. This method is called ***"System of Rice Intensification" (S.R.I.)***, and in this chapter we describe the principles and methods of SRI.

Why do SRI ?

Benefits of practicing SRI

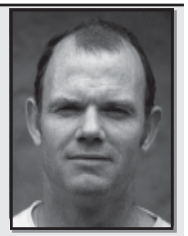
- rice production increased
- less water needed
- less seed needed
- no extra external inputs needed
- can use local/traditional seed
- due to better soil and water management:
  - less pests & disease
  - better quality grain
  - more fertile soil

How to do SRI ?

SRI involves four major changes from conventional rice production:

1. The seedlings grown in the nursery beds are transplanted after just 8-10 days, or at the 2-leaf stage.
2. Seedlings are transplanted singly, not in a bunch.
3. Seedlings are transplanted at a wide spacing, from 20 to 50 cm apart.
4. Much less water is kept on the paddies.

This booklet's author
Chris Evans, advisor,
Himalayan Permaculture Centre, Nepal
www.applewoodcourses.com
www.himalayanpermaculture.com



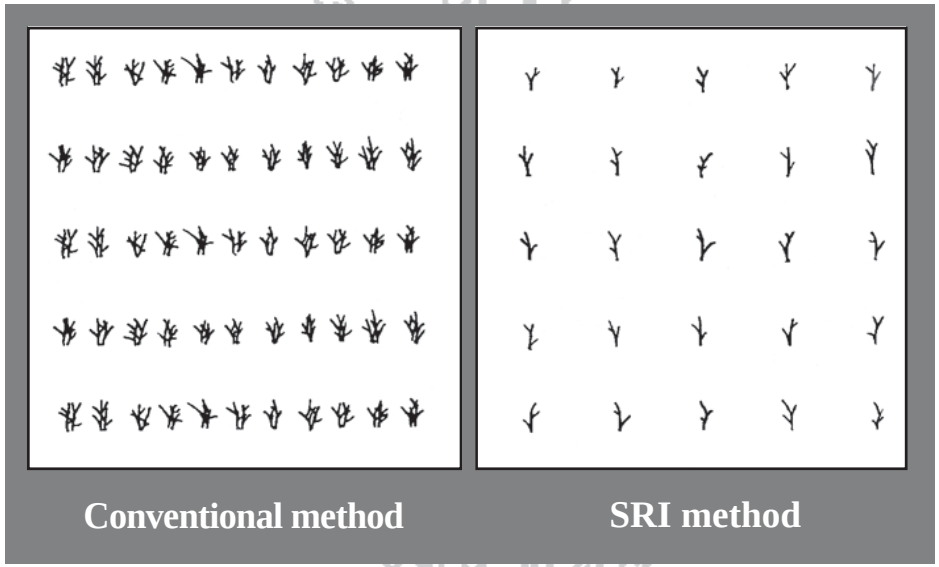
Text

1. The seedlings grown in the nursery beds are transplanted after just 8-10 days, or at the 2-leaf stage. It is the ***biological*** age of the seedling which is important rather than the number of days. In warmer areas the 2 leaf stage is reached in just 8-10 days. This may take 3 or even 4 weeks in colder areas. The old seed case is still attached to the plant at this stage. Such a small seedling should be transplanted with much care not to disturb the roots, and when planting, the roots should be pointing down, not bent upwards as often happens when planting quickly. When are left pointing upwards, the ability of the plant to grow and seed well is reduced. When the seedling is planted small, it can grow without being disturbed, its roots grow bigger and so it can produce better grain.

