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# System of Rice Intensification

# Climate Smart Agriculture


Dilasa Janvikas Pratishthan

Aurangabad

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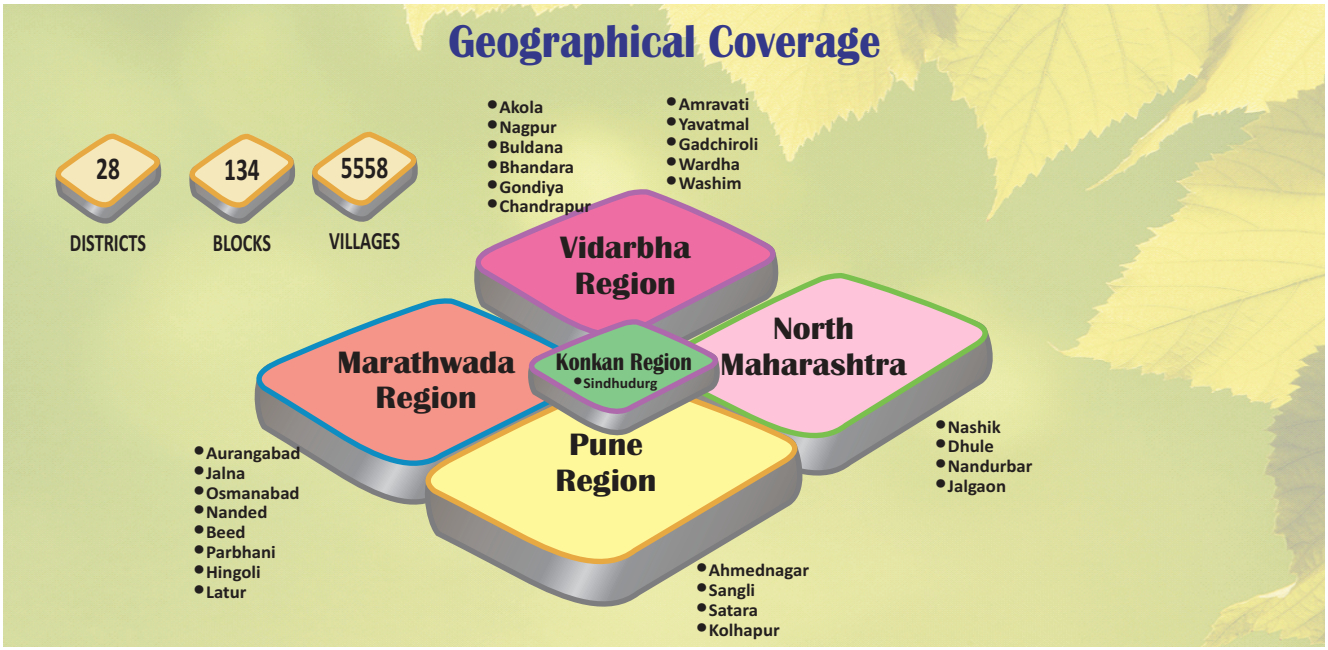
# Brief about Organization

Dilasa Janvikas Pratishthan is an organization dedicated to rural development and makes the seal of its presence in watershed development, women empowerment, development of FPOs, aquifer management and agriculture related projects. The mission of Dilasa is to **uplift the environmental, and socio-economical status of rural people by the implementation of sustainable natural resource management programs** and its vision is to **restore agricultural economy** through natural resource management, better agricultural productivity through soil health improvement and market development. Till now we have covered 5558 villages of Maharashtra under various programmes. The organization has established its offices in Nasik, Pune and Sindhudurg apart from its main office at Aurangabad.



## Lead Role of the Organization

- Resource Support Organization in Indo-German Watershed Development Programme (IGWDP).
- Resource Support Organization (RSO) in NABARD supported Integrated Watershed Development Programme (NHWDP).
- Resource Support Organization (RSO) in Watershed Development Fund (WDF).
- State Resource Organization (SRO) in Livelihood, FPO, Skill Development, etc. for IWMP programme.
- Resource Institute (RI) for Small Farmers Agriculture Consortium (SFAC).
- Producer Organization Promoting Institute (POPI) for NABARD supported FPOs.
- Service Provider for Farmer Common Service Center (FCSC) FPOs for Maharashtra Agricultural Competitiveness Programme (MACP).
- State Level Accredited Monitoring Organization for Monitoring, Evaluation, Learning and Documentation (MELD) of IWMP Programme in Nasik Agriculture Division.
- Monitoring Agency for Jalyukta Shivar of Maharashtra State.
- Monitoring Agency for Hariyali, IWDP, DPAP watersheds of Maharashtra state.
- Impaneled Monitoring Organization of YASHADA for various government schemes.

### Resource Institution (RI) in Agriculture:

Dilasa is one of the selected organizations working as Resource Institution in Agriculture. The organization conducted the massive survey of vegetables in Marathwada and also engaged in successful implementation of the project. As RI, Dilasa has taken the movement to form farmers groups and its transformation into Farmer Producer Organization in a big way.

### DilasaManovikas Foundation:

With an outstanding experience of more than 30 years in the field of Psychology, the Chairman of Dilasa, established a unique entity known as Dilasa Manovikas Foundation, which is actively working in urban and rural areas. The organization implemented the programme 'Battery Recharge' & 'Chintamukta Pariksha' under Manav Vikas Mission with the zeal to help unsuccessful students of the 10th and 12th standard.

### Micro-irrigation outreach for farmers:

Dilasa envisages improving water management in agriculture by increasing the outreach of farmers to micro-irrigation systems. Dilasa has achieved a total coverage of more than 4000 ha under drip irrigation with an outreach to more than 1500 farmers across Aurangabad, Jalna and Osmanabad districts. Dilasa presently has financing partnerships with RBL (Ratnakar Bank Ltd) and NABARD ( in UPNRM ). Dilasa also has partnerships for drip irrigation system distribution, installation and maintenance with world-renowned drip irrigation system dealers like NETAFIM and Finolex.

- **Tribal Development Programme:**

Dilasa is also implementing Tribal Development Fund (TDF) Programme in Igatpuri block of Nasik and Patur block of Akola district. The tribals developed different orchards in a highly innovative manner apart from the successful implementation of livelihood activities. Sustainable growth of 2000 Wadis showcase tribal efforts and the bond of Dilasa with them.

- **Centre for Sustainable Livelihood (CSL):**

With outstanding experience of 20 years in convergence of various livelihood activities, Dilasa has established a unique Centre for Sustainable Livelihood (CSL). The organization is also working as State Resource Organization (SRO) in livelihood in Integrated Watershed Management Programme (IWMP) and the role of the organization remains noteworthy in preparing Livelihood Action Plans (LAP).

- **Promoting Farmer Producer Organizations (FPOs):**

Dilasa has been authorized by the government to promote Farmer Producer Organizations (FPOs) in Maharashtra in order to improve the productivity, profitability and market access of farmers by aggregating them into farmer producer organizations. Dilasa is presently facilitating the aggregation of more than 40,000 farmers into 2000 plus producer groups which are being further federated into 125 Farmer Producer Organizations (FPOs). The next step involves registering these FPOs as Producer Companies and helping them build business plans. Thereafter, Dilasa is helping the FPOs implement their business plans through market forward and backward linkages, improved agricultural practices, certification of crop for better marketability, NCDEX forward markets registration etc.

- **Commodity Marketing**

Only organization which is actively working in commodity marketing for the farmers by providing essential food grains to the reputed institutions like ESCKON and initiated first shoplet of FPO Baliraja in the APMC Market of Lasur station, which is considered as the major market of food grains.

- **Water Supply Schemes**

Implemented more than 320 village water supply schemes in Jalswarajya Project of World Bank and Aaple Pani Project of Kfw.

