

SRI in Tamil Nadu-A Status Report



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Status report on SRI in Tamilnadu region

1. Introduction:

The crop 'paddy' always seen as inseparable from 'water' in the farming history and cultivated in an inundated situation years together. But it was the wisdom of farmer that cultivated paddy even in dry land situation (by small and marginal resource less peasants) those days that performed a very great output than the paddy in inundated condition (grown by resourceful farmers). But still the fullest output not reached in case of inundated situation as expected by the research effort. In such situation, if a question is raised on the SRI's unbelievable accomplishment in terms of its yield potential, the answer would be the farming system approach that provided "suitable crop ecosystem" facilitating plants to express its potential growth and yield performance. This is what termed as SRI in other wards.

Farmer usually do farming based on what he knows, but his know-how part is often influenced by the forward linkages of external innovation/technology /research and advisory services that some time even directed their "farm eco system approach" which often provided chance of better connected effort between biotic and abiotic factors. In most case, those days farmers who did 'farming' were self-reliant, independent and free to decide and invest his experiential knowledge (gained out of realistic interaction with various biotic and abiotic elements of his farm by himself), but in most case now-a-days unlike 'Farming' the 'Agriculture' became external dependent in every aspects, controlled by indoor research and extension system (private, profit motive & unrealistic) making small peasants' returns unremunerative. Farm operations which are expected to provide congenial environment to the 'crop plant' to perform its growth function towards potential output does not materialize often, as the operations mostly in disintegrated way deviating from farm-eco-system approach. One such example is Paddy cultivation in inundated condition (traditional method) and wet condition (SRI method), where the former is agriculturally specialized approach and later one is farming system approach, are placed in two different opposite directions. The later one is the proven approach/innovation developed by a farmer (Father Henri de Laulanie, a Jesuit priest in Madagascar) through his years of farming experience interacting with various farm elements. It shows the existing far-flung situation between research and real field experience, if the gap is reduced through

researchers' realistic interface along with farm-farmer and their experience, then the similar success can be triggered in all crops.

Hence, performance of any plant is not solely dependent on its genetic potential; it is sum total of function and interaction of biotic and abiotic elements in the real field condition. Such valuable experience of a farmer (in Madagaskar) should necessarily get scaled up to the entire paddy cultivating world as it would certainly address many issues like hunger, water scarcity, inter state water dispute, lower productivity etc. This could only be possible by the voluntary organizations like CWS having wider reach through networks of CBOs and NGOs in several states of India. Therefore, it is utmost important that such innovative approach should get picked up in all the areas, towards that, this short study to assess the status of SRI in Tamilnadu is done for Center for World Solidarity (CWS).

2. The Purpose of Study:

The basic purpose of the study is to assess the status of SRI and its ground situation, analyzing the potential opportunities to popularize the same towards effective utilization of water resource, augmenting yield/income for the livelihood upliftment of farming community.

3. Methodology of study:

Methodology followed in this study is random sampling of farmers of SRI practitioners and non-practitioners in delta and non-delta regions. Field visits were made to the paddy area of the delta and non-delta regions, held on-site interaction with farmers along with field observations. Discussion with officials of Department of Agriculture (DoA), participated in SRI popularization meet with Farmer Interest Group (FIG) by DoA, interaction with various officials of KVK during the KVK action plan meeting held on 9th to 11th April 2008 at TNAU, Coimbatore and visited NGO partner (Kudumbam) of CWS and other NGOs like BEST, World Vision Mannarkudi and AME Foundation.

4.SRI - the scenario / involvement of various stakeholders:

Rice is staple food for 65 % of population in India. Being the second largest rice producing country in the world, the southern part of it, the Tamilnadu state with the geographical area of 13 million ha and cultivable area of 5.8 million ha contributes 2 million ha of paddy cultivation mostly under irrigated condition. The average productivity of rice in the state is highest in the country, with an average yield of 5 tones/ha.

There are various actors involved in Tamil Nadu to popularize the paddy cultivation in SRI method. There are 3 categories of actors involved such as TNAU, DoA, and NGOs focusing their effort in different ways of their style. Though extent of linkage between actors and organizations is weak in TamilNadu, considerable efforts are taken by the development organizations in bringing various stakeholders together.

4.1.Tamil Nadu Agricultural University (TNAU)

TNAU being a forefront in crop research heard and imbibed the concept of SRI from Plant Research International of Netherland through Dr. H.F.M.Ten Berge during 2000 that paved way for the conduct of observation trials under SRI in 2000-2001. A detailed study was taken through the water saving rice production project funded by the Dutch government through the Plant Research International at Wageningen. The first observation trial was conducted with Co43 with treatments of wet seeding of sprouted seeds and transplanting of 10-day-old seedlings. Though there was no spectacular yield difference, the study confirmed that the flooding was not necessary to maintain yield.

Followed by this, formal experiment was conducted during August 2001- January 2002 to compare some of components of SRI with the existing practices of transplanted rice. This followed establishing 100 adaptive trials in 2003-04. During experiments in 2003-2004 at the Agricultural College and Research Institute (TNAU), Killikulam, Tamil Nadu, it was found that, on average, 53% less irrigation water was used in SRI farms. In these experiments, 21-day-old seedlings were transplanted 15 x 10 cm apart on the conventional farm. The SRI farm had 14-day-old seedlings transplanted 20 x 20 cm apart. Water depth on the SRI farm was maintained at 2.5 cm, with alternate wetting and drying cycles up to the panicle initiation stage. The farm was flooded to the same depth thereafter until harvest. On the conventional farm, the depth of the water was maintained at 5 cm throughout the standing crop. The SRI farm recorded a grain yield of 3,892 kg/ha, 28% higher than from the conventional farm.