2-leaf seedlings

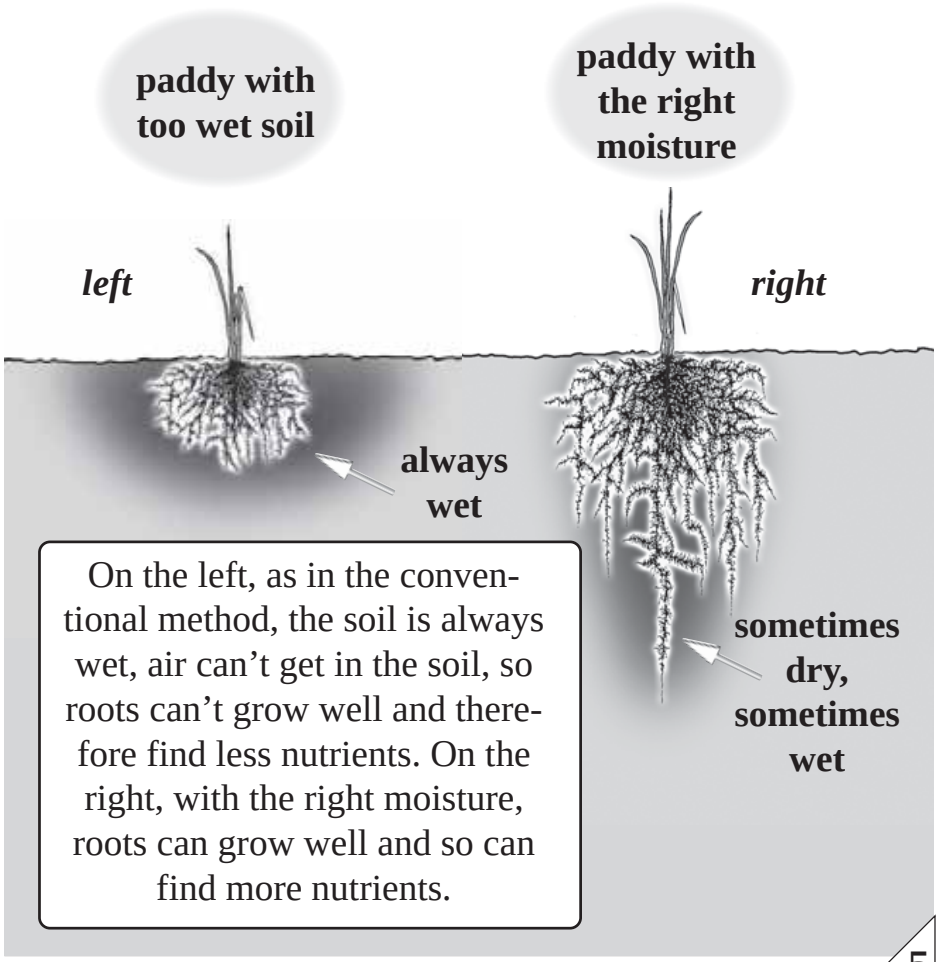
At Sunrise Farm in Kathmandu, Nepal, rice seed is sown in old egg boxes filled with soil. This means less root disturbance when planting the seedlings.

2. Single seedlings are transplanted. In the conventional or traditional method, a bunch of 3-6 seedlings are planted together in a clump. This leads to competition between the roots, and later the leaves. Single seedlings do not compete and they can get more access to nutrients and water.



3. Seedlings are planted at wide spacing. There can be between 20 to 50 cm between single seedlings. Seedlings that are in clumps and planted close together suffer from competition (as in 2. above). They will compete for water, nutrients and light. Planting far apart means that each seedling has lots of light and plenty of space to obtain nutrients and water. Also, when single seedlings are spaced wide apart much less seed is needed. If the conventional method needs 100 kg per hectare of seed, with SRI only 7 kg of seed is needed to plant a hectare.

4. After transplanting, much less water should be allowed onto the paddy. In the conventional method, paddies are kept flooded only to control weeds in the rice. But this means that less air is allowed in the soil. When the soil is waterlogged, scientists have found that up to 75% of roots can die. When there is too much water, the roots do not grow well. In SRI, out once the seedlings are established, water is managed to keep the soil moist and sometimes even dry. This promotes good root growth, so the plant can find plenty of nutrients from a bigger area.

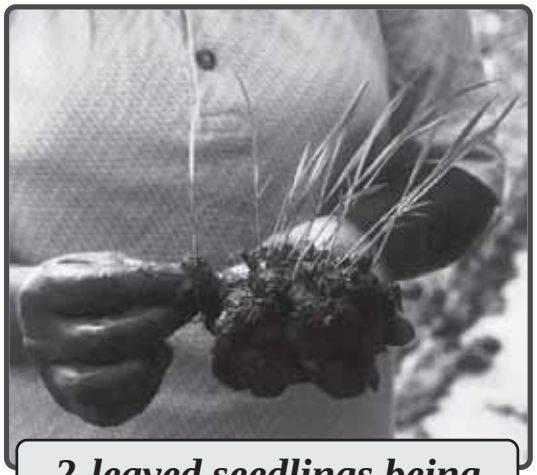


Taking the above 4 differences into account, the SRI method is described below

1 As in the traditional paddy rice cultivation, first sow the seeds in a nursery, but sowing more thinly makes it easier to transplant the small seedlings later on.

2 Seedlings are planted when they are 8-10 days old (in warm areas) or whenever the 2-leaf stage is reached. At this time the rice seed husk is usually still attached to the seedling.

3 When transplanting the 2-leaf seedlings great care must be taken not to damage the roots, or expose them to the sun. The seedlings should be planted as soon as possible - if possible within 15-20 minutes of uprooting.



