Water and Livelihoods
SRI in Large Irrigation Projects in Andhra Pradesh, India

programme supported by
Irrigation and CAD, GOAP and WALAMTARI

JalaSpandana
South India Farmers Organisation for Water Management

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Preface

Capacity building of water users in an integrated approach is the need of the hour. JalaSpandana with its experience in water and crop management issues arrived at a conclusion that any intervention programme left to government agencies alone do not reap desired results due to inherent problems encompassing financial, human resources, skill, etc. Further, the extension services towards water management is the lowest priority of any development programmes taken up by governments.

JalaSpandana designed the participatory training programme that facilitate participation of farmers, representatives of water users associations, department officials and other stakeholders in designing and implementing the programme through regular analysis of the situation and evolving appropriate strategies. Progressive farmers and local youth belonging to farming community were extensively used as resource persons.

This booklet details the System of Rice Intensification (SRI) method of paddy cultivation carried out by JalaSpandana in Rajolibanda Diversion Scheme, Priyadharshini Jurala Project and Kurnool Cuddapah Canal in Krishna Basin in Andhra Pradesh. It highlights the different approach experimented in carrying out training programme, SRI as water conservation technology, livelihoods, myths and realities of SRI, cost benefit, chemical application in SRI, etc. JalaSpandana carried out similar exercise in Karnataka, Kerala and Tamil Nadu.

JalaSpandana is thankful to Irrigation and CAD, Government of Andhra Pradesh and Water and Land and Management and Training and Research Institute, Hyderabad for their financial and other support in carrying out this programme in Andhra Pradesh. We are thankful to farmers, officials of irrigation department, and other stakeholders of Andhra Pradesh, Karnataka, Kerala and Tamil Nadu who directly and indirectly contributed to the success of the programme. JalaSpandana acknowledge the intensive work carried out by its staff namely Mr. K. Thachinamurthy, Raghavendra, Devadass, Ramesh Reddy, Naganna, Jagan, Narayana, Ravikumar, Ramesh, Raheem, Malikarjun, Selvam, Gunashekar, Ramadas and others.

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President

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Introduction

It is imperative to focus on the better utilisation of water with the existing infrastructure like dams, weirs, lift irrigation schemes and canal networks to secure increased output from irrigated agriculture. In this context, capacity building exercise needs to be carried out with integration of all allied activities of water with the better convergence among and between multiple departments. The need of the hour is to evolve and adopt effective participatory training programme. JalaSpandana developed the concept 'Participatory Training Programme (PTP)' to address, the social, technical, political and economic issues in large irrigation projects in an integrated approach. This concept was further developed with the help of very appropriate inputs given by Mr. S.P. Tucker, Principal Secretary, Irrigation and Command Area Development, Government of Andhra Pradesh. JalaSpandana is piloting PTP in Rajolibanda Diversion Scheme (RDS), Priyadharshini Jurala Project (PJP) and Kurnool Cuddapah Canal (KCC) in Krishna Basin, with the financial assistance from Irrigation and CAD, Government of Andhra Pradesh.

Integrated Approach

The approach adopted in piloting PTP to water users' associations in large irrigation projects differ from the conventional method of training. In other words, PTP is an Action Research Programme. It encompasses topics like structure and function of WUAs, introducing water saving technologies, crop and water productivity and enhanced livelihoods. In this text we discuss one such interventions i.e., establishing Farmers Field Schools for 'System of Rice Intensification (SRI)' paddy cultivation method.

What is SRI ?

SRI is a different method of cultivating Rice plant. Fr. Hentri de loulanie and his students developed the SRI method which is spreading very fast across the continents. SRI can be adopted in any variety of rice, climate and type of soil with little irrigation facilities. This needs some of the time immemorial methods to be changed to induce the plant to express itself fully in producing more grains.