The results from two on-farm, state government-funded evaluations by TNAU -- one of which was in the Tamiraparani basin in south Tamil Nadu, showed that mean grain yields under SRI and conventional cultivation were 7,227 and 5,637 kg/ha respectively, showing an overall yield advantage of 1,570 kg/ha (maximum yield advantage: 4,036 kg/ha) for SRI. Around 31 farmers recorded grain yields of over 8 t/ha under SRI.

With this back up of research effort and proven results, TNAU has recommended SRI as Technology in Tamil nadu to increase productivity and save irrigation water.

4.2. World Bank support

As reported by the Association Tefy Saina and CIIFAD, **Tamil Nadu plans for 250,000 Ha under SRI**. The World Bank has approved on January 23, 2007, the Tamil Nadu Irrigated Agriculture Modernization and Water-Bodies Restoration and Management Project. This will rehabilitate and improve >600,000 ha of irrigated land in 63 sub-basins throughout that state. The project design projects an extension of SRI methods to be used on at least 40% of this area (250,000 ha). SRI is identified in project documents as a "key intermediate outcome indicator" for project implementation and success. Farmers' productivity gains from using SRI methods are part of the economic justification for the project investment. Though the project was approved in January 2007, the project implementation started from September 2007 (The Hindu, 13th May 2008, Special Edition on Tamil Nadu).

Area under SRI covered / plan:

As reported in Hindu dated 24th Jan2008 by Audiseshiah, Secretary, Public Works Department accompanied by Vibu Nayar, Project Director, IAMWARM (Integrated Agriculture Modernization and Water Bodies Restoration and Management) project, C. Ramasamy, Vice-Chancellor, Tamil Nadu Agricultural University, and District Collector Brajendra Navnit inspected the demonstration plot raising paddy under SRI technology at Vikkiravandi in Villuppuram district.

Mr. Audiseshiah told reporters that the SRI technology was being propagated by the State government and the TNAU. So far 3,000 hectare (ha) had come under the project and since it was being promoted under the mission mode it would soon bring about 11 lakh ha (of the total area of 20.5 lakh ha under paddy) under SRI in the next two-three years.

Yet, no target was fixed nor any compulsion involved for the farmers to go for the new crop method.

Under the IAMWARM project, funded by World Bank and implemented through the TNAU, a subsidy of Rs. 10,000 a ha was being given to the farmers, and for other areas the Agriculture Department was giving away a subsidy of Rs 2,000 per ha.

Asked how long the subsidy scheme would continue, Mr. Audiseshiah said it would be available only to the demonstration plots.

However, the government had proposed to give 10,000 cono-weeders free of cost to the farmers during the next paddy season.

Though Hindu has reported the above informations, there is no clear mention available at Department of Agriculture or the Agriculture Ministry about the support of World Bank for SRI paddy and the targeted area etc.

And in case of area covered/planned under SRI though it was ambitiously reported in news papers that 250,000 ha of target area would be covered under SRI in Tamil Nadu, no proper documentation is done / available about the status and reach achieved already. Hence, the study could not quantify the achievements so far, but for the qualitative aspects mentioned in the report earlier. While focus of these initiatives is clearly on command areas of major river basins, large areas under traditional paddy cultivation, either rainfed or well irrigated, are neglected depriving many poor farmers to harvest the benefits of SRI in the State.

As per the budget speech Minister of Agriculture of Tamilnadu Government in 2008-09, about 10 lakh acres (4 lakh ha) is already covered under SRI in the state. Now, during 2008-09, they want to increase to 18 lakh acres (more than 7 lakh ha). Further, under NFSM (National Food Security Mission), there is also SRI component. But, there is no mention of SRI in earlier budget speeches.

And as per the speech of agrl minister of TN in the conference of agrl ministers during 23rd April 2008, It says that ICDP (Integrated Cereal Development Program) demonstrated in 11,690 ha but publicity covered around 4.2 lakh ha during 2007-08. Further, it reports that budget speech says that plan for 2008-09 is to cover 7.5 lakh ha which is inconsistent with the data given in TN Government budget speech.

As there are inconsistencies in various reports about the coverage planned and achieved, the study could not quantify the actual area planned or achieved under SRI.

4.3. Research Stations

Tamil Nadu Rice Research Institute, Aduthurai, Rice Research Institute, Tirur etc., have been taking initiatives in training various farmer groups and the civil societies of its service area besides promoting mandatory research trials on the

SRI system. They also joined on request with the development organizations' initiatives to share the views. Dr.Thiagarajan, Scientist from Rice Research Station, Tirur is the one who took initiatives to assess SRI paddy in TNAU and represented India in international platform making significant role in furthering research work in SRI paddy in Tamilnadu.