- **System of Rice Intensification**

Implementing unique project of System of Rice Intensification (SRI) in 8 blocks of Sindhudurg district under RBL Bank Ltd. In total there are 1516 farmers under SRI techniques covering a land area of 400 ha. The CSR that has been initiated for intensifying paddy cultivation has given a very wide scope for the farmers to increase their yield at a huge level and in turn their input cost has been reduced drastically.

## Medicinal Crop Cultivation

Dilasa has implemented a project, the cultivation of medicinal and ayurvedic crop in Aurangabad district with RBL Bank Ltd. The total number of 390 farmers have been covered covering an area of 190 acres under different medicinal crop cultivation in Kannad block.

## Biodiversity Programme

In addition, organization is implementing bio-diversity programme in Aurangabad district. Overall 30 bio-diversity committees are formed in the concerned area in that Dilasa has installed smokeless chullas, conducted awareness programme for the farmers about the conservation of bio-diversity in a sustainable manner.

## Better Cotton Initiative

Implementing Better Cotton Initiative (BCI) Project for Ten Thousand farmers, which is a model of intensive agriculture extension for increasing per acre yield by reducing production cost and inputs sensitizing about pesticides and fertilizers.

## Financial Literacy Programme

Dilasa has conducted financial literacy program with the help of NABARD in 10 different villages of Aurangabad to provide the farmers assistance towards banking system.

## SHGs Linkage Programme

Dilasa has organized SHGs linkage for more than 487 groups out of which most groups are linked with banks and other financial institutions like NABFINS. Till now Dilasa has formed 2000 SHGs groups. Dilasa has conducted awareness programmes and capacity

building of these groups for their successful setup of enterprises. Dilasa has opened multipurpose centre for women wherein women groups can learn about major entrepreneurial skills. The activities that were undertaken in SHGs include goat rearing, dairy farming, agriculture, saree shops, kirana shops, tailoring, chilli cutter, *sewayi* making, pickle & papad making, etc.

## Credentials

- The organization received 96% marks in watershed development and sustainable livelihood for the impanelment of the State Level Monitoring Agency.
- Institutional study conducted by NABARD, Pune office –Got 92 % marks.
- Life Member of Global Compact Network of India (GCNI) and in Implementing Agency (IA) Hub of Ministry of Corporate Affairs (MoCA).
- National level rating by Department of Land Resources (DoLR) – One of the 8 agencies in Maharashtra – MELD for Integrated Watershed Management Programme (IWMP).
- Project Steering Committee member in Tribal Development Fund projects of NABARD.

## Infrastructure

- Dilasa has its well equipped building at Vedant Nagar in Aurangabad. It consists of 6000 sqft area which is specious for its staff.


- Laptops - 20 nos., Tab - 6 nos., LCD projectors -2 nos., Air Conditioners - 10 nos., Agro equipments and tools, CC Cameras, Computer - 28 nos., Laser Printers - 10 nos., Color Laser Printers - 2 nos., Xerox Machine - 2 nos., Digital Cameras - 5 nos., 1 DG set -1 no. UPS System - 1 no., Computer Backup System- 1 oo., Video Conferencing Centre.
- Site equipment - Abney & Dumpy level, Survey equipments
- Vehicle arrangements - Vehicle Trackers, Motorcycles - 12 nos., Jeeps - 3 nos., Ambassador – 1 no, TATA Zest - 1 no., Mahindra Scorpio, Mahindra TUV 300, Tractors -2 nos., water tankers - 1 no., Loading Rickshaw -2, Mahindra Minibus- 1, Refer Van - 1, Ayesher Tempo - 1 no.,
- Two Telephone facilities, Fax, Broadband Fiber Optic Cable internet connection.

## Milestones over the years

- Dilasa as a strong implementing organization in watershed development, has treated almost 5 lakh hectares area of land, which itself is a record.
- Constructed 492 Cement Nalla Bunds (CNB) under CSR and Government schemes in Marathwada region.
- Implemented first aquifer management pilot project in the country.
- Established more than 125 FPOs in Marathwada & Western Maharashtra and forming 52 more FPOs in Nasik Agriculture Division.
- Established unique Chamber of Farmer Producer Organization for the hand holding support of Farmer Producer Organization (FPO).

## The Awards of Dilasa

- ***Bhoomijal Samvardhan Award*** for adopting Innovative Practices of Ground Water Augmentation
- ***John D. Rock Feller Scholarship*** this awarded to the NGO for the first time in history.
- ***Vanashree Award*** for remarkable plantation work in the rural areas with developed and creative activities.
- ***Jalsandharan Award*** for its successful work in watershed development.
- ***National Award*** for Innovations in watershed development.
- ***Mahatma Phule Jal-Bhumi Abhiyan Puraskar*** for remarkable work in soil and water conservation.
- ***Sinchan Mitra Puraskar*** for completion of 25000ha. soil & water conservation work.
- ***IWWA Award*** for remarkable contribution in the field of water supply.
- ***Water Digest Award*** for outstanding contribution in the field of water.


# 2

# Introduction to SRI

## Why SRI?

India is the second largest producer of rice in the world with a production of 106,500,000 metric tones every year (*source: worldriceproduction.com*). There are nearly 10,000 varieties of rice in the world, of which nearly 4000 are grown in India. The fact that rice forms the staple diet of the Eastern and Southern parts of the country, explains the increasing demand for the crop in the region. Rice has shaped the culture, diets and economic of thousand of millions of peoples. For more than half of the humanity "rice is life". The top most producer of rice in India is West Bengal followed by Uttar Pradesh. Nevertheless, throughout the country rice is cultivated in different agro-climatic conditions. This rice ecosystem diversity is a unique feature of India.

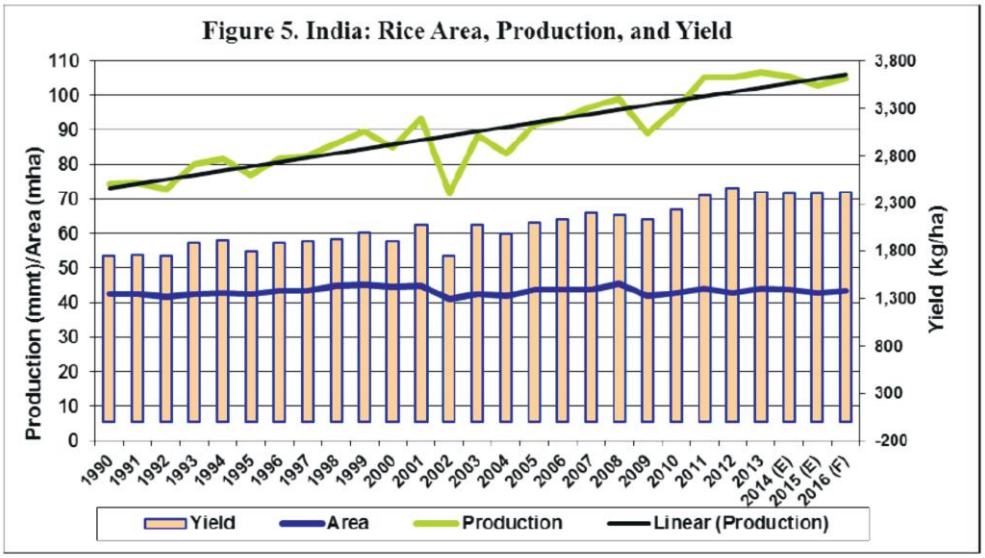
The green revolution has played a major role in achieving the quantum jump in food production in the last two decades. However, this leap has only helped farmers with large farm holdings in the irrigated flood plains of India. The small and marginal farmers still grapple with the reality of having to face food insecurity. Even after rolling out large amount of money in subsidies, the situation has worsened. Owing to this, there is a grave need to find out a solution, which will be having a great impact to the farmers in ensuring a sustainable livelihood.