There are seven such changes: 1) Transplanting young seedlings (8 to 12 days); 2) Wide spacing (at least 25 X 25 cms); 3) Planting only one seedling per hill and shallow planting; 4) Transplanting quickly within 30 minutes of uprooting without damage of roots; 5) Intermittent watering (up to vegetative period); 6) Keeping the soil moist during the first fifteen days after transplantation and during the formation of panicle; and 7) frequent weeding using simple tools (instead of hand weeding).

Why SRI ?

Of late, the normal method of paddy cultivation is creating demand for more water, increased cost of inputs including heavy dosage of chemical fertilizers and pesticides and less returns causing negative effect on the livelihoods of the farmers. Paddy is basically not an aquatic plant but over the years due to over stagnation of water in the paddy plots, it has developed resistance towards more water. In present paddy cultivation method, farmers adopt unscientific methods to address some problems which, causes damage to the growth of the plant. Methods like aged nursery, awkward way of uprooting seedlings, transplanting bunch of seedlings, less spacing, stagnating water and applying more chemical inputs are basically have a bearing on yield and productivity. The tendency to devote less time for cultivation also has contributed to the problem.

The SRI method works the other way round and has the potential to increase the yield, reduce demand for water and improve the livelihoods of the farmers. Thus, SRI method enables paddy plant to have normal growth with less water.

By adopting these changes the rice plant expresses itself fully and in turn in high yield. The demand for scarce water is reduced by 50 per cent, in most cases and up to 70 per cent in some cases. But the opposite happens in the yield. It increases by two fold in many cases.

Aim of the Programme

To spread SRI method of Paddy cultivation by developing farmers' fields as model plots, involving the farmers and water users associations.

Objectives

1) Enhanced livelihoods for the farmers
2) Reducing the water need for paddy cultivation in the command area.
3) Increasing the economic sustainability of paddy cultivation.
4) Increasing the sustainability of soil fertility through less stagnation of water and less or no use of Chemical inputs.
5) Promoting farmers as trainers in promoting and expanding SRI methods.
6) Increasing water availability for dry land cropping.

7) Reducing the water conflicts among the farmers and the commands.
8) Documenting the whole activities through records, pictures, audios and videos to spread out the method in the next phase.
9) Learning lessons from field experiences for further development of training methodology.

Apprehensions over SRI

JalaSpandana has carried out surveys to assess the potential for developing SRI paddy cultivation in RDS, PJP and KCC command area. It is interesting to note that the farmers in the region had heard a lot about SRI paddy method. However, the willingness to adopt SRI method was absent. The reasons identified during the assessment for not adopting the SRI method are as follows;

1. Discussions with the farmers showed that handling the seedlings of 8 to12 days for transplantation was simply out of farmers' imagination. The reason being that farmers are used to the method of easily pulling of the seedlings, placing in bundles and transporting them to the distant fields with time gap.
2. Farmers carried an impression that SRI method was delicate to handle, need extra care and was laborious.
3. Farmers carried a general belief that SRI comprised lot of weeding and de-weeding was expensive and labour-intensive.
4. The unreliable water supply system in major irrigation projects don't permit any irrigation calendar.
5. Water management practice in large irrigation projects was mostly plot-to-plot irrigation method.
6. Although, much was talked about an SRI method, there was no visible evidence shown through demonstration to make them believe the technology in terms of more tillerings in plants and more yield.
7. Big farmers believed that the SRI paddy method was possible in small areas and simply unsuitable in large areas (above 2 acres), thus best suited to small and marginal farmers.
8. On the contrary, the mindset among the small and marginal farmers was that SRI method was too risky for these categories, and was best suited for medium and big farmers as they could afford and take chance in adopting SRI.
9. It was found that the crop promotion agencies in the region were providing incentives to adopt different method of practice. This was the normal internalised attitude of the farmers to anticipate support packages like free seeds, agricultural implements and crop assurance package.
10. The non-availability of markers and weeders was a big question in the area.
11. The result of crop failure spread much faster than the success case, thus, became the talk of the region that discourage new entrants.
12. The crop failures of a couple of farmers were quoted by most of the farmers in the region. Diagnosis reveal that these farmers had not been given adequate technical training.