4.4. Banking sectors

It is quite encouraging that the initiatives of non-government organizations bring various actors of research and civil societies to a common platform to popularize such technology. For instance, voluntary organization 'VAANGHAI' (Virtual Action on Agriculture by Nagurway Growing and Husbandry of Animals India) held workshop (on organic farming in SRI) on August 22, 2007 at Sangamangalam of Nagapattinam district getting support from NABARD along with Tamil Nadu Rice Research Institution (Aduthurai), Rice Research Station (Tirur) and Krishi Vigyan Kendra, Sikkal. The program was co-sponsored by National Bank for Agriculture and Rural Development (NABARD) and Indian Overseas Bank, Nagapattinam.

The banker's bank NABARD is so keen in supporting the initiatives taken by various organizations like NGOs, research stations, KVKs etc. through the location specific nationalized banking sectors. It supports the proposals on SRI promotion through various stakeholders.

4.5. Krishi Vigyan Kendras (KVKs)

KVKs with their mandate of Technology Assessment, Refinement and Demonstration have been actively formulating location specific research proposal (of SRI) through On Farm Trials (OFTs) and Front Line Demonstrations (FLDs) and implement in farmers field providing critical inputs. They also conduct on campus training to the farmers on SRI method. Action plan meeting of KVKs held during 9th to 11th April 2008 at TNAU, Coimbatore, discussed on specific problems of SRI like 'Drudgery in cono weeder' and in accordance finalized OFTs and FLDs to refine and promote Battery operated Cono weeders in their operational areas.

4.6. State Department of Agriculture (DoA)

The scaling up of SRI, outside the research system began in Tamil Nadu for the first time through the Department of Agriculture. Beginning August 2004, SRI was promoted under the 'Integrated Cereal Development Programme-Rice' with a target of 9000 acres to be covered in 2004-05 under the system.

State Department of Agriculture has planned for 2,60,000 ha of paddy area in Tamilnadu under SRI paddy cultivation, which would be completed during 2008 to 2009.

Government schemes and subsidy: Department of Agriculture (DoA) promote SRI through cluster approach involving Farmers Interest Groups (FIGs), Tamilnadu Women in Agriculture (TANWEB) etc, (Rs. 20,000/- per cluster for promotion of SRI technology + Rs.5000 per cluster for training of farmer and labour in each cluster of 10 ha.) with financial outlay of 283 lakhs under innovative scheme. The district joint directors of agriculture are authorized to draw the amount of Rs. 5000/- per cluster for conduct of training to farmers/laborers in cluster.

Budget allocation:

Basically there is the Central Government sponsored macro management of agriculture. Under that, there are two schemes 1) Integrated cereal development program and 2) promotion of SRI under cluster approach, that promote SRI in Tamilnadu. As per Tamilnadu GO (GO Ms no.284 dated 16.07.2007) budget allocation for SRI promotion is Rs. 7 crores for 2007-08 out of 38 crores for Agriculture department.

The study observes that as the clarity in terms of area to promote SRI is lacking (discriminately reported by budget speech and ministers meet), it is difficult to comment on whether the allocated budget of Rs. 7 crores is proportionate to achieve the target. It solely dependent on the way it would be implemented where the actual area would be covered, the training plan and the input supply (marker and weeder) etc would be the deciding factors to assess the budget requirement. But one thing is clear that the allocated budget amount (Rs. 7crores) if worked out for one ha keeping 2,50,000 ha as base, the actual amount can be spent for one ha is Rs. 280/- only which is not possible to support farmers with inputs like cono weeder, marker etc.

4.7. Contribution by Media in popularizing SRI method

Messages published from The Hindu:

Salem: March 2008, The Agriculture Department has begun implementation of System of Rice Intensification (SRI) for paddy cultivation in 19 blocks in the district. Paddy seedlings are planted in 25 acres in each block under the new method. The SRI is a new technique for improving productivity in paddy crop with less quantum of water. Farmers can get three tonnes per acre instead of 2 to 2.5

tones under the conventional method, Joint Director of Agriculture K. Janagan said after inspecting the paddy fields, which were brought under the method in Chettichavadi village of Salem district.

“Presently Paddy is being cultivated in about 46,000 hectares in the district. DoA has decided to cover at least 800 hectares more under the method this year. Training programmes for farmers on SRI are being organized in various parts of the district. We are encouraging more farmers to adopt the method,” Mr. Janagan said.

Farmers were advised to ensure wider spacing between seedlings and manage water carefully under this method, agriculture officials said.

Erode: (14th Feb 2008): “I will do only this type of cultivation even if you ordered me not to do so, said D.Gnanasampandam of Sundarapuri village near Nathakadiyur to *The Hindu* recently. The Joint Director of Agriculture Erode S.Somasundaram, who has inspected the field, recently told *The Hindu* that other farmers in this area were willingly coming forward to adopt this practice after seeing the difference in crop, compared to that cultivated in the non-SRI field.

Kangayam: The Assistant Director of Agriculture Kangayam A.Prabakaran said that due to the larger space provided among the plants built up the population of beneficial insects and it was possible to see more spiders in the SRI field.

Tanjore: On July 07, 2006, Joint Director Agriculture has expressed the target of 16,000 hectares to be covered under SRI against district’s total cultivation area of 40,000 hectares.

Tiruchi: on April 26, 2008, Joint Director of Agriculture has announced that the department would bring the entire paddy coverage area of 61,000 hectares in Tiruchirapalli district this year under the system of Rice Intensification (SRI), a technique offering huge potential for increasing productivity with less water requirement, he said.