Under this scenario, the System of Rice Intensification (SRI) offers a great opportunity to paddy cultivation, which can be considered as an effective tool for sustainable agricultural production. The whole process of SRI can be implemented on the field, which actually reduces the large amount of input consumption in the cropping cycle. As compared to traditional method it could address the food security issue and fodder requirements very effectively. SRI is perhaps the best option available to the farmers particularly the small and marginal farmers to promote community led agriculture growth, while managing all the inputs effectively.

## What is SRI

SRI is a climate-smart and agro-ecological methodology to increase the productivity of irrigated rice (and, more recently, other crops) by changing the management of plants, soil, water and nutrients. SRI was developed in Madagascar by a French priest, Father Henri de Laulanié, S.J, who spent 34 years (1961-1995) working with farmers there to improve rural livelihoods through increased rice productivity. The main practices of SRI were synthesized by the mid-1980s. With Malagasy colleagues, Laulanié established a local non-profit, Association TefySaina, in 1990, which promoted the knowledge of the SRI methodology and its use as part of a holistic rural development strategy.

It focuses on increasing the yield of rice produced in farming. A low water, labor-intensive, method involves the usage of singly spaced younger seedlings and hand weeding with special tools. The main principles included applying a minimum quantity of water and the individual transplanting of very young seedlings in a square pattern at a specified spacing.



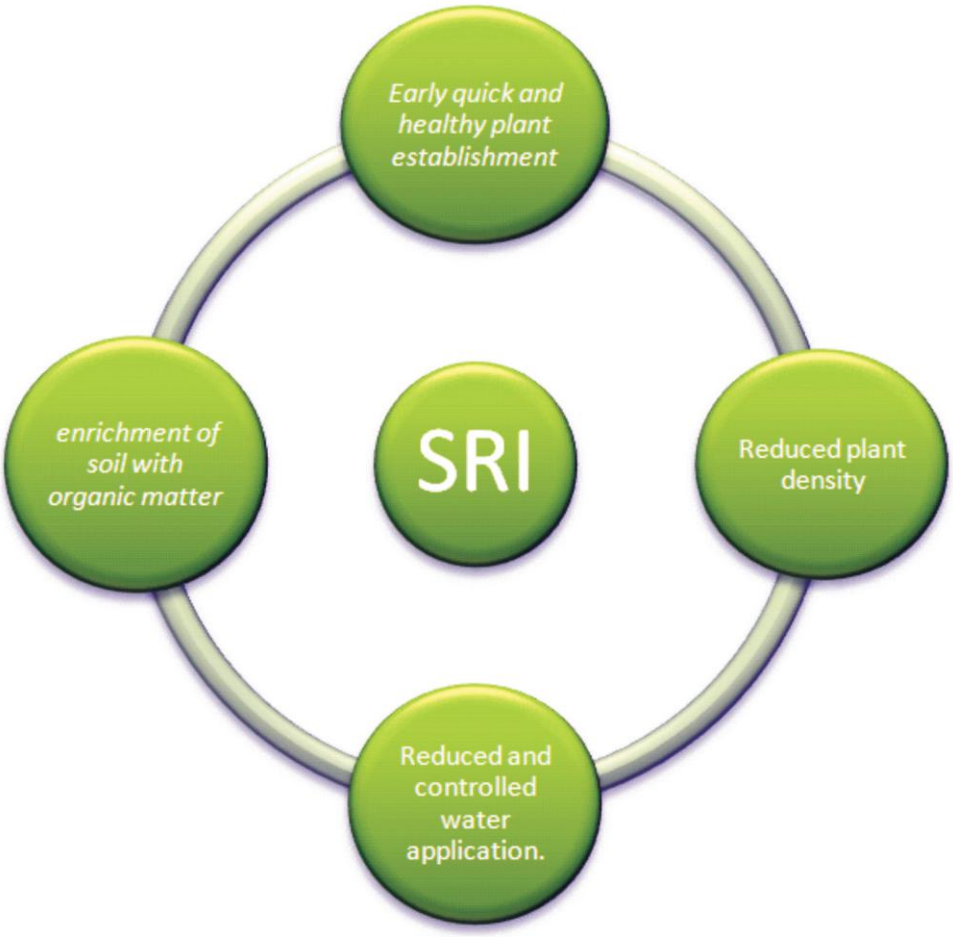

Source: Ministry of Agriculture, GOI; and FAS/New Delhi (MY 2015/16 and 2016/17)

## SRI Principles

SRI is smart, an environment-friendly method that has the potential to sustain in the changing climate and save lives of the poor. SRI is a set of modified practices for managing rice plants, soil water, and nutrients.

## Statistical Data of Paddy Production in India

Under this scenario, the System of Rice Intensification (SRI) offered a great opportunity to paddy cultivation that can be considered as effective tools for sustainable agricultural production. The whole process of SRI that can be implemented on the field actually reduces the large amount of input consumption in the field. As compared to traditional method it could address the food security issue and fodder requirements very effectively. However, the SRI is perhaps the best option available to the farmers particularly the small and marginal farmers to promote community led agriculture growth, while managing the all the inputs effectively.



**Highlights of SRI management practices**

SRI method can be applied to any type of rice variety.

- **Transplant young seedlings**, 8-12 days old (2-3 leaf stage), to preserve the potential for tailoring and rooting ability.
- **Transplant at a wider spacing** at 25 cm x 25 cm. Transplant single seedling at each hill with utmost care for seed roots.
- **Minimum use of chemicals** (fertilizer, pesticide, insecticide, herbicide), and more use of organic manure, vermi compost, and Farm Yard Manure.
- **Less water use** by applying wet-dry cycle of soil moisture.
- **Use of Conoweeder** to aerate the soil as well as to control the growth of weed.

## SRI in India

In India it was first tried out in Tamil Nadu in 2000. With scientific and extension support from Tamil Nadu State University, the area under SRI management has now reached about half of the State's rice area. In Tripura, from just 44 farmers using the methods in 2002, the number has increased to about 3,50,000 over 1,00,000 hectares, nearing half of that State's rice cultivated area. Bihar started it with only a few hundred farmers, in 2007; four years later, the area under SRI was reported to be around percent of the State's rice area, with a target area of 40 per cent set for 2013-14. Today SRI is being adopted in 12 states in India and the response from farmers has been overwhelming seeing the benefits of the method.

SRI is a combination of several practices, which include changes in nursery management, time of transplanting, water and weed management. It is a different way of cultivating rice crop though the fundamental practices remain more or less the same as in the conventional method; it just emphasizes altering of certain agronomic practices of the conventional way of rice cultivation. All these new practices are together known as System of Rice Intensification (SRI). SRI is not a fixed package of technical specifications, but a system of production with four main components, viz., soil fertility management, planting method, weed control and water (irrigation) management.

Delay in arrival of monsoon in the recent past, the shortfall in rain, an excess of widespread drought, flood, and cyclone, extremes in temperature are important climate-related factors which affect the agricultural scenario along with the economy of the country.

## Need of SRI

For small and marginal farmers, who hold 67% of India's cultivable land, SRI is a game changer because of reduced input requirement like the fertilizer, seed requirement, pesticides. The SRI method involves only reorganizing the way in

which available resources are managed and in turn the output is increased in a major way there by making the framers self sufficient to carry out their livelihood perfectly.