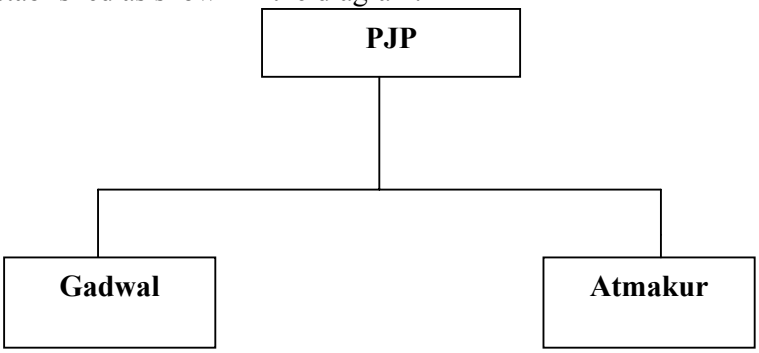
Training Courses

Based on the findings on the need assessment, the strategies were worked out to overcome these apprehensions over SRI. Appropriately, dialogues were framed and used during the discussion over SRI wean the farmers from the above beliefs. This gave us an indication, that any new experiment either on-farm or off-farm should be watched and talked about in the region. Thus, it became necessary to be cautious while carrying our demonstration and experimentation on the SRI method.

JalaSpandana designed strategies like

1. Establishing training centers and sub centres in the command area and be available to the farmers for clarifying doubts
2. SRI Farmers Field School (FFS) to ensure success
3. Removing complex of delicacy in handling SRI seedlings and other practices
4. Implementing SRI in large area (more than 2 acres)
5. Helping small farmers to overcome the fear complex of risk
6. Promoting panchakavya and herbal decoctions (bio starters and bio growth promoters)
7. Approaching Self-Help Groups and other women agricultural labourers
8. Adopting Farmer to Farmers Technology Transfer as a top strategy
9. Promoting manufacture of markers and weeders locally

JalaSpandana has established training centres and sub centres in the command area of the three major irrigation projects, for example, in Priyadharshini Jurala Project, Centres were established as shown in the diagram.



Grounding SRI in the Command Area

As a first step in grounding SRI, awareness, motivation and orientation sessions were conducted and a consent list of farmers willing to adopt SRI was prepared. In RDS and KCC the canal water for irrigation was available only in *kharif* and the area shown in *rabi* in these two projects were under groundwater and lift irrigation.

*** No water in canal for irrigation**

Project	No. of WUAs JalaSpandana is operating	*Kharif* (acres)	*Rabi* (acres)
RDS	34	61.00	18.00*
PJP	5	21.00	141.25
KCC	31	68.50	3.00*

First Impression is the Best Impression

JalaSpandana gained the faith and confidence of the farmers by generating good impression through the extension services. The staff of JalaSpandana went into farm plots during the process of nursery bed preparation, transplantation and weeding. Farmers experienced in SRI from other parts of South India were involved in the training programme. The category of land holding of farmers who adopted SRI range from 1 acre to 70 acres and the adoption of SRI especially under canal irrigation is in the range of 0.50 acres to 15 acres. The yield range from 38 bags per acre to a maximum of 62 bags, while the yield under normal paddy method was about 20 to 35 bags. There was a slight variation in the yield from project to project depending on the water quality and soil fertility.

Case 1.

Mrs. Prabhavathamma of Tanagala Village, Wadepally Mandal of Mahabubnagar District, was the first (woman) farmer to come forward to adopt SRI paddy in ten acres. Prior to transplantation of paddy, she cultivated green manure called as *pachirota* in Telugu. The starters and plant growth promoters like panchakavya (old and advanced version) were prepared in her house and applied during the nursery stage of the crop.