2-leaved seedlings being lifted from the nursery.

A rake is used to mark out planting distances. The distance between teeth of the rake becomes the planting distance of the seedlings

Shyam's rake has holes on the horizontal bar at different distances. This means he can set different widths to mark out his planting distances.

4 When planting the seedlings, the roots should point downwards, not be bent upwards.

The seedlings are then planted according to the marks of the rake, anywhere between 20-50cm.

5 Plant the seedlings singly, one-by-one. The distance between seedlings can be 20 to 50cm. Farmers can research this themselves to find which distance is best for management and yield. Some farmers prefer 40cm, some 30, etc.

The roots of the seedling should point downwards

6 For up to 2 weeks, as the seedlings are establishing , the paddy should be kept wet. After this, water should be managed to allow just the right amount of moisture. Once every 1-2 weeks the soil can be allowed to completely dry out, even crack. In the monsoon season, rain should be enough to satisfy water needs. If irrigation is needed, flood the field once in the evening, allow it to soak in overnight, then drain off any excess water. When the rice flowers, more water can be allowed to flood the field. From 3-4 weeks before harvest, no irrigation should be done & the field drained.

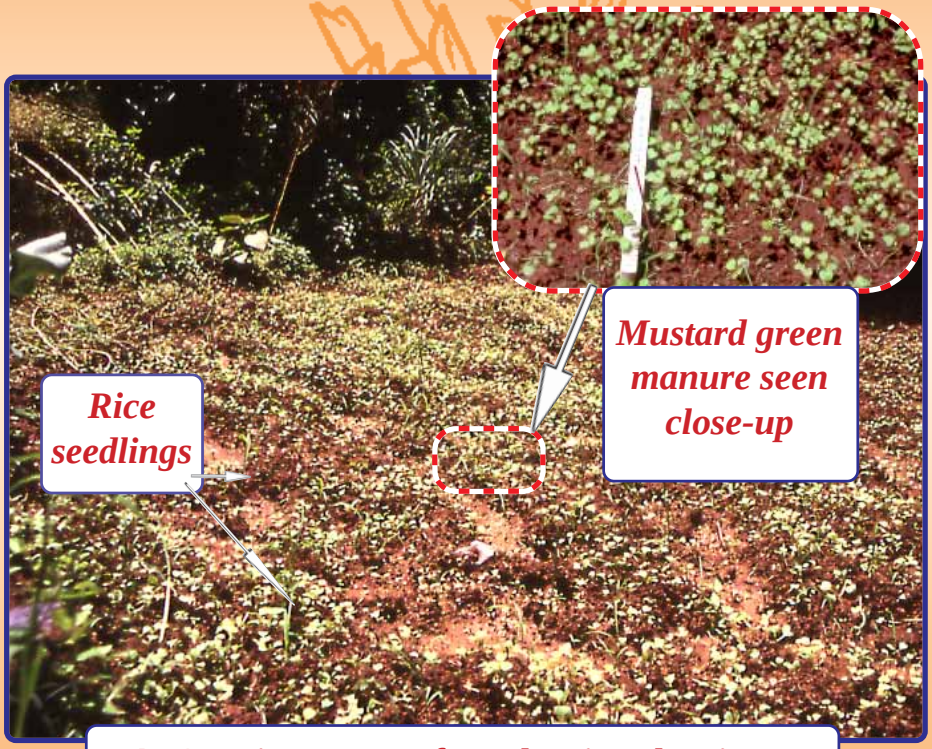
Fields under SRI, one month after planting

Compost

Good organic fertilizer for the soil is crucial for the success of SRI, to give good root growth. Because plants are far apart, mulch can also be added. Mulching will also help control the weeds. Green manures can also be used. For example, before planting rice, sesbania can be grown and ploughed into the soil. Mustard can also be sown with the transplanting to control weeds, and be dug in at time of first weeding.