## HOW SRI DIFFERENT FROM TRADITIONAL PRACTICES

| Parameter | | System of Rice Intensification | Traditional Rice Cultivation |
|---|---|---|---|
| Age of seedling | 1 | Young seedlings are transplanted at 12-15 days old without disturbing the soil that are intact with the roots. | Older seedlings are transplanted at 21-40, days old. The soil is shaken from roots, and seedlings are bundled and transported to fields. Bundles are often left in the open for days. |
| Number of seedlings | 2 | 1-2 seedlings per hill are transplanted with ashallow depth (1-2 cm) into soils that are not flooded but well puddle. | 3-4 seedlings (even 6-8) are clumped and pressed deep into flooded soils, resulting in close plantation and increase competition. |
| Spacing of plants | 3 | Wider spacing, with hills 25x25 cm apart, set out in a square or matrix pattern to facilitate moving through the field with a weeder, and to expose plants fully to the sunlight. | Close spacing with hills 10-15 cm apart, either in rows or more typically with random spacing. |
| Water management | 4 | Non-flooded aerobic soil conditions with intermittent irrigation | Continuous flooding of paddy fields with 5-15 cm of water throughout the growing cycle. |
| Soil fertilization | 5 | Organic matter is preferred to the extent feasible but may be complemented with synthetic fertilizers | Inorganic synthetic fertilizer is applied, largely replacing the application of organic matter, which enhances soil structures and functioning. |
| Weed and pest control | 6 | Cono-weederis used to remove weeds and in turn the weeds are incorporated in the soil with its help. | Weeding is done manually and the weeds are thrown out. |

## Benefits and impact of SRI

- **Increase in per acre yield:** Increased yield attributes to 60 to 80 % higher grain yield and 50 to 75% straw yield as compare to the traditional method.
- **Low water requirement of paddy:** Reduction in water requirement 25-50%
- **Minimal seed requirement:** Seed requirement only 8 kg/ha compare to 80 kg/ha in the traditional system.
- **Towards Organic Culture:** Dependence on green manure and compost reduces the need for inorganic fertilizers.
- **Reduction in pesticides:** Owing to low plant density, penetration of sunlight and aeration of the field is proper resulting in low incidences of disease and pest resulting into low pesticide use.
- **Greenhouse gas emission:** Methane gas emission is less because of lack of standing water column.
- **Improved grain quality:** More grain and less chaff.
- **Grain ripening is quicker:** Grain ripening is 7-10 days sooner.
- **Improved grain quality:** More grain and less chaff.
- **Grain ripening is quicker:** Grain ripening is 7-10 days sooner.
- **Improved food security:** Higher productivity from small holding thus helping in more income.
- **Low labor requirement:** In long run labor requirement is reduced.

***Reduced Input cost:*** *The inputs like seeds, pesticides, fertilizers are required in less quantity, which lead to increase the output and reduce the production cost (10-20%) farmer's net income increased at a certain level.*

- **Better drought coping:** Owing to low seed rate staggered nursery is feasible in the event of unfavorable monsoon.
- **Relevance of SRI for Climate Change**
- SRI has significant climate implications in terms of adaptation to climate change and mitigation of

climate change.

- 30% **saving** in water, 70% **saving** in seeds.
- Changes in climate affect rice production and an impact on food security in a positive way
- The transition of SRI method enhances availability and quality of natural resource assets (land and water).
- **Improvement in soil quality** and soil biota
- **Helps to reduce resource** degradation by saving precious surface and groundwater
- **Helps in enhancing household** and national level food production.
- The practice of green manuring and green leaf manuring **improves the soil health** and productivity.

### Adaptation to Climate Change

- Improved drought resistance.
- SRI plants require less irrigation water (30% to 50%) per land area due to deeper, larger root system.
- Reduced competition among plants creates stronger plants above and below ground.
- Organic matter enriched soils able to store more water and furnish nutrients.
- Higher pest and disease resistance due to stronger, healthier plants and less humidity in the land canopy.
- Greater resistance toward rain and wind damage from the storm.

### Mitigation

- SRI-Rice plants emit less carbon, higher grain and straw yield and more root biomass.
- Increased soil organic matter through SRI practices that improves the soil with more organic matter application and increased root exudates.
- Reduced carbon footprint due to less use of agrochemicals.
- Reduced greenhouse gas emission from paddy soils.

## Methodology and Process of SRI

**Preparing high-quality land**: SRI requires careful leveling and raking of land, with drainage facilitated easily to avoid excess water stagnation.

**Preferring compost or farmyard manure to synthetic fertilizers** : The use organic nutrients is better, as they are good at promoting the abundance and diversity of microorganisms, starting with beneficial bacteria and fungi in the soil. It promote proper microbial activity, thereby improving production.

**Developing nutrient-rich and un-flooded nurseries**: The seed beds are made nutrient rich and are established close to the main field as possible. This will enable quicker and easier transportation between the nurseries and the fields, minimizing both transports time and costs so that the seedlings are efficiently transplanted.

**Using young seedlings for early transplantation:** The transplantation takes place when the seedlings are just 12 to 15 days old, soon after they have two-three leaves, and at least before the 15th day after sowing.

**Ensuring wider spacing between seedlings:** The seedlings are planted at precise spacing, usually 25 X 25 cm, about 16 plants per square meter. Rice plant roots and canopies grow better if spaced widely, rather than densely.

**Transplanting the seedlings singly**: The seedlings are transplanted singly with their roots intact, while the seed sac is still attached. They must not be plunged too deep into the soil, but placed at 1-2 cm on the ground at the appropriate point on the planting grid.

**Frequent inter cultivation with conoweeder:** A manual weeder is operated perpendicularly in both directions in between the rows within 10 to 12 days of transplantation, and at intervals of 10-12 days afterwards. This operation not only controls the weeds but churns the soil which causes a lot of changes in the soil which favors better growth of the crop.

**Managing water carefully so that the plants' root zones moisten, but are not continuously submerged:** SRI requires the root zone to be kept moist, not submerged. Water applications is intermittent, leaving plant roots with sufficiency, rather than surfeit of water. Rice grown under SRI has larger root system, profuse and strong tillers with big panicles and well-filled spikelets with higher grain weight. The rice plants develop about 30 – 80 tillers and the yields are reported to be higher. The secret behind this is that rice plants do best when young seedlings are transplanted carefully at wider spacing; their roots grow larger on soil that is kept well aerated with abundant and diverse soil microorganisms.