Initially, people made fun of her. Mrs. Prabhavathamma says that some farmers who were skeptical about SRI in the village called her mad for attempting SRI method in ten acres. As the days went by, the scenario changed. Crop growth in terms of tillerings (max. 92) made farmers feel surprise. The

comparative analysis between normal method and the SRI started among farmers and became the talk in several surrounding villages. Farmers who had not adopted SRI started repenting. At last, Mrs. Prabhavathamma harvested a good crop with the yield of 62 bags under SRI as against 35 under normal method (per bag 75 kgs). Now, she has become the resource person for SRI in Tanagal village and has taken the decision to adopt SRI in the coming years.

Case 2

Mr. Ramboopal Reddy, a big farmer from Nidzur village, Kurnool mandal, Kurnool District got impressed with the approach of the training programme conducted by JalaSpandana. He adopted SRI in 15 acres under one pipe outlet under Kurnool Cuddapah Canal. He became the model farmer to do SRI under canal irrigation on a big scale, which removed most of the apprehensions the farmers had on the feasibility of SRI under canal irrigation. Mr. Ramboopal Reddy is continuing to practice SRI during *rabi* season under lift irrigation.

Case 3

Mr. Balakrishna, a farmer from G. Singavaram village, Kurnool mandal of Kurnool District, with a total land holding of one acre under Kurnool Cuddapah Canal adopted the SRI method. The seed treatment and nursery was raised under the training and supervision of different agency. Due to technical problem in raising the nursery, the seedlings turned into yellowish in colour and were not fit for transplantation. JalaSpandana intervened and helped this farmer through borrowing seedlings from the nearby big farmer who adopted SRI under the training and monitoring of JalaSpandana. Mr. Balakrishna practised as per the training given by JalaSpandana. He harvested a successful crop with a yield of 48 bags per acre. At present, Mr. Balakrishna trains other farmers in the surrounding villages on behalf of JalaSpandana.

Case 4

Mr. Kuruva Yellappa, a farmer from Chenigonapally village, Gadwal mandal of Mahabubnagar District adopted SRI in two acres under Priyadharshini Jurala Project. His total paddy area is 4 acres. This farmer was very doubtful about the SRI even after transplantation stage. He went on making phone calls and visiting our training centre several times in the first one month period. After 35 days, Mr. Kuruva Yellappa started making phone calls for different purpose and that is to inform us on his happiness about the number of tillerings in the plant. He became the centre of attraction in the village. The comparative analysis of SRI and normal paddy method in his own land showed that he got 38 bags per acre under SRI and 26 bags under the

normal method. The recognition he got from SRI also elevated his position in the executive committee of water users' association. Mr. Kuruva Yellappa who was a Territorial constituency member became president of the same water users' association. He participated in several meetings and workshops on SRI locally and at Hyderabad level.

Comparative Analysis

An attempt here has been made to analyse the crop performance under SRI method (with different types of spacing due to short term variety) and normal paddy method. The samples were collected from one variety of plant, i.e. *Telahamsa,* a crop duration of 120 days in r*abi* season

Analysis of SRI Crop and Methodology Adopted

i. Types of experiment

As described earlier, there were three types of experiments carried out in the model farm namely 1) Experiment A – SRI Paddy with 25 x 25 cm spacing, 2) Experiment B – SRI paddy with 25 x 12.5 spacing, 3) Experiment C – Normal method of paddy cultivation.

ii. Sampling method of analysis and selection of sample areas

In order to be more objective in the analysis, it adopted the well established random sampling technique. This technique was to identify the crop area to be selected by not actually looking at the crop, but by throwing a piece of stone on the back. The area of one square meter was taken for sample in the place where the stone fell. In this manner, three samples were collected from each experiment.

iii. Paddy hills in 1 m^2 area

The analysis shows that there was no difference in the number of hills in the defined spacing paddy transplantation like 25 x 25 cm and 25 x 12.5 cm spacing. Scientifically there were 16 hills in 1 m^2 area of 25 x 25 cm spacing SRI paddy area and there were 32 hills in 1 m^2 area of 25 x 12.5 cm spacing SRI paddy area, whereas, in normal practice of paddy cultivation there were no defined paddy hills number within a fixed area. Here, in the sample area of normal paddy, it was found that there were 53 hills in 1 m^2 area.