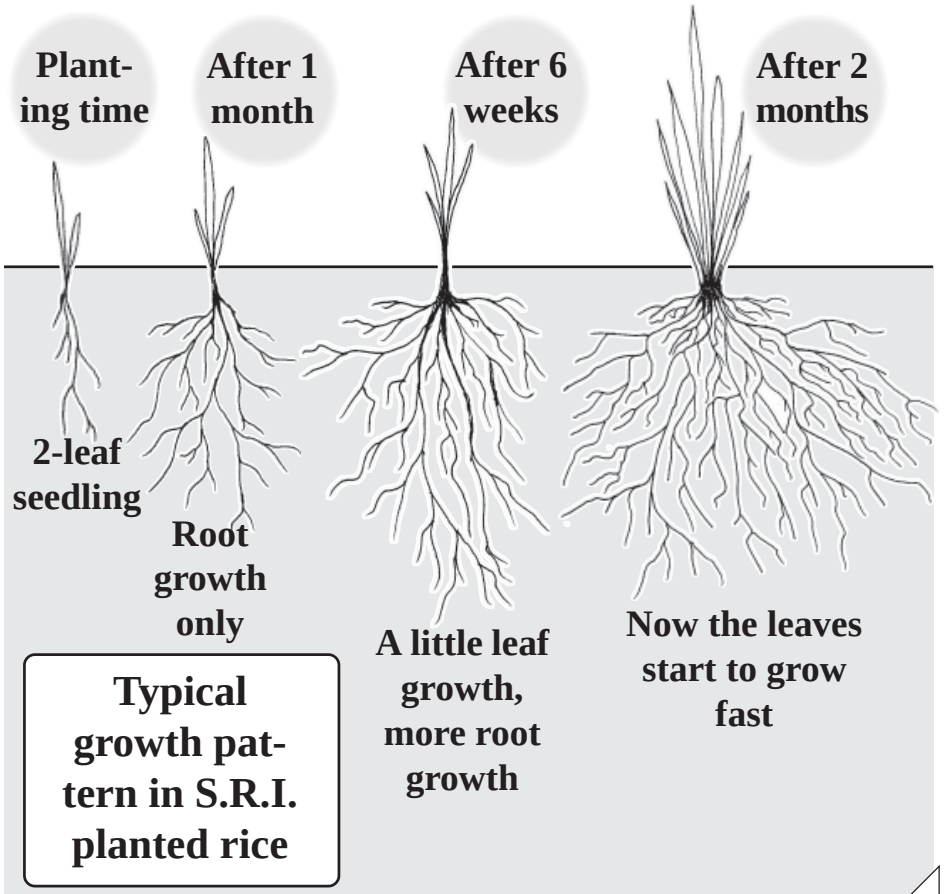
Weeding

In SRI because the soil is not saturated with water, and seedlings are further apart, more work is required in weeding. The first weeding should be done about 10 days to 2 weeks after transplanting. The next weeding may be 2 weeks later. At least 3-4 weedings will be needed, but in SRI the more weeding is done, the better the rice production will be. Uprooted weeds should be left to rot on the soil.



At Sunrise Farm, after planting the rice a green manure of mustard is sown. This helps to control weeds, and after 2-3 weeks is dug in, which helps to aerate the soil as well as providing a source of nutrients.

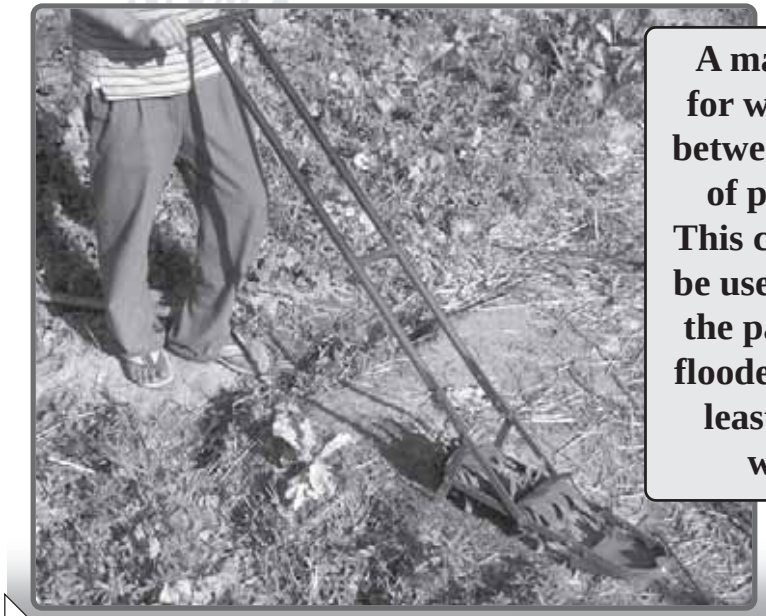
Because seedlings are small and planted far apart, for up to 1 month the crop may look very poor. But at this time, most development is going on in the roots. In the second month, tillering starts and in the third month the above-soil plant grows very fast and becomes a thick clump. Most work is needed at planting because the seedlings are small and need great care. But as experience grows, this work can be done faster. Weeding takes more work than traditional paddy cultivation, but production increases as a result. Mulching and green manures can reduce the amount of weeding needed.