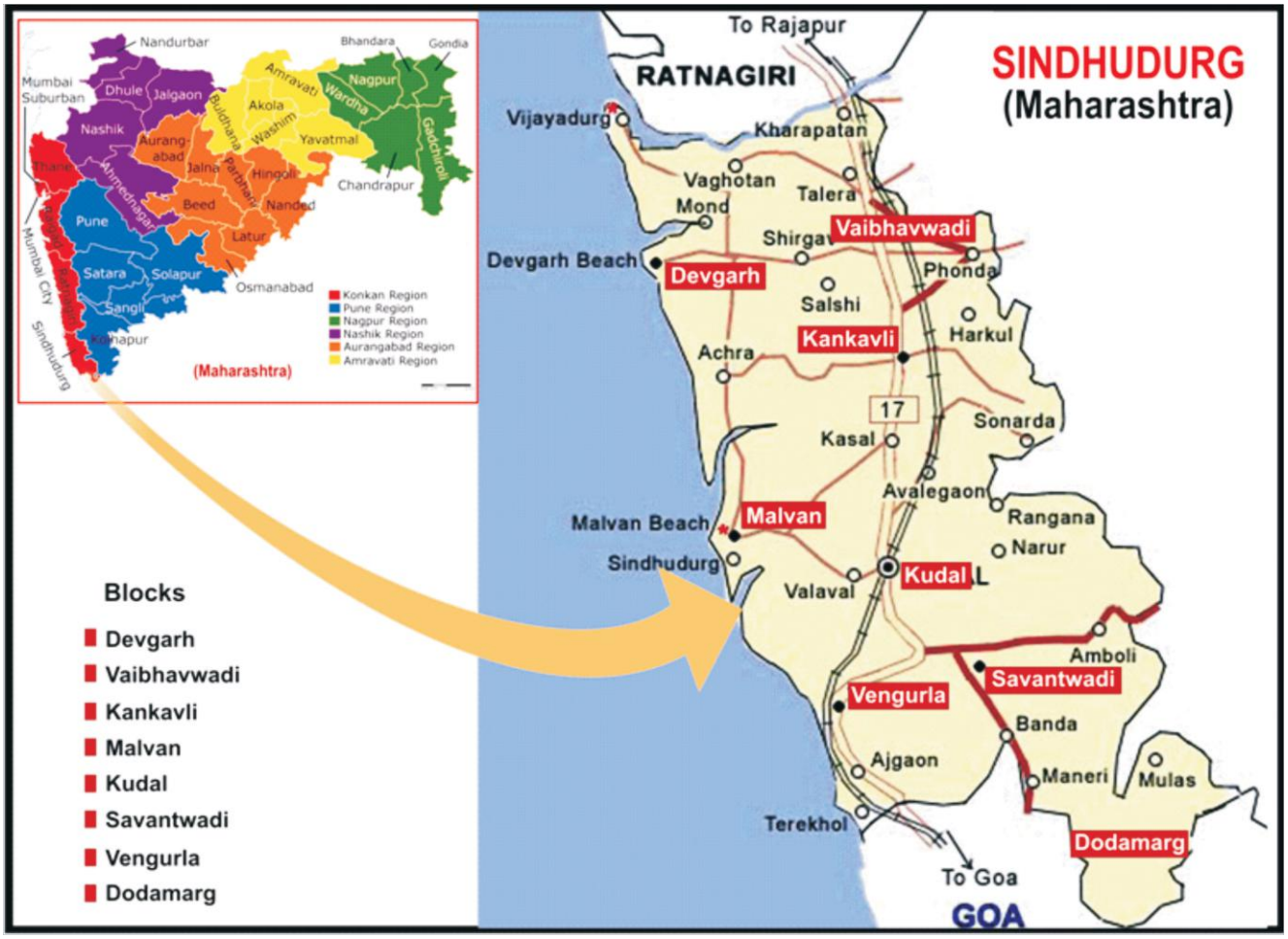
The System of Rice Intensification is a novel and promising resource saving method of growing rice under irrigated or rain fed conditions. A number of countries have shown a significant increase in rice yield along with substantial savings of seeds (80-90%), water (25-50 %) and cost (10-20 %) in comparison to the traditional methods. SRI is not a technology, but a set of simple ideas and principles that helps in establishing productive and robust plants.

# 3
# Dilasa in SRI

Dilasa has taken the initiative with the help of RBL Bank Ltd. to implement the System of Rice Intensification among the farmers of Sindhudurg covering 8 different blocks covering 1518 farmers. The CSR (Corporate Social Responsibility) by RBL Bank Ltd has provided the vision to change the farmers' mind set regarding the cultivation of paddy so that they can reap more benefit as compared to their monotonous traditional paddy farming. Dilasa team has initiated a drastic change at the ground level by conducting capacity building and awareness programmes, reaching out to farmers through village meetings, exposure visits to the demonstration plots, and on field training on SRI. The support of RBL Bank Ltd has been instrumental in achieving this feet.

## About Area of SRI

The Sindhudurg district lies in the southern part of Konkan region of Maharashtra State. With an area of 5207 Sq. km. (5,03,950 hectare), it occupies 1.69 percent of the total area of Maharashtra. The rural population in the district faces several challenges in the form of low employment opportunities, lack of access to income generating resources, fragmented land holding etc. Farming is the primary occupation for a majority of local individuals, thereby making agriculture the key livelihood source in the district. The main crop grown in the district is paddy (representing 90% of the crops grown in the district and used in the majority of cases for self-consumption). The secondary crops in the district include cashew, mango, coconut, kokum and other forest fruits plantations.




**Map depicting the area of Sindhudurg in SRI**

Cashew processing and fishing related activities are some of the other predominant traditional economic activities.

Across the globe, rice cultivation is in crisis and Sindhudurg is no exception, with a shrinking area, fluctuating annual production, stagnating yields and escalating input costs. The cost of cultivation of paddy has consistently been increasing owing to the rising costs of seeds, fertilizers, and labor. With increasing labor scarcity due to urbanization, sustaining the interest of farmers in rice cultivation has become a challenge (migration has been the major issue). For several years following the Green revolution, the production system, which was based on HYVs (High Yielding Varieties) and high input is driven technology, the productivity of crops has been stagnating and the rising cost of inputs have rendered such cultivation practices

unviable. However, with the advent of SRI, an exciting approach had been discovered, which not only reduces the use of inputs but also increases yields significantly and enhances the livelihoods of farmers. SRI being variety neutral does not call for use of any specific seed.

The statistics of paddy in Sindhudurg region is that it occupies 91 percent of the area under cultivation during Kharif and 31.7 percent of the area under cultivation during Rabi. Of the total cropped area, 88.7 percent is under Kharif crops. Following traditional paddy cultivation, transplantation is carried out using 25-40 days old nursery grown saplings. Usually, two to five saplings are planted per hill. They are placed at a distance of 8 to 10 cm apart from each other. In the traditional method of cultivation, the growth of weeds is fast and plenty, thereby making the de-weeding of paddy fields a highly laborious task. Furthermore, because of the close placement of saplings, the naturally available nutrients in the soil become inadequate to meet the requirement for healthy growth of the saplings. This, in turn, increases the fertilizer requirement, thereby increasing the input cost. The flood irrigation method also leads to methane production.

| Sr.No | Taluka | No.of Beneficiary | No.of villages | Area (Ha) |
|---|---|---|---|---|
| 1 | Kudal | 233 | 58 | 61.5 |
| 2 | Malawan | 239 | 44 | 35.26 |
| 3 | Vengurla | 107 | 16 | 27.01 |
| 4 | Kanakawali | 127 | 27 | 22.45 |
| 5 | Sawantwadi | 145 | 32 | 35.26 |
| 6 | Vaibhavwadi | 96 | 12 | 18.46 |
| 7 | Deogad | 70 | 22 | 7.74 |
| 8 | Dodamarg | 18 | 11 | 2.61 |
| **Total** | | **1035** | **222** | **210.29** |

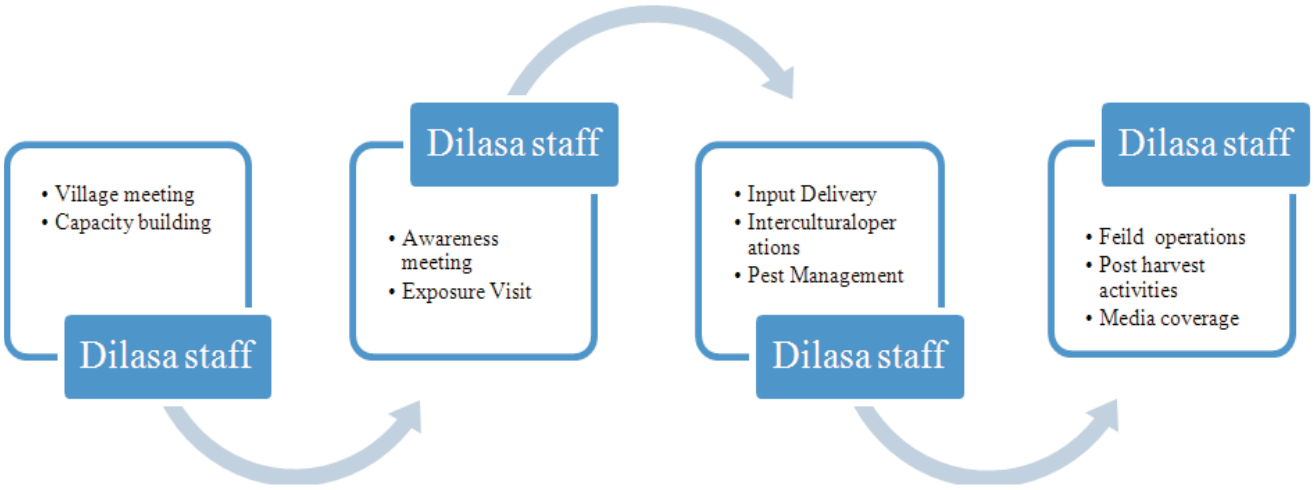
**Table-1 : The table showing the total number of farmers, villages and the area (ha) that is covered in kharif season 2016**

| Sr. No. | Block Name | No. of Villages | No. of Beneficiaries | Area Covered (in Ha) |
|---|---|---|---|---|
| 1 | Dodamarg | 7 | 90 | 27.42 |
| 2 | Kankavali | 10 | 35 | 6.2 |
| 3 | Kudal | 16 | 95 | 28.8 |
| 4 | Malvan | 8 | 92 | 28.2 |
| 5 | Savantwadi | 7 | 65 | 17.89 |
| 6 | Vengula | 7 | 104 | 22 |
| | Total | 55 | 481 | 130.51 |

**Table-2 : The table showing the total number of farmers, villages and the area (ha) that is covered in rabi season 2016**

Dilasa is committed towards improving the lives of the farmers, and its President Dr. Anagha Patil envisioned the utilization of SRI for the upliftment of paddy growing farmer in the Sindhudurg district.