iv. Height of the crop

The height of the crop measured from the top of the soil level to the tip of the highest leaf of the crop. This method of height measurement of paddy plants were carried out in five plants in each experiment and made average calculations were made.

v. Panicle in a hill

To calculate the productivity of the crop, the number of panicle in a hill (a crop) was very important. Thus, five hills were selected in various locations in the field for counting the productive panicle number in the hills to derive the average panicles in a hill.

vi. Length of panicle

To evaluate the growth of the panicle, five panicles were selected in different locations of the field and measured the length from the bottom of the first branch in the panicle to tip of the panicle.

vii. Main branches in a panicle

To find out the variations in the number of panicles in the main branches, the main branches were counted from five different panicles and the average of main branches in a panicle was calculated.

viii. Grains in a panicle – filled and unfilled

Five panicles were selected from each of the experiment areas and grains from the panicles were separated and the number of filled grains and unfilled grains were counted. Out of this exercise the understanding that emerged was the strength of the grain and the resistance power of the crop from the diseases and pest attacks.

ix. Grains weight for every 1000 nos.

One thousand number of good quality grains were separated from each of the experiment areas and weighed. Out of this exercise one can understand the quality of the grain from each experiment.

x. Grains weight in 1 m^2 area

To calculate the yield in the entire area, there were samples collected as mentioned earlier from each of the experiment area and the grains were separated from the straw. The unfilled grains were removed from the good grains and weighed. Out of the three samples in each experiment area, calculations were made to get the average yield per one square meter area.

xi. Yield per acre

Out of the 1m^2 area grain yield, the calculations were made to find out the average yield per acre area. One acre consists of 4000 m^2 area. Therefore, the average of 1m2 area yield was multiplied by 4000 to arrive at average yield per acre area.

xii. Excess yield percentage

Comparative calculations on the yield level made in three experiment area showed that there was excess yield percentage in SRI paddy cultivation method when compared with normally practised paddy. The comparative analysis of excess yield was calculated for both the types of SRI paddy experiments and an average percentage level of excess yield was analyzed.

xiii. Straw weight in 1 m^2 area

Paddy straw yield is also important for the farmer in the sense of fodder for cattle, marketing, house roofing etc. In this connection, the paddy straw measurements were taken in 1m^2 from three experiment locations and weighed.

xiv. Excess straw percentage

Comparative calculations made with three experiment areas with related straw level found the excess straw percentage in SRI paddy cultivation compared with normally practised paddy. The comparative analysis of excess yield was calculated for both the types of SRI paddy experiments and an average percentage level of excess yield was analyzed.

Result sheet

The following are the three type of samples,

Type A	-	SRI method – Spacing with 25 x 25 cm
Type B	-	SRI method – Spacing 25 x 12.5 cm
Type C	-	Normal paddy

i. Hills in 1 m^2.

S. No	Type Name	Hills in 1 m^2
1.	Type A	16
2.	Type B	32
3.	Type C	53

ii. Height of the crop (cm)

Type Name	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
Type A	109	105	106	116	104	108
Type B	116	113	112	110	107	111.6
Type C	97	107	102	104	105	103

iii. Panicle in a hill

Type Name	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
Type A	25	17	26	25	31	24
Type B	24	19	21	15	24	20.6
Type C	17	10	8	12	15	12.4

iv. Length of Panicle (cm)

Type Name	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
Type A	23.5	23	23.5	24.5	25	23.9
Type B	24.5	26	25	25	28	25.7
Type C	23	20.5	21.5	18	21	20.8

v. Main branches in a Panicle

Type Name	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5	Average
Type A	10	11	14	12	11	11.6
Type B	13	14	11	15	11	12.8
Type C	7	9	9	9	11	9.00

vi. Grains in a Panicle

Type	Sample 1		Sample 2		Sample 3		Sample 4		Sample 5		Average	
Name	F	U	F	U	F	U	F	U	F	U	F	U
Type A	108	17	96	21	108	7	94	43	92	24	99.6	22.4
Type B	146	18	118	8	106	15	156	19	159	17	137	15.4
Type C	72	15	53	11	66	31	77	28	90	41	71.6	25.2

vii. Grain weight – 1000 Nos (gms)