Typical growth pattern in S.R.I. planted rice

On the left is a rice plant grown with the SRI principles. On the right is a plant grown with the conventional method.

After the SRI rice has been planted, green manures like *Sesbania*, mustard or buckwheat can be sown and then be dug into the soil. Any form of mulch can be also be laid down. Either of these will help to control weeds as well as add fertility to the soil.



A machine for weeding between rows of paddy. This can only be used when the paddy is flooded, or at least very wet.

Rice plants in SRI method

Rice, planted as single seedlings at 40cm distance, is starting to ripen.

A large, multi-tillered clump of rice from a single seedling

Paddy managed under SRI has shown good increases in yield. Double yields are not difficult to achieve, and some farmers have achieved up to 4 times their normal yield. To try out SRI, start experimenting with the above ideas on a small area of your land. If you find good results, increase the area. Form a network with other farmers and research/development organisations, so more people can try and share experiences. Keep good records of inputs and outputs, and any new approaches which work well for you, in your area.

Comparison between conventional and SRI methods

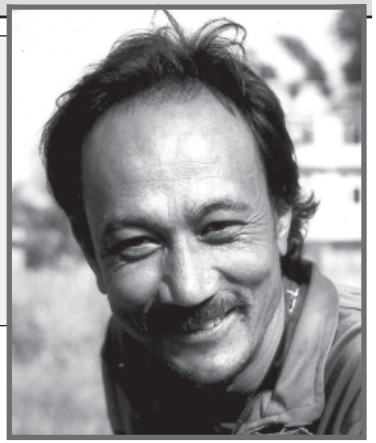
	Conventional method	SRI method
No: seedlings per clump	4	1
No: tillers per seedling	8.3	55
No: seeds per tiller	114	189
No: seeds per plant	824	5858
Yield (tonne/Ha)	2.0	7.3

Joelibarison 1998

Farmers' Experience

Mr Shyam Shrestha

Mr Shyam Shrestha, owner and manager of Sunrise Farm, Sita Paila on the outski-rts of Kathmandu in Nepal, has been growing rice using the SRI principles since 2001. Now let's hear about his experience.



Shyam Shrestha

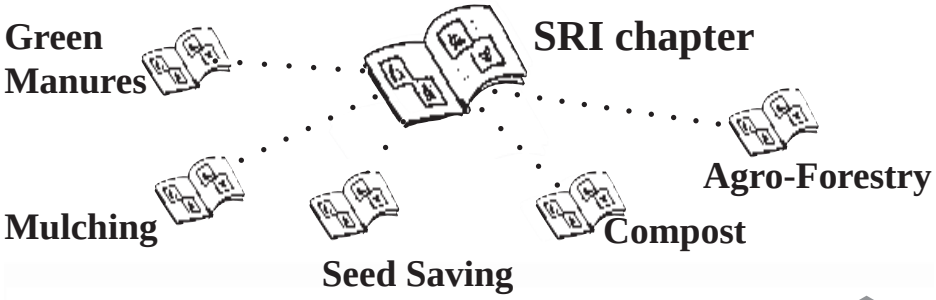
My experience since 2001 has shown me that although SRI requires more thought and work in some areas, the benefits more than compensate for this. But I also think that once we get more practice and develope a habit of planting this way, jobs like planting seedlings and weeding, which take more time at the moment, will become quicker as we get more experienced. You should take care not to put too much water on the fields. I use more mulch to control weeds. You shouldn't weed late - this makes it more difficult later. Before if we weeded twice, with SRI we weed 3 or 4 times. I've used green manures of mustard and *Sesbania*. This keeps the soil more loose and makes weeding easier. With mustard I got a benefit of some greens to eat as well as the weed control and soil improvement. So overall I've seen that with extra work, the fruits are more abundant!

This booklet was produced with the participation of the SRI Group-Nepal, an alliance of (I)NGOs and individuals interested to research, evaluate and network SRI practice in Nepal.
http://groups.yahoo.com/group/sri-nepal
sri-nepal@yahoogroups.com
SRI homepage (International) - http://ciifad.cornell.edu/sri/

Read On !

Subjects Related to SRI

Good benefits can be had from the information in this book about SRI. However, this information is also linked to other methods. For extra benefits let's read, learn and practice from other related chapters.



Green Manures chapter - use green manures to add fertility to the soil and produce more crops

Mulching chapter - how to grow more crops with less work while keeping the soil covered

Seed Saving chapter - information on methods to produce and store various quality seeds at home

Compost chapter - information on how to make good compost quickly is given in this chapter

Agro-Forestry chapter - how to plant and manage trees on farmland to increase and diversify farm yield