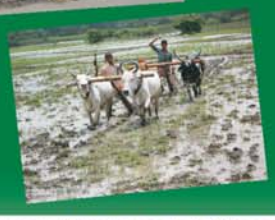
System of Rice Intensification

Growing More Rice with Less Water




SRI method facilitates innovation and local adaptation of practices. Farmers should further refine these practices according to their local situation. Farmers in different places are adopting such approach and enhancing the knowledge related 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.





SRI is neither a new variety nor hybrid... It is only a method of cultivating paddy that increases the productivity of the soil, water and other resources... Any paddy variety can be cultivated by this method.

THE WORLD BANK

Andhra Pradesh
Drought Adaptation Initiative

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SRI Method - Key Attributes

To achieve higher productivity in Paddy:

- A plant should have more number of tillers
- The number of effective tillers should be higher
- The number of grains in a panicle should be higher
- The grain weight should be more
- The roots should have extensive and healthy growth

SRI Method of Paddy cultivation helps in achieving the above.

For SRI Method

- Plots should be even and level
- Drainage channels should be there , if needed
- Plots should be of small size

Wide Planting

With wide spacing each plant gets more space, air and sunlight. As a result each plant gives more tillers. The panicle length would be more. The panicle has more number of grains and the grain weight would also be more.

Less Seed

As wide spacing is adopted the seed required would be less. Thus it is easy to use and produce quality seed.

Transplanting young seedling

As 2 leaf stage seedling is transplanted, it grows healthily and generates more number of tillers. It can achieve the potential of giving higher yield.

Less Water

When the water is stagnated in the field, the new tillers from the roots would be submerged in the water, which hinders their growth. For a healthy paddy plant water should not be in stagnated situation in the field. When irrigation is provided intermittently the roots are aerated and grow healthily.

Turning back the weeds into the soil

Instead of weeding and throwing the weeds outside the plot, it should be turned into the soil, which gives several advantages. Firstly, the soil gets aerated and secondly, the weeds get decomposed in the soil and turn into organic matter. With this the roots and the plant grow healthily and higher yields can be achieved.

Use of Organic Manures

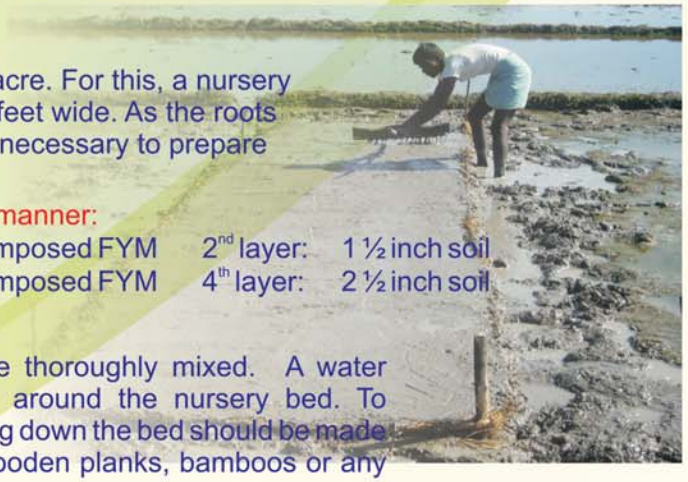
When organic matter is added the microorganisms in the soil multiply manifold. The microorganisms bring nutrients into available form and are made available to them as and when they are needed.

Raising Nursery

Transporting the young seedlings to the main field is one of the problems in SRI method. To overcome this problem nursery raising need to be taken up near the main field. For every acre have one nursery of 400 sq.ft. either in the centre or on one side of the field

Bed Preparation

Two kgs seed would be needed for transplanting in one acre. For this, a nursery bed of 44 sq.yards / 400 sq.ft. is required. It should be 4 feet wide. As the roots of 8-12 day old seedling would grow upto 30 inches, it is necessary to prepare raised beds of 5-6 inches.