Starting from the capacity building to the harvesting, Dilasa is taking part in each and every steps to accomplish the farmers in all the way of paddy cultivation.



The project has aimed at the System of Rice Intensification (SRI) amongst the farmers in such a way that they became self sustained and self reliable. The methodology adopted in SRI helps the plant fight various stresses – biotic stress (pests/diseases) and abiotic stress (extreme weather, drought, storm). Many studies have also shown that there are fewer pest attacks – because plants are healthier. When SRI rice is milled, there is less breakage of grain, since the grain is fuller and less chalky – assuring a better price for the farmers.

Increasing the number of farmers who have adopted SRI over traditional techniques implies the success of awareness generation techniques amongst the small and marginal farmers. The benefits of SRI have been proven among the farmers on a larger scale where they will be able to reap more with the lesser incorporation of inputs at the same time. The outcome of the activity adopted has given a drastic result in Sindhudurg area.

Under the project, the focus was to guide and to provide handhold support to the target beneficiaries throughout the Kharif and Rabi season right from sowing till harvesting. The size and scope of farmers will not be predetermined but will follow a demand driven process. Depending on the capacity, maturity and needs, these beneficiary farmers have been provided training in Paddy cultivation.

# 4

# Intervention in Sindhudurg

The project was initiated in the Kharif season of year 2016. The intervention of Dilasa included the hand holding support and capacity building to farmers to take SRI to further miles. The extensive field trips and exposure visits during the two seasons since then has resulted in more and more farmers turning up to join the movement. With the next Kharif season in anvil, Dilasa hopes to extend its outreach program far and wide in the region as more farmers will benefit out of this.

## Capacity Building for NGO Staff

The staffs of Dilasa who were in the SRI project team were given training by experts in the field to inculcate an understanding regarding the methods and to have a wider view of the work that is to be implemented in the region. The main aim of the training was to create agents of change who were well versed with the nuances of SRI.

## Preliminary meeting : village selection

Dilasa has conducted preliminary village meetings in the concerned villages of different blocks with the farmers to assess the actual potential and to analyze the real acceptance capacity of the farmers to move away from traditional practice of rice cultivation to SRI practice.

## Awareness Programme for Beneficiaries by NGO Staff

Dilasa team has conducted awareness programme for the farmers to educate them about SRI and how it is beneficial for better yield results in the field as a whole. Multiple programs were conducted with the collaboration of farmers. The farmers were informed about the practices and methods to save the input costs. These programs aimed at mobilizing more farmers to take up this smart agriculture.

## Capacity Building-cum-training programme for beneficiary farmers

The training and capacity building programs were conducted in different blocks where Dilasa distributed IEC materials, power point presentations and demonstrations of marker rope and Cono weeder that is being used in SRI. The increasing enthusiasm of the farmers to be a part of the paddy revolution can be solely attributed to the effectiveness of the training sessions.

In these meetings the agriculture officer, the village Sarpanch and the up Sarpanch were present and the farmer folks who have taken a very good interest in the collection of knowledge disbursed by team Dilasa, Dilasa has also provided such a vast and deep knowledge to the farmers in a very easy manner so that it can be easily understood by them and in turn they can be benefitted out of it. The result of the awareness meeting is that the framers were eager to become the enthusiastic participants for this paddy revolution.

## Purchase and distribution of seeds in the villages

The different types of seed hybrids like Shubhangi, Suma, Poonam, Kranti, Karjat-1 & Karjat-2 were distributed to the farmers as per the suitability of their place. According to the requirements, Dilasa has contacted multiple seed suppliers so as to get a better price.


The purchase order were given after inviting quotations from these suppliers and the most beneficial seed supplier was chosen and the purchase order was given. This entire process was repeated for all the different blocks.

## Land preparation & Transplantation

**Nursery bed Preparation**

The low cost nursery bed is prepared for SRI by following methods:

The area is selected either in the field or in the backyard (1x3 sq. meter for an acre).Its base consists of either plastic sheet, wooden plank or soil bed. The soil that is used for nursery bed preparation is prepared thoroughly with the addition of organic compost in it. The bed was taken up at a height of 10-15 cm to reduce the pest attack directly from the soil. The seeds were planted on the bed and the seedlings were allowed to grow for around 12-15 days in normal atmospheric condition and for 18 days in humid condition at the time of transplantation.

The land which is supposed to be used for SRI is thoroughly ploughed and tillered so that the soil particles become fine. The land is allowed to get filled with water by flooding so that proper amount of water can be absorbed by the soil and excess will runoff.

The practices that were followed in the field regarding transplanting are:

- Seedlings at 2-3 leaf stage, ready to be transplanted
- Carefully remove seedlings along with soils using a shovel to avoid trauma to roots
- Use a flat item to carry the seedlings to the field
- Avoid damages and drying up of tender seedlings and their roots while transplanting
- Transplant young seedlings (2-leaf stage plant has the potential to attain 84 tillers) each at a shallow depth (2-3cm) in a slightly slanting position.
- The soil particles in the root should not be removed and should be planted into a level field, which is well puddled but not flooded.
- Use 25 x 25 cm spacing between seedlings by using a marker rope or pole. This uses less number of seedlings at the same time reducing the competition for nutrients water and sunlight. The root system will spread out in the extra space available. This facilitates easier weeding.
- The field should be kept flooding free for the next 12- 14 days but the moisture should be maintained using alternate wetting and drying method till the flowering stage.

**AWD in SRI: The continuous flooding of the field in the traditional method causes plant roots to die owing to lack of oxygen. AWD is a series of wetting and drying cycle adopted till the crop reaches thee flowering stage. The field is flooded for 3-6 days and thein drained out and kept dry for the same number of days. The number of days depend on the type of soil and weather condition. This process allows the plant to receive adequate water and air. Less irrigation water is only used and after flowering a water level of 3-5 cm should be maintained prior to two weeks of harvest.**

**Marker**-Is an instrument that is used to place the seeds in the field at a proper distance, it is handy and can be easily shifted from one position to another by two members only. The marker rope was provided by Dilasa to the farmers so that proper distance can be maintained in the field at the time of transplantation. The marker rope are of several types like bamboo marker, PVC marker and simple thread on that the marking is done with the help of straw or color at a distance of 25 cm. It can be handled easily by 2 person in the field. It has helped farmers of maintain specific distance thereby the operation of Conoweeder in the field very easy.

## Intercultural operations in the field

### Weeding

The conoweeder is an instrument which is used for inter-cultural operations in the field. The first weeding is carried out after 15 days and the next after 45 days under the supervision of our staff who have provided the farmers with the Conoweeder and demonstrated its usage in the field so that all the practices can be carried out easily without any hassle. The implement aerates the soil as well as controls the weeds by turning the weeds into the soil. The weeding has to be carried for two weeks till the complete closing of canopy takes place.