He told newsmen that though the government has fixed a target of 30,000 hectares for SRI in the district this year, the Department was planning to promote the system in the normal paddy coverage area. To begin with, SRI would be promoted in 10,000 hectares during the kuruvai season, he added.

LEISA India Magazine:

LEISA Magazine • 22.4 • December 2006

The magazine has contributed its efforts in consolidating the apprehensions and the experiences of SRI across world that benefited Tamilnadu farmers too in imbibing the SRI approach. In connection, there are some perceptive comments about SRI by various scientists across world published in this magazine and the extract of it given below:

Dr.Norman Uphoff

The very term “soil” does not reflect adequately the extent to which its fertility is a consequence of the life within it – the abundance, diversity and activity of soil organisms. It would be better to talk and think in terms of “soil systems”, as implied by the motto of organic farmers: “Don’t feed the plant – feed the soil, and the soil will feed the plant”.

Dr.T.M.Thiyagarajan. Rice Research Station/Krishi Vigyan Kendra, Tirur, Tiruvallur District.

SRI is attractive to small and marginal farmers because of the higher yields, the lower seed requirement and the relative ease of weed management. Results obtained by farmers throughout the state have convinced the Tamil Nadu State Department of Agriculture to actively promote SRI through its extension service. They set up demonstration trials in major rice producing areas of the state in the 2004, 2005 and 2006 rice seasons. Extension has helped spread SRI to farmers, as have the more informal farmer-to-farmer exchanges. The benefits of using younger seedlings, wider spacing and weeder use are best demonstrated by the visible results, which once seen by farmers lead to high uptake. Many NGOs are also taking a keen interest in this approach.

Rajendra Uprety. Agriculture Extension Officer

The main attraction behind SRI is its suitability for a resource-poor country. Farmers find the approach advantageous because of SRI’s greater productivity and higher profits due to lower requirements for seed, fertilizers, pesticides, and irrigation water. In addition to saving water, SRI helps reduce soil and water pollution and conserve rice biodiversity for sustainable development. In Nepal, SRI is becoming seen as the best solution for its food-deficit problems and for enhancing food security in remote areas where modern inputs are costly and difficult to obtain.

Willem A. Stoop, Netherland

The potential of SRI can be better realised if it is integrated into a long-term development effort in which research, together with education and participatory learning –through, for example, Farmer Field Schools– play a vital role. Small farmers have developed an empirical package of practices for rice that in many ways run contrary to conventional wisdom (introducing single plants, wide spacing, very young transplants, and intermittent drainage rather than continuous irrigation). This in itself should be of considerable interest to agricultural scientists. To seize on this obvious opportunity, researchers need to match the agricultural professionalism shown by some Malgache farmers and increasingly by farmers in other parts of the world.

4.8. All India Radio (AIR) Trichy

AIR, Trichy has been playing pivotal role for the past 4 years in popularizing the SRI technology reaching the mass in almost 22 districts of Tamilnadu. The experts were called from the following institutions to give special talks on SRI paddy.

They are:

- Tamilnadu Rice Research Institute (TRR) Aduthurai, Tamilnadu,
- KVK Sirugamani, Trichy
- Department of Agriculture through Farmers Training Centers (FTC),
- Indian Farmers Fertilizer Cooperative Limited (IFFCO) has made On Farm Trials (OFT) in Thiruvarampur of Trichy district using bio fertilizers in SRI systems and the effort was broadcasted in the AIR Trichy.

AIR, Trichy has pipeline program of the following:

- Direct talk and interview with SRI practicing farmers
- Discussion with specialists of various institutions.
- Voice Recording at farmers field on their SRI experience
- Phone in program (on line provision to the SRI farmers to interact with the SRI experts)

4.9. Non-governmental Organizations (NGO)

The receptivity and adoption level of NGO sector on SRI system of paddy cultivation seems to be better than the government organizations. Outside the government system, more NGOs started picking up SRI as part of their work prior to the TNAU research stations.

NGOs were proactively involved in demonstrations and vigorous experimentation in the farmers' field with use of bio-pesticides and other formulations using locally

available ingredients and knowledge. These groups see SRI quite differently from the government's own SRI, which see as being excessively dependent on chemical fertilizers. Most of the time their involvement and accomplishments played instrumental to motivate government system to get involved in SRI.

World Vision, Tamilnadu

Area Development Project (ADP) Mannargudi, Tamilnadu

ADP Mannargudi has taken concerted effort in popularizing the technologies among the farmers after coming to a conviction stage out of their experience and they have reached the multiple impacts in terms of yield and plant growth. They have also in collaboration with DoA in Mannargudi district has planned to go for seed production in a compact area. The impact of such initiative has triggered well within the ADPs of World vision and influenced their director's visit. It shows the receptivity and importance that the World Vision offers to the SRI system.

BEST in Pudhukottai district

BEST is an NGO having its operational area at 'Keeranur' of Pudhukottai district, being member of SCINDeA, (a network NGOs promoting slum area and agriculture development work) have taken massive steps in popularizing the technology with the support from AME Foundation. In principle, it entered into an agreement with AME foundation for technical and partial fund support. It got trained its 30 staff members for 15 days period in SRI-Farmer Field School (SRI-FFS) mode and started its implementation in 15 villages through conducting SRI in FFS mode.

During the field visit to their area while interacting with a woman farmer Vasanthi expressed SRI as good method to cultivate paddy as it has reduced the labour requirement, transplantation time, weed population etc.