Nursery bed is prepared in this manner:

1st layer: 1 inch thick well decomposed FYM
2nd layer: 1 ½ inch soil
3rd layer: 1 inch thick well decomposed FYM
4th layer: 2 ½ inch soil

All these layers should be thoroughly mixed. A water channel should be made around the nursery bed. To prevent the wet soil dropping down the bed should be made secure on all sides with wooden planks, bamboos or any other suitable material.

Growing Seedlings

Pre-soaking and Germinating the seeds: Using pre-soaked and germinated seeds is one of the methods in raising nursery. Soak the paddy seed for 12 hours. Transfer the soaked seed into a gunny bag or make a heap and cover it with gunny clothe. Leave it for 24 hours. At this time the seed germinates. This seed is used for sowing on the nursery bed.

Broadcasting the seed: To ensure uniform broadcasting, make the seed into 4 equal parts. Broadcast each part separately one after the other. Two seeds should be separated by a distance of length of one seed. It is better to broadcast the seeds in the evenings.

Covering the seed: Cover the seed with a thin layer of well decomposed FYM or dry soil. Even paddy straw can be used for this purpose. The seed is protected from direct sun and rain by this layer. It also protects from being eaten away by birds and ants.

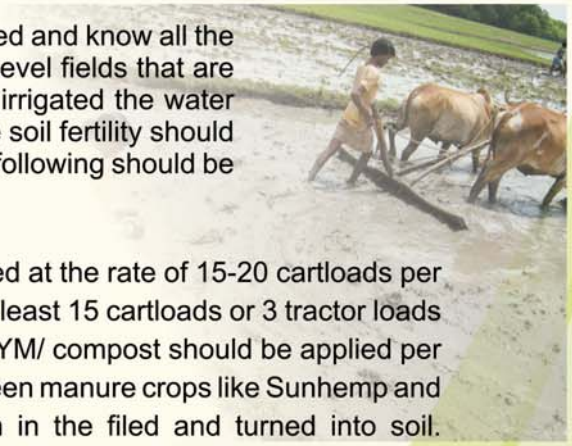
Watering the beds: Depending upon the need, watered the bed daily in the morning and evening. It should be gently sprinkled over the bed. The nursery can be watered by letting in water into the canal surrounding the nursery bed.

'Mat' Method

In this method, nursery is raised on polythene sheet or empty fertilizer bags. If adjoining farmers follow this method, it would be advantageous for them in terms of labour and costs. The nursery can be uprooted in chunks and easily transported to the main field on bullock carts.

Preparation of Main Field

Farmers who want to follow SRI method should first get the soil tested and know all the details. If it is dry ploughed and watered, results would be better. Level fields that are convenient to irrigate and drain would be ideal. When the plot is irrigated the water should spread uniformly across the field. Methods of improving the soil fertility should be taken up right from the beginning. At least two methods from the following should be practiced every year.



Tank silt should be applied at the rate of 15-20 cartloads per acre (40-50 tons/ha). At least 15 cartloads or 3 tractor loads (6tons) of good quality FYM/ compost should be applied per every acre. Common green manure crops like Sunhemp and Sesbania can be grown in the filed and turned into soil. Otherwise, the traditional practice of flocking the cattle, goats and sheep in the field during the night could be followed.

If soils are saline...

Though, saline or alkali soils are not suitable, with due care, it is possible to bring these soils under the SRI cultivation. Activities like growing green manure crops and turning them into soil and keeping the field in hair thin level water should be taken up.

For smooth transplantation, field operations like cleaning of bunds, leveling and marking should be completed a day before transplantation.

Different types of Markers

Farmers have prepared different types of markers using rope, wood and iron. There are markers with 4 rows and super markers with 16 rows. In Andhra Pradesh during Sankranti time rangolis are drawn using a small drum (approx. ½ inch wide and 4 inches long) with holes. Based on this the farmers have designed the roller marker. In the roller marker the horizontal and vertical lines are formed by pulling it, thus forming grids.