### Manuring

In SRI, the use of FYM or compost made from decomposed biomass (straw, etc.) is prescribed. Their application not only improves soil structure but also enhances the number and diversity of useful organisms in the field. This improves the health of soil, improves the overall quality of environment and reduces the cost of cultivation.

### Irrigation through AWD

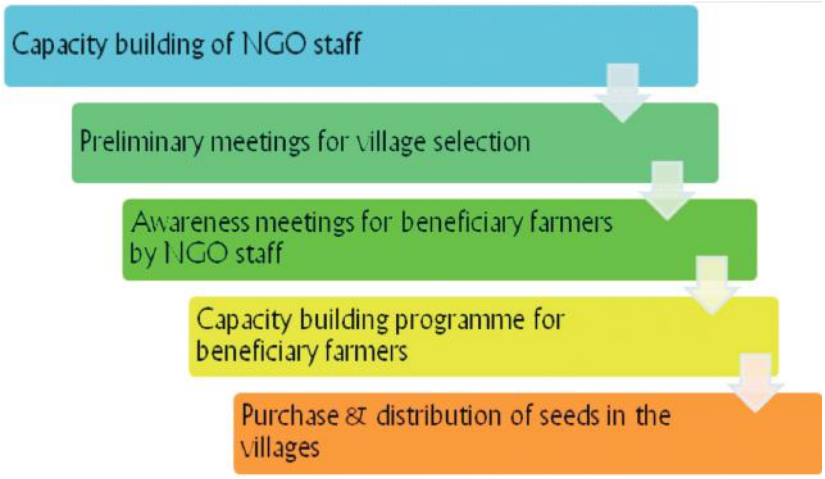
The process helps in keeping the weeds in check and also saves large amount of water. The practice of intermittent wetting and drying makes the field maintained for better aeration which will reduce the pest and disease infestation in the field and plant grow healthier. It helps the plants to become thick at the base so that no crop lodging will occur in the field and it will save the field by increasing the crop yield and the density in a proper way. The method for alternate wetting and drying help in saving the water thus creating water management by benefitting the farmers. The water management practice is done by the farmers to save water.

## Harvesting Activity & Exposure Visits

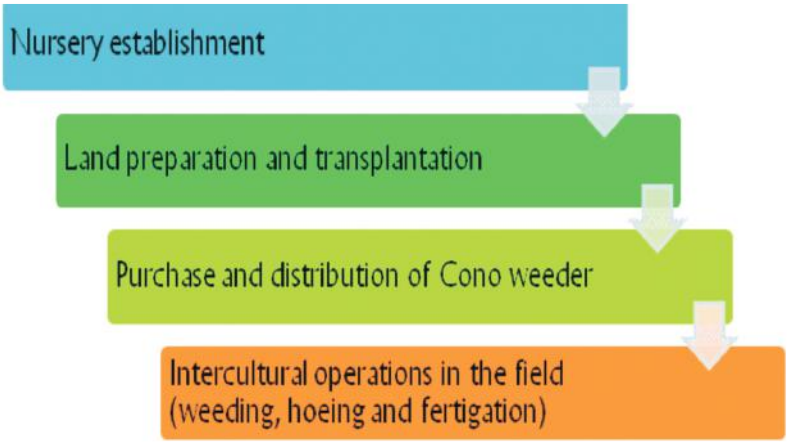
Exposure visit was conducted by Dilasa for the farmers of different blocks so that they can understand the know-how of the field and cultivation practices. The farmers visited the demo plots and a doubt clearing session was also carried out. The harvesting was done by the farmers under the assistance of the Dilasa staff. Guidance was provided by the staff to the farmers at multiple

# Phase of Project Implementation by Dilasa

## Phase-I




## Phase-II




## Phase-III

# IEC material developed by Dilasa


**Booklet (front & rear view)**

# 5

# Scope for Women Empowerment

## Introduction

Women as farmers, agricultural workers, entrepreneurs constitute the backbone of Indian agriculture and rural economy. Their knowledge, labor and skill not only produce food and income but contribute to global food stocks. Today there is a greatest threat in Konkan area to rice cultivation due to inadequate rainfall, insufficient of irrigation, small and marginal land holding pattern, mono cropping and low level of technology adoption resulting very less productivity. The future of rice cultivation depends on developing and adopting technologies which will help to increase the production. Women farmer is the only sector of society which performs 80% of agricultural work; if are empowered can be the change makers of the situation.

## Problem

Worldwide more women are involved in rice cultivation than in any other livelihood activity. Research and developmental strategies focus mostly on new seeds and agro-chemical inputs to increase rice production but do not take into consideration the impact on women's bodies, their time, their health and their lives. Especially women perform the seeding, transplantation and weeding activities which require them to bend and work for long hours for rice cultivation in the field. It has

come to the notice from various studies that this difficult posture causes the considerable amount of drudgery for women. In addition to that occurrence of skin irritation, gynecological ailments and other illness from prolonged exposure to water on body parts and to water borne diseases vectors (e.g. mosquitoes and snails). **The declining profitability of rice farming resulted in migration of men for jobs in metro cities like Mumbai, leaving women with responsibility for farming. If the women are trained and indulged in the improved farming practices of the rice, they can achieve wonders.**

On this background the SRI is effective tool which has potential to empower women by producing more rice with fewer inputs. **SRI is a climate smart, agro ecological methodology for increasing the productivity of rice by changing the management of plants, soil, water and nutrients** thus by helping women to improvise the existing stressful agricultural practices, in turn reducing their drudgery, income improvement, higher productivity, more sustainable livelihood options, increasing food security and improved nutrition and reducing the medical expenses. This system is characterized by 30% saving in water, 70% saving in seeds. It improves the soil quality, helps in enhancing household production, increases per acre yield, reduces use of pesticides and input costs, improves grain quality with quicker ripening and has the potential of adaptation with climate change. With SRI adoption, yields increase on an average 20-40% and often doubled or tripled which lead to self sufficiency of women. Women don't have to work in constant flooded fields and stand in muddy water for hours together. It definitely reduces their skin problems and other illnesses. Traditional rice cultivation requires 8 hours a day of labor to cultivate one hectare of rice, with SRI the number of seeds and plants are reduced, transplantation operations go faster with less pain and drudgery.

Traditionally weeding is done manually by women but in SRI mechanical hand weeder is used which greatly reduces the time and permits comfortable posture irrespective of bend position. It is found in many studies that women gain confidence and enhance their status in family and in community with implementation of SRI.

All over the world and in nation various efforts to empower women have been undertaken. Empowerment is multidimensional concept which includes process, goals, skill development, awareness generation and capacity building. Considering the agricultural scenario in our state women can emerge as farmer leader, economic actors, and change agents for poverty alleviation and food security **by rising the rice production** with the implementation of appropriate technology and capacity building. Making women more productive hence more effective income earners will reduce their economic dependency and enhance their self-esteem. Economic success for women will improve their own lives and those of all Indians.

## The main objectives SRI method adoption

The SRI adoption will led to :

- Economic upliftment of rural women by increasing rice production.
- Empowerment of women by using improved agricultural technology.
- Drudgery reduction of rice growing women farmers.
- Promote sustainable livelihood
- Reduce production cost of rice by using SRI.
- Build the capacities of the women regarding nursery raising, transplanting, weeding, water management, and pest and disease surveillance, organic manure.

## Women intervention in SRI results in

- Women empowerment will be achieved through techno-financial tools.
- There will be considerable increase in rice production and income of women.
- Reduction of women drudgery and health problems.
- The participation of women will be strengthened through SHGs by social mobilization.
- Migration will be substantially stalled with the technical backup and efforts of women.
- Women status in their family will be increased as income earner and the attitude of male counterpart towards women will be changed.
- Women's participation in decision making process will increase in the family.
- Women's active involvement in food security.
- Women entrepreneur skills will be developed through value addition.
- Sustainable rice production with climate change

# 6
# Impact Study of SRI

The data was collected from the farmers using different analytical tools:

## Methodology

**A) Questionnaire**

Questionnaire was prepared in which all the questions that were relevant for SRI were covered for precision in the analysis and the outcome. The questionnaire related to estimate the seed requirement was also prepared.