AME Foundation

AME Foundation being in Dharmapuri district of Tamilnadu has been actively involved in promoting SRI paddy cultivation through offering Modified Training of Facilitators (MToF) in FFS mode keeping SRI as core. Joining hands with network NGOs like MYRADA in Krishnagiri, Hosur, Dharmapuri and SCINDeA at Yelagiri hills AME promotes SRI paddy through offering innovating trainings. In its recent training, offered SRI training in FFS mode by training the NGO staff members of 30 nos. from various parts of Tamilnadu and Pondicherry including CWS supported NGOs.

Kudumbam

On-site field interaction held with Mr. Aravind of Odukkampatti village of Pudukottai district who cultivate paddy under SRI system (supported by Kudumbam) for the past 4 years. According to him: i) Fear of young and single seedling planting that discouraged farmers ii) Strain in operating Cono weeder as the soil is harder iii) lack of experience, not trained, were the reason for others not to follow in his village. He also suggested that the weeder needs some refinement and marker has to be provided to the farmers. He praised SRI as meritorious for the reasons that it saved the cost involved in nursery preparation, removal, bundling, lifting seedling and planting. The number of labour required is only 10 per acre against the 20 in the usual pattern of cultivation. No pest and disease occurrence hence no related expenditures, no rat problem due to the wider spacing, lodging is totally nil, the quality of rice is good and also when it is cooked. As a whole drudgery reduction is observed.

VAANGHAI (Virtual Action on Agriculture by Nature way Growing and Husbandry of Animals India)

VAANGHAI is a charitable trust based in Nagapattinam and working for the farming community since 1987. It takes the platform of natural farming to popularize SRI besides networking farmers in various districts of Tamilnadu. In its way of SRI, arecanut and banana mats are used to raise the seedlings to avoid heat formation in nursery bed and subsequently the yellowing symptom of young plantlets. Cow dung and burnt rice husk are used in the nursery.

They experimented with single seedling of 8 to 38 days old to transplant and found better performance when 14 days old seedlings were transplanted. They maintain 9" to 10" spacing between seedlings at all sides in square pattern. In case of water management alternate wetting and drying system of irrigation is followed while the weeding done through rotary weeder. In order to improve the moisture retention capacity in soil, composted coir pith is used based on the soil type.

Keeping the soil nutritive status as core principle, they cultivate green manure crops like sesbania, sun hemp etc., and plough in-situ on 45th day. Green gram, black gram, Sorghum are also being tried out to enrich the soil nutrients. They also apply green leaf manure, well decomposed Farm Yard Manure in main field. Application of decomposed cow dung, oil cakes of castor, groundnut etc., and rice mill ash (one of them) are followed alternatively every year. They have realized enhanced straw yield and 13% higher grain yield compare to paddy in flooded system.

5. Field visits and interaction with farmers

Field visits were made to Pudukottai (Kudumbam supported area), Tanjore and Tiruchi in exploring the ground situation and the opinion of farmers (both adopter and non adopter). Following are the points expressed by them:

Farmers expressed that handling the seedlings of 8 to 12 days for transplantation is simply out of their imagination. The reason being that their traditional mindset and used to the method of easily pulling of the seedlings, placing in bundles and transporting them to the distant fields with time gap. It does not require much care as that of the young seedling in SRI.

In a Farmer Interest Group (FIG) meeting held by the Joint Director of Agriculture in Perambalur district during March 2008, while interacting with farmers on SRI, though they astonished to hear the principle approach of it, few strongly objected and showed resistance to accept saying it is impossible. This might be due to their lack of exposure to the real field situation of SRI and their traditional mindset.

The SRI farmer Mrs. Anjana Devi in Karatampatti of Trichy district expressed strongly that the continuous monitoring is very essential to the SRI which is crucial factor that decides the farmers' decision of continuance.

Another woman farmer namely Mrs. Pappa said that she is very much confident that she would continue doing SRI cultivation as she experienced that the method saved her crop from water crisis during drought period in 2005. For 20 days without water she could manage the crop health with profuse tillering.

She also expressed that weeding is the one that discourage farmers to continue SRI as they lack Cono weeder or unable to borrow from neighbors as they don't own such weeder usually.

She pointed that though it is profitable, the intensive care is essential unlike the traditional farming system that develops into an impression that SRI is delicate to handle, laborious, intensive care is needed etc.

It was understood from the discussion with few farmers that generally they carry a feel that SRI comprises mainly intensive weeding.

Some delta regions like Tanjore, Thiruvarur, cuddalore etc the farmers' control over water is difficult one as the water once opened in reservoir simply creates inundated situation in the paddy fields where water management or regulating the water by farmers is real challenge for SRI paddy. Also it is apparent that the

water supply system in delta region is unreliable and followed in plot-to-plot system where harvesting maximum water is the motive of any farmer.

Though SRI is widely pronounced well, the demonstrating plots of permanent measures to prove its result is seldom seen hence the ripple/spread effect is low/slow and some parts of Tamilnadu the SRI system not even heard by paddy farmers.

Few farmers think that the SRI is possible in small holding and meant for small and marginal farmers, the same is cumbersome to follow in bigger holdings, hence showed reluctance in adoption. In contrast, the small and marginal holders feel it as risky one and unaffordable, thinking it is suited for big farmers.