Transplantation

Marking

Once the main file is ready, marking for transplantation should be done, ideally a day before transplantation. This would ease the burden in terms of labour time. The row to row distance and within a row plant to plant distance should be 10 x 10 inches (25 x 25 cms). There are bar markers which have to be drawn either way to form a grid and roller markers would form grids at one go. The paddy seedling has to be transplanted where the vertical and horizontal lines meet. The roller marker gives 8 grids at a time. For the rows to be straight, it is ideal that a rope is tied along the length of the field and the marker is drawn along the rope.

Leaving pathways

These paths result in good aeration of the paddy fields. As a result the pest and disease intensity gets reduced. It would be easy for the farmers to undertake necessary works in the field. Farmers also adopted this practice of leaving paths for every 2 metres. When roller marker is used, once the marker is pulled lengthwise across the field, i.e. after every 8 rows, it should be pulled after leaving a gap of 12-13 inches.

Taking the seedlings

In the conventional method, the practice is to pull the seedlings by holding the plant. But in SRI method the plants would be very small. So a metal sheet is pushed 4-5 inches below the nursery and lifted on to the plate. This means that the seedlings along with the soil are taken on to the sheet. This can be transported to the main field on the metal sheet itself or transferred into a wicker basket or gamela. After uprooting the seedling transplantation should be completed as soon as possible, preferably within half an hour. This minimizes the trauma to the seedling. Transplantation should be done with utmost care and concentration.

Method of Transplanting

Wide spacing is important in SRI method. In the conventional method 33-40 hills are transplanted per square metre with 4-5 plants per hill. But in SRI method, it would be 16 hills per square metre, with one plant for each hill. If there is any doubt regarding the survival of plant then two plants can be transplanted per hill. In the conventional method, seedlings are transplanted by thrusting them into the soil using the middle and the pointing fingers.

With this the root takes a 'U' turn. In SRI method the seedlings are transplanted shallow with the roots forming a 'L' shape. Start at 1 inch above the intersection of the horizontal and vertical lines and gently pull down using the pointing finger. The seedling is taken along with the soil using the thumb and pointing finger. As a result the seedling establishes quickly and grows healthily. The field should be lightly irrigated either on the same day or the day after transplantation.

Initially, SRI method requires 10-15 persons to transplant one acre. Once the farmers/ labourers gain experience it can be completed with fewer persons.

Weed Management

As there is no standing water in SRI method, weeds would be more. As the weeds are useful for the soil as organic manure, it should be allowed to grow and then turned into the soil intermittently. Implements like 'weeder' are available for this purpose. This would help in more aeration to the plant roots resulting in their healthy growth. As the plant is strong and healthy, the number of tillers would be more.

Rotating the Weeder: It should be rotated, atleast 3-4 times with an interval of 10 days in between. First weeding should be done on 10th day after transplantation i.e; when the weeds are small,

Light irrigation should be given to the field, the day before the weeder is rotated. This would facilitate easy moving of weeder. Water should not be let out from the plot, after the weeder is rotated, as there is possibility of nutrients going out from the plot.

There are proven benefits with Azolla, when it is applied in SRI fields. Apart from organic matter/nutrients, it also helps in better moisture retention and suppresses the growth of weeds.

Apply azolla with first irrigation (3rd day after transplantation) to SRI field. Spread the azolla mass across the field. It spreads by the time of the first weeding (about 10 days) and gets incorporated into soil while weeding. Some azolla mass trapped around the hills will spread again in the field. This time it multiplies relatively faster. Incorporate it again into soil with the second weeding. It might help in increasing the duration between 2nd and 3rd weeding, in which there will be more time for azolla to spread intensively. By this time it would look like a thick mat as more time is given for it to grow. Again incorporate this into the field with the 3rd weeding.

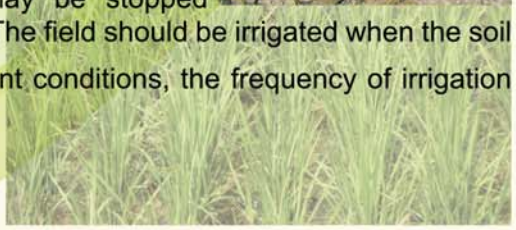
Equipment Bank

Markers and Weeders are such equipments which are used once or twice a year. And there is no need for each farmer to have them on their own. If some farmers join together and purchase the needed equipment collectively, they can be made available for hiring among them through custom hiring centres. Nominal charge could be collected which can be used for the maintenance of the equipment.