**B) Focus Group Discussions (FGD)s**

The FGDs were held in the villages to know the current impact of the SRI cultivation practices and how SRI is benefitting the farmers in a better way. The farmers have shared their views that how they felt while learning this new activity. They are highly motivated by the new practice.

**C) Interviews**

Interviews were conducted from the farmers to know their actual realization about SRI and also to know about the feedback and the success stories of them.

In all 1516 were introduced to SRI technique over a year that is 2016-17 covering a total of 400 hectares, the results of SRI technique about its yield, the number of tillers per hills, the number of grains per panicle are shown in the table depicted below: A sample of 100 farmers were taken including all the blocks. The results of SRI is shown in the table depicted below :

| The results of SRI (Kharif and Rabi season) | Traditional | SRI | % Increase |
|---|---|---|---|
| Yeild (kg/m2) | 0.75 | 1.25 | 66.7% |
| No of tillers per hill | 27 | 53 | 96.3% |
| No of grains/panicle | 97 | 152 | 56.7% |
| Yeild/sq mt (gm) | 513 | 1021 | 99.0% |

## *Statistical Analysis and Discussion*

**Mean Standard *Deviation and t value of Traditional method of rice cultivation and SRI method of rice cultivation among Farmers.***

***Table No-1***

| Factors | Traditional method of rice cultivation | | SRI method of rice cultivation | | | |
|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | df | t |
| 1) Nursery Preparation (No of days) | 23.08 | 7.42 | 12.17 | 1.29 | 118 | 11.22** |
| 2) Seed used for nursery (Kg/farmer ) | 37.10 | 21.96 | 5.72 | 3.39 | 118 | 10.94** |
| 3) No of plants per farmer | 457423.33 | 277467.80 | 91093.33 | 54176.10 | 118 | 10.03** |
| 4) Inorganic Fertilizer Used (Kg/farmer) | 177.92 | 105.81 | 28.46 | 16.93 | 118 | 10.80** |
| 5) Organic Fertilizer Used (Kg/farmer) | 355.83 | 211.62 | 427.00 | 253.95 | 118 | 1.67 |
| 6) Crop Duration (in days) | 133.37 | 21.71 | 121.12 | 15.69 | 118 | 3.54** |
| 7) No of Tillers per plant | 15.77 | 1.91 | 31.38 | 3.60 | 118 | 29.70** |
| 8) No. of Grains / Panicle^ | 118.35 | 6.25 | 126.42 | 7.97 | 118 | 6.17** |
| 9) Filled grains per panicle (%) ^ | 82.67 | 2.52 | 93.92 | 2.08 | 118 | 26.71** |
| 10) Weight of 100 grain (gm)^ | 1.23 | 0.25 | 3.05 | 0.28 | 118 | 36.89** |
| 11) Grain Yield with husk and bran (Kg/ Farmer)# | 3439.86 | 2182.77 | 4356.86 | 2706.31 | 118 | 2.04* |
| 12) Straw Yield (Kg/ Farmer)# | 11129.65 | 7199.53 | 13101.15 | 8374.09 | 118 | 1.38 |
| 13) Straw Length (cm) | 104.43 | 7.82 | 106.40 | 8.14 | 118 | 1.35 |
| 14) Finished Rice Yield in kg/farmer | 1850.30 | 1208.63 | 3602.32 | 2150.19 | 118 | 5.50** |
| 15) Labor requirement per farmer | 8.00 | 0.00 | 4.00 | 0.00 | 118 | 240.00** |
| 16) Working hours of farmer in the field | 8.00 | 0.00 | 6.00 | 0.00 | 118 | 120.00** |
| 17) Production cost per farmer | 20725.83 | 12215.14 | 11386.67 | 6772.01 | 118 | 5.18** |
| 18) Production cost per acre | 13817.22 | 8143.40 | 7591.05 | 4514.70 | 118 | 5.17** |
| 19) Income in Rs per farmer | 25904.08 | 16920.83 | 50432.08 | 30102.92 | 118 | 5.50** |
| 20) Income in Rs per acre | 17803.33 | 3104.83 | 35443.33 | 2355.26 | 118 | 35.06** |
| 21) Saving per acre | 3986.12 | 8065.13 | 27852.28 | 5108.70 | 118 | 19.36** |

** 0.05 = 1.98 and ** 0.01 = 2.63*

# Success Stories

# Success Stories

The farmers who have adopted SRI techniques in their farm with the help of Dilasa guidance and RBL Bank Ltd assistance have their successful tales to narrate. They are thankful to RBL Bank Ltd for their interventions in Sindhudurg to support farmers who are doing paddy cultivation.

Namdev Pujari
A/p-Rathiwade
Block-Malvan
Area-20R
Yield-72Kg/R

I am Namdev Pujari and I am very much happy to inform that I have harvested 72 Kg/R of paddy in my own field with the guidance and support of Dilasa and its team. Mr. Shashikant Kasle gave us information and training on SRI, after that under his guidance I took rice cultivation in 20 R area. I got more profit from SRI intervention than from regular traditional method. Special thanks to RBL Bank Ltd. who has shown us a path towards a new horizon related to agriculture.

Mrs.Ankita Ekanath Kambli
A/P-Kariwade (Gauliwadi)
Block-Sawantwadi
Area-15R
Yield-80Kg/R

I am Ankita Kambli, a member of Vaishanvi Swayamsahayta Mahila bachat gat.We decided to take up farming by SRI method under the guidance of Mr. S.L.Anavakar (coordinator of Dilasa). The farming method included under nursery bed preparation, transplantation, Cono-weeding and harvesting. The yields improved drastically as compared to traditional method. The cost of inputs like seed and fertilizers also reduced. We are very much satisfied by the SRI Method. Our hearty thanks to RBL Bank Ltd. and Dilasa for making us self sustained in the field of agriculture.

# Success Stories

Narayan Sahadev Parab
A/P- Kumame
Taluka –Malvan
Area-2 Acre
Yield-92Kg/R

I, Narayan Parab, have 2 acres of land which I utilized for paddy cultivation. From last year I am taking up paddy cultivation with the help of Dilasa and RBL Bank Ltd.I did SRI cultivation method in 2-acres area of land under the monitoring of Mr.Kasle, co-ordinator of Dilasa foundation. He has given me support for taking up SRI technique to increase the paddy yield.

I got huge advantage from SRI method, such as seeds saving, less time requirement for seedlings growth, the maturity period is less as compared to the traditional methods, and also there is less requirement of fertilizers. I would like to share that we did group farming with the help of some villagers. The seed requirement has been reduced from 62 kg/acre to 6 -7 kg/acre. In the last Rabi season, 64 tillers were formed on a single seedling. We got 92 kg yield/R. This method has proven to give a very good result.

Mrs. Shilpa Umesh Bhalekar
A/p–Kariwade (gouliwadi)
Block-Sawantwadi
Area-1 Acre
Yield-90Kg/R

I am Shilpa Bhalekar, member of Sundar Swayansahayata Mahila Bachat Gat. We got 360 quintals yield per acre. We received the input assistance from the Dilasa coordinator, we thank Dilasa and RBL Bank Ltd. for providing us the support to become independent. We have learnt a lot in SRI method. Starting from nursery bed preparation, transplantation, land preparation, conoweeding and other intercultural operations, we got hands on support from Dilasa and in future we will be going to take this up among new women farmers who are really interested in carrying out agricultural practices. Due to SRI technique, the income of Bachat gat has been doubled.


**Dilasa Janvikas Pratishthan**

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