Most of the farmers and even some stakeholders too think that SRI is a technology which can be done with specified paddy variety only.

The category of farmers who adopt the SRI is mainly influenced by their know-how, if the farmer is exposed/trained to the SRI system they adopt it. It is observed during the field that both small and big farmers have done SRI where small farmers give more importance to it as it addressed their water scarcity, labour cost etc. Dalit farmer's involvement in SRI is not seen that much prominent.

SRI in water conservation:

It is widely observed during field visits that the water saving is greatly experienced by the farmers who followed the realistic irrigation pattern of Alternate Wetting and Drying system (AWD) maintained for 70 to 80% of crop life that reduced the water use by 25 to 40% compare to flooding type. Some who followed the Semi Dry Method could save 20 to 50% of water. Few places in Pudukottai maintained shallow depth of water due to the rain. Among the various irrigation systems the Alternate Wetting and Drying system has influenced higher growth and yield output.

Role of women and their views:

The technology is women friendly, woman in Pudukottai namely Vasanthi while interacting she was in the SRI field doing weeding operation (using cono weeder) along with an assisting woman. She clearly pointed out that the operation needs only few ladies (2 against 15 labors per acre in conventional method) and that she could do it along with little assistance.

Few places in Karatampatti of Tiruchy district, the weeding operation is done by gents as it involves higher energy in operating the machine manually. There, the exchange of gender role is observed in case of weeding operation which is due to the manual implement which needs extra energy to operate, of course, it is apparent that the mass involvement of women in weeding operation disappear in case of SRI. But, the same is the case in raising the seedling, transportation to field and planting in main field. This one-way reduces the labour requirement and the drudgery on the other hand, which was expressed by Anjana in Karatampatti. By and large the energy requirement and the drudgery involved in conventional method is higher which is comparatively lesser (nearly 50% drudgery reduce) in case of SRI.

Few farmers expressed that harvesting is little difficulty as the SRI paddy has prominent leaf thorns as the plants show its wild character in growth. While harvesting in bent position, damages the face and hands creating itching to the women engaged in harvesting operation.

The right and decision making capacity of women in case of SRI observed to be encouraging, as they are first trained and the field level success by them brings value and importance from their male partners.

6. Variants of SRI

SRI, with its origin in Madagascar, is a new technique for rice culture being followed world over by various stakeholders. In Tamilnadu various modifications are done according to the location. Mostly, modifications done in transplanting density, seedling age, planting pattern, and field management.

Raising nurseries

TNAU mostly favored Dapog nursery (raising nursery in polythene sheet and transplanting to main field) for SRI method of paddy cultivation.

Most of the areas in Tamilnadu followed tray method to raise the nursery where well-decomposed FYM is spread to a thickness of 5cm and seeds broadcasted. Then the tray is taken to the main field with seedlings and transplanted carefully and placed gently in the main field within 15-30 minutes.

Gunnysacks are also being used in the absence of tray.

In Tanjore polythene bag or urea bag are used to raise the nurseries, soil spread on it to a height of three to four inches. Two kgs of Di-Ammonium Phosphate

(DAP) is mixed. Then seeds are sown in it. The seedlings are transplanted on 15th day.

Main field operation/nutrient application

The farmers who are used to the inorganic way of paddy cultivation apply application of herbicide before transplanting and they felt that the herbicide application would reduce the weeds.

Chemical Fertilizer is added to promote plant growth especially to promote productive tillering stage.

Biofertilizers such as Azospirillum, Phosphobacteria, potash solublizing bacteria and Psudomonas are used by the farmers extensively in the SRI cultivation.

Making shallow furrows before transplanting is observed for easy alternate wetting and drying method, shallow furrows are made to drain water easily from the field.

Few farmers cultivate green manure crops like sesbania , daincha in the main field and incorporate them after 30-45 days in-situ condition and then transplant the young seedlings maintaining pure organic environment.

Planting pattern

Generally square plating with one or two seedlings are found.

Transplanting densities

There is wider variations seen in maintaining the planting space between seedlings such as 25x25 cm, 30x30 cm, 45cm×45cm, 50x50cm, of them mostly 25x25 and 30x30 are found in most of the area.

In TNAU experiments, 14 days old seedlings were transplanted at 20x20 cm apart and water depth was maintained at 2.5 cm, with alternate wetting and drying cycles up to the panicle initiation stage. The farm was flooded to the same depth thereafter until harvest.

The recent innovations from TNAU recommend for the use of drum seeder method to sow the seeds directly in the main field, instead of raising nursery.

TNAU favors Paddy transplanter to plant the seedlings of slightly matured (20 to 25 days) in the main field to grow under SRI system.

Battery operated weeder is available at Kumulur Agricultural Engineering college, Trichy. The machine cost is Rs. 10,000/-

The Yanmar Rice Transplanter (Model VP6) is completely automated. It is powered by a 14 hp engine with two forward and one reverse gear speeds for field travel. It runs on a set of solid rubber tyres in the front and traction wheels at the rear. It has a power-steering system, which offers easy field operation with small turning radius. The machine can effectively plant 14-day-old rice seedlings with a field capacity of one acre per hour. It uses a rotary transplanting picker mechanism with a fixed row spacing of 30 cm and adjustable plant-to-plant spacing of 13 to 28 cm in steps. The seedlings are transplanted at a depth of 0.8 to four cm as desired, maintaining uniform depth of planting.