Type Name	Weight (gms)
Type A	35
Type B	35
Type C	30

viii. Grain weight in 1 m^2 area

Type	Sample 1		Sample 2		Sample 3		Average	
Name	Filled	Unfilled	Filled	Unfilled	Filled	Unfilled	Filled	Unfilled
Type A	778	60	790	85	772	80	780	75
Type B	685	40	645	35	650	45	660	40
Type C	560	65	540	65	538	50	545	60

ix. Yield per acre

Sample A: SRI Paddy with 25 x 25 spacing

1 m^2 yield	=	780 gms
1 acre (4000 m^2)	=	780 gms x 4000 m^2
	=	3120.000 Kgs
1 acre yield in bags	=	3120 / 75 kg
	=	41.60 bags

Sample B: SRI Paddy with 25 x 12.5 spacing

1 m^2 yield	=	660 gms
1 acre (4000 m^2)	=	660 gms x 4000 m^2
	=	2640.000 Kgs
1 acre yield in bags	=	2640 / 75 kg
	=	35.20 bags

Sample C: Normal paddy

1 m^2 yield	=	545 gms
1 acre (4000 m^2)	=	545 gms x 4000 m^2
	=	2180.000 Kgs
1 acre yield in bags	=	2180 / 75 kg
	=	29.06 bags.

x. Increases yield percentage per acre

More yield ratio in 25 x 25 spacing SRI paddy	=	43 %
More yield ratio in 25 x 12.5 spacing SRI paddy	=	21%

xi. Straw weight in 1 m^2 area

Type Name	Sample 1	Sample 2	Sample 3	Average
Type A	2.250	2.500	2.300	2.350
Type B	1.900	1.600	1.660	1.720
Type C	1.560	1.700	1.750	1.670

xii. Increased straw weight percentage per acre

More weight percentage in 25 x 25 spacing SRI paddy field	=	40.7 %
More weight percentage in 25 x 12.5 spacing SRI paddy field	=	02.7 %

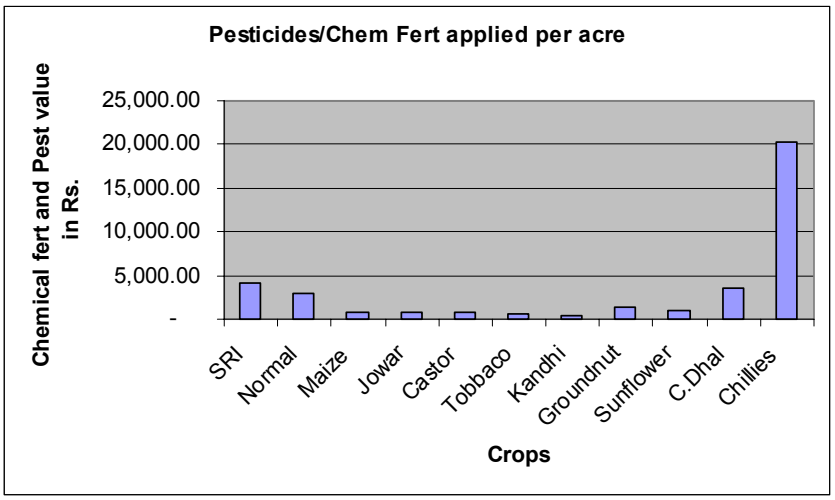
Cost Benefit of Crops in Large Projects

The cost of cultivation and net returns for various crops grown in command area is given in the following table (Under each crop *n* = 30).