Water Management

When the soil is flooded with water, the roots of the plants would die due to lack of aeration. That is why the fields are not flooded under SRI method. As the soil is not flooded, the roots of the paddy plant grow healthily, deeply in all directions. As the field is intermittently irrigated and dried, the micro organisms will make nutrients available to the plant.

If irrigation water is to be used efficiently then the plots should be small and levelled. Instead of letting in the water until it reaches the end of the field, it may be stopped (depending upon the local conditions) after 3/4 of the field is irrigated. The field should be irrigated when the soil develops hairline cracks. Depending upon the soil and the environment conditions, the frequency of irrigation should be decided.



Pest & Disease Management

Use of organic manures results in healthy growth of the plants and incidence of the pests and diseases is naturally low. The pests can be easily managed by using some organic concoctions either as a preventive measure or as and when needed. Amrit Jalam is one such concoction.

Preparation of Amrit Jalam

Mix the cow urine (one litre), cow dung (one kilo), jaggery (organic- 250 grams) and chlorine free water (10 liters) in a plastic container or an earthen pot. Let them ferment for 24 hours. Dilute this with water in the ratio of 1:10. Filter the solution using a fine cloth. This can be used for spraying. If spraying is not possible, let this flow with field canal along with water. It not only gives nitrogen to the plants but also repels harmful insects and micro organisms. This can be stored for a period of 30 days. However it has to be stirred daily.

What Farmer's say...

Nerlapalli Hanumaiah (Farmer, Nagireddypally, Mahabubnagar)

"... In SRI, less seed is required... Earlier, atleast 12-15 women need to be employed for transplantation... Now, I'm making it up with 8-12 women...Infact, I'm doing it now with my family members only.. It all depends on managing the weed... It used to be more if we could get 25 bags of yield from our land... With SRI method, the yield is increased and now I'm getting 28-32 bags... We have been practicing this method since 4 years... In this Rabi season (2009), our entire village has gone for SRI method.."

Bujjamma (Treasurer, Village Organization, Kottur, Mahabubnagar)

"... It used to be all depend upon the water availability in our village tank... When there is water, some used to grow paddy... And this was according to '*Taibandi' (panchayat resolution)*....later it was also not possible and with increasing conflicts for water, gradually our lands were kept in follow for almost 4 years... When we came to know about SRI method in Ayacut area of our neighboring village, Nagireddy Palli, our farmers also showed interest and followed the same...In Khariff, 2008, entire ayacut area under the tank (107 acres) was brought under SRI method of cultivation... The logic of using less water has given the needed strength to our farmers, resulting into making fertile of the fallow lands... "

Chintakindi China Venkataiah (Farmer, Nagireddypally, Mahabubnagar)

"... The main concern for the farmers is about weeding... This is the main reason for farmers not going in for SRI method... It is often felt that it is more laborious and costs are also more...As irrigation is intermittent, naturally the weeds are more.. and if timely weeding is not done, the crop would be in risk.. But, there is no need to have such fear... In conventional way, atleast 15-20 women are required for weeding activity... But in SRI, the farmer himself can along do that with the help of weeder... It is true that it is a strain if it is done by a single person... It would be better if 2-3 persons are engaged in this process... This would ease the burden, both in terms of costs and labour... The critical aspect is this process should be done in time..."

- Saving on seed cost as the seed requirement is less
- Saving on water as Irrigated - Dry method is followed
- Cost of external inputs gets reduced as chemical fertilizers and pesticides are not used
- Incidence of pests and diseases is low as the soil is allowed to dry intermittently.
- More healthy and tasty rice as a result of organic farming practices.
- Higher yields due to profuse tillering, increased panicle length and grain weight
- Seed multiplication with less quantity of parent seed.
- Farmers can produce their own quality seed.