It has an automatic hydraulic leveling system to keep the transplanting depths constant in all the rows. The machine is provided with row marking and aligning systems to synchronize the subsequent transplanting passes. TNAU has been taking concerted efforts in mobilizing those innovations.

7.Reasons for adoption and non-adoption of SRI by farmers

Reasons for Adoption:

Concerted institutional support provided by various service organizations, research systems, Departments through trainings, inputs and monitoring support.

SRI saved the operational cost involved in nursery raising, uprooting, bundling and lifting to the field.

Reduced requirement of seeds and lesser cost.

No pest and disease incidence as the crop eco system provides congenial environment to the plant to show its full virulence and potential.

Higher yield compared to the prevailing cultivation system.

Reduction of labour cost to the tune of 50%.

Proven experience in saving of water and found it as the best option to address water crisis.

Possibility of expanding the area under paddy cultivation with minimum water availability.

Positive results and experience voiced by the neighboring farmers.

Reasons for non-adoption:

Discussions with the farmers showed that handling the seedlings of 8 to 12 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.

Farmers felt it is hard to transplant young seedlings at 2-leaf stage in multiple cropping systems. Traditionally older-age seedlings (about 7-leaf stage) are transplanted into fields very easily.

Farmers carry an impression that SRI method was delicate to handle, need extra care and was laborious.

Farmers carry a general belief that SRI comprised lot of weeding and de-weeding therefore expensive and labour-intensive.

The unreliable water supply system in major irrigation projects does not permit any irrigation calendar, hence, farmers of delta region habituated to store water as much as they can and flood the rice field. Even if they try to do so, the water management to suit SRI is difficult task that they feel.

Research bodies like TNAU are not recommending the SRI paddy cultivation in delta region stating reason that the water management is difficult task in those areas.

Water management practice in large irrigation projects is mostly plot-to-plot irrigation method that obviously does not provide creating drainage channels for alternate wetting and drying to suit SRI system.

Although, much was talked about SRI method, there was no visible evidence shown through demonstrations to make the farmers believe the technology in terms of more tillerings in plants and more yield.

Big farmers believe 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.

On the contrary, the mindset among the small and marginal farmers is that SRI method is too risky for these categories, and best suited for medium and big farmers as they could afford.

It is found that the crop promotion agencies in the region used to provide incentives to adopt different method of practices. This is normally internalized attitude of the farmers to anticipate support packages like free seeds, agricultural implements and crop assurance package even for SRI.

The availability of markers and weeders are the big factors that decide the pace of SRI paddy spread. In case of its non-availability farmers discontinue SRI and discourage new entrants.

The result of crop failure spread much faster than the success that because only few innovative farmers in village take initiative and others keeps watching for its failure only as they simply reject it due to their laggardness. More importantly, the crop failures of a couple of farmers were quoted by most of the farmers in the region. Further probing cleared that these farmers had not been given adequate technical training.

8. Recommendations

It is utmost important that the stakeholder whomsoever to train farmers intensively in such a way that the farmers get the confidence in handling/converting flooded situation to SRI situation.

Making awareness about SRI will not fetch anything, creating deep insight in mind is essential. Hence, SRI should necessarily be popularized through experiential and research mode of training for the entire crop season. The routine in-house trainings will not be sufficient.

In above context Following are the essential:

i) Farmer Field School is very apt approach that can provide experiential learning situation in sustained manner.

ii) Continuous technical monitoring and support is necessary to the SRI promotional areas at least for one crop season till farmers gain sufficient experience and confidence about the method.

iii) Interactive demonstration plots to show result, visible evidences and its workability and best practices should be created.

iv) **Comparative research trials at farmers** land should be facilitated decoding the research protocol in an adoptable farm to facilitate farmer to practice SRI and further innovate in similar direction.

v) **Establishing Satellite plots of SRI** with full-fledged info to trigger the interest and proactive action among farmers.

Categorizing the farmers (as per adopter categories into innovator, early adopter, late adopter, laggards) and keeping data base and in consonance taking up promotional activities to change their attitude is essential. It is not the farmer who adopt, it is their character and attitude that accepts or rejects any changes/innovation. Therefore, designing approaches to influence the characters/attitude of farmers is essential than simply adopting promotional activities.

It should be made clear to farmers that the SRI is mere changed approach in paddy crop eco-system which doesn't involve extra cost.

Farmers see the SRI as like the routine schemes promoted by DoA, expecting free inputs of seeds, fertilizers, pesticides than understanding its core philosophy, such scheme approach may not bring real knowledge development on SRI. Like any other scheme, knowingly or unknowingly the subsidy platform is utilized by DoA to popularize SRI that raise farmers' expectation level of subsidy than understanding the core principles. Therefore, input-oriented approach need to be avoided and the skill-oriented approached has to be adopted.

Multi Stakeholder Meets:

It is apparent that the knowledge and expertise available at various stakeholder level (is at varying degree) is insufficient (surprise is even agriculture specialists are lacking knowledge on SRI but involved in promotional activities as target) that needs to be improved through **Multi Stakeholder Meets** to bring commonality in understanding the mean and actual.

Networking of SRI farmers:

It would be highly effective if "**SRI Farmers workshop**" is organized exclusively for the SRI practicing farmers to know the ground situation towards **networking of SRI farmers**.