Crops	Total Cost	Total Returns	Net Returns
SRI Paddy	10,548.50	20,221.00	9,672.50
Normal Paddy	9,661.00	16,489.16	6,827.70
Maize	4,791.00	10443.50	5,692.50
Jowar	2,980.00	13396.00	10,416.00
Castor	3,551.66	9180.30	5,628.64
Tobacco	3,242.50	13051.68	9,809.18
Kandhi	3,136.25	7,921.16	4,784.75
Groundnut	6,893.33	13,062.33	6,169.00
Sunflower	4,416.00	11,965.23	8,749.43
Chenna Dal	7,188.00	15,898.00	8,710.00
Chillies	38,136.00	65,260.00	27,114.00

Chemicals usage

The graph given below shows the extent of chemical fertilizers and pesticides used per acre in different crops grown under large irrigation projects.



Conclusion

The system of rice intensification method of paddy cultivation is beneficial both in terms of productivity and quality of food grains. It is evident from the above analysis that the SRI method results in better yield in rice and straw production. In addition, it prevents soil degradation and is environment friendly. The livelihoods of the farmers especially small and marginal farmer is improved due to less input cost and high returns. Thus, the State governments should make sincere efforts in propagating SRI, which is also one of the major water saving technology.

Need for Consistent Approach

Any transfer of technology in Indian rural scenario needs consistent training programme and follow up for a minimum of three years. This point also emerged clearly during the discussion with the agricultural scientists and extension service experts. Large canal irrigation schemes being potential for paddy, the attention towards propagating SRI should be intensified. It was estimated that SRI method alone could save about 264 TMC of water in Andhra Pradesh.

SRI paddy practice in Tamil Nadu

JalaSpandana initiated the idea of promoting SRI paddy cultivation method in Lower Bhavani Irrigation Project (LBP) in Cauvery Basin in Tamil Nadu through the local agencies. The federation of farmers of LBP water users associations is well established users institution voluntarily formed by the representatives of WUAs in LBP. Command area. There are 44 water users associations in LBP command area spread across 2.7 lakh acres. JalaSpandana through its State chapter called 'Tamilaga Velan Neevala Niruvanam' promoted the idea of SRI practice in LBP command area with the help of water users associations. The LBP federation showed keen interest in promoting SRI and allocate funds to this activity. Another local body working on organic farming called 'Farmers Organic Network Federation' headed by Mr. Selvam joined the venture. The consortium of JalaSpandana, TVNN, LBP Federation, FONF carried out this SRI programme in LBP command area. In this programme 46 farmers with an area of 72.00 acres covering 20 water users associations undertook SRI.

SRI paddy practice in Karnataka and Kerala

JalaSpandana initiated SRI exercise in Mushtur village of Gangavathi taluk in Tungabhadra Basin in Karnataka and Palakkad District of Kerala. Mrs. Byri Eramma and M.K. Ramadass member of JalaSpandana anchored the training programme in Karnataka and Kerala respectively. In Karnataka 4 farmers (one women farmer) to an extent of 12.00 and in Kerala, 2 farmers to an extent of 6 acres carried out SRI. For more details contact JalaSpandana.

Who are We

JalaSpandana – South India Farmers' Organisation for Water Management, was formed in 2003 by the farmers committed for the development of water sector and livelihoods of farmers from Andhra Pradesh, Karnataka, Tamil Nadu, Kerala and Pondicherry. The main aim of JalaSpandana is to facilitate farmers' participation in the political process of water policy formulation and implementation.

Who can become members

Farmers interested and committed for the cause of water and livelihoods of farmers and other dependents can become members of JalaSpandana by paying a sum of Rs. 500/- towards life membership and Rs. 100/- towards annual membership.

We invite you to

- be a volunteer
- campaign on issues related to water and farmers
- suggest strategies and initiatives to improve water use efficiency in irrigation projects
- resource person in technology transfer
- assist in research and action research
- help us in translations
- spread the message about JalaSpandana to fellow farmers and water professionals
- donate generously
- provide links to our website

Our offices are

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