Pre Season, Mid Season and Post Season SRI Conferences would be a realistic pattern to be conducted location/area wise involving farmers to plan, promote and evaluate the SRI cultivation.

In terms of input requirement, non availability of **Markers** (*DoA supplies free of cost*) **and Weeders** are the factors that discourage farmers to go in for SRI, therefore such inputs should be ensured.

Formation of SRI stakeholder networks:

Creating SRI working groups, building/forging linkages with stakeholders with similar vision would bring in synergistic effect and within short span the highest reach and multiplied ripple effect can be accomplished. This may pave way for further research angles and innovations.

Lobbying with government to influence water drainage system-when SRI is meant for reducing the water requirement and save huge amount of water, it is meaningless to stop recommending in delta region. Hence, location specific **Water Drainage System** is very essential in Delta regions to popularize the system, instead of simply avoiding it coating untested reasons.

Documentation and Dissemination

Careful **documentation** is very essential and exploring the behavioral change of the crop, functional role of pest, pest and predator ratio and its occurrence in SRI field, consumption level of water resource and quantity of water saved and its utilization for other purpose, improvements attained in Crop Ecological Environment, soil microbial health status, biodiversity improvement due to the non-use of pesticide, fungicides and chemical fertilizers.

The **nutritional improvement** of the SRI paddy grains (already reports say considerable improvement in protein content), genetically potential etc. should also be analyzed and documented in coordination with research organizations.

Dissemination of such documents with various stakeholders especially sharing with the SRI Practicing farmers, for cross-learning and further strategizing research efforts is essential.

9. Suggested Strategies

Establishing training centers and sub-centers in the command area and be available to the farmers for clarifying doubts

Developing Farmer Expert Group of SRI in each village to ensure continued technical support to the practicing farmers in the village itself.

Conducting SRI Farmers Field School (FFS) to involve farmers to learn SRI in experiential learning mode and provide opportunity to do field research and innovate on their own.

Removing complex of delicacy in handling SRI seedlings and other practices through on-site experiential mode of facilitative training and demonstration.

Implementing SRI in large area (more than 2 acres) to show its workability in wider areas.

Helping small and marginal farmers to overcome the fear complex of risk

Utilizing Self-Help Groups, Farmer Interested Group (FIG), NABARD (National Bank for Agriculture and Rural Development) farmers club, farmers associations to upscale the SRI method of cultivation.

Giving top priority for Farmer- to- Farmers Technology Transfer and ensuring frequent conference or workshop at farmer level to interface their knowledge and exchange experiences towards further refinement and development.

Promoting manufacture of markers and weeders locally involving the farmer.

Farmer-participated location-specific research approach instead of just training/teaching.

Multi stakeholder meet, SRI Farmers workshop, network on SRI farmers, Pre-Mid-and Post season SRI conferences need to be considered.

Grass root level advocacy:

Organizing community level meeting to create SRI network farmers, SRI NGO network to create state level platform to interface experience and knowledge thereby pursuing the plan of action. Tamilnadu Regional SRI Consultation meet can be organized.

Lobbying and advocacy with Research domain:

The grass root level meeting outcome would pave the way for chalking out the area specific problems (such as delta and non-delta region) for research effort that needs to be in turn coordinated with research bodies of both Government and Premier organizations of Tamilnadu to find appropriate solutions to the locale specific problems. For example: the battery operated cono weeder is designed and produced by the TamilNadu Agrl. Engineering college, Kumulur, Trichy, the workability, suitability and simplicity of such machine not known

location wise, the same can be put in on- farm- trials various location to refine the technology. Here, the research stations of TNAU, KVKs (including private research organization like M.S.Swamynathan Research Foundation) at each districts can be very well be coordinated and persuaded towards SRI through Advocacy and Lobbying.

Lobbying and advocacy role with state Government:

Building up linkages with various SRI actors (like grass root level NGOs, community organizations, Farmers club, research organizations etc.) would create a sufficient visibility and strong relationship that could be utilized in playing major role in influencing the decision at government level fulfilling the SRI vision. For example, it needs a strong platform with government to influence for desirable decision in case of irrigation system in accordance with SRI system of cultivation. This can only be achieved through systematic lobbying with various departments (Department of Agriculture, University research stations, Extension wings, Public Work Department for irrigation control, private research organizations, Farmers networks etc.).

10. Conclusion

Linkages between the research and non-research actors are missing right now. Similarly, the link between non-research actors and policy makers as well to give more thrust towards SRI. The essential part is coordinated effort and forging linkages with development organizations who are having the similar vision.

There is in-sufficient two-way flow of information between farmers and researchers in the system currently which can hinder innovations and lead to rigidities.

There are also insufficient horizontal linkages between farmers and researchers across regions although immense possibilities of cross learning exist.

The response, receptivity level, proactive actions in Government concerns (of research and extension services) appears to be insufficient, there is crisis in expertise, perception level among officials on SRI technology differs widely; some (non-trained) opines that SRI as impossible and some (trained) favor it, hence the enhancement of expertise on SRI among various stakeholders is real challenge than taking it to the field.

Various practitioners in isolation adopt SRI approach without much opportunity for cross learning except the websites/e-connected interaction by the experts.

Hence, the need is concerted efforts towards 'SRI practitioners' meets' to harvest the repository of '-experiential'- knowledge from the practitioners.

SRI should not be misconstrued as technology and spread through schemes and support as any other technology is treated so far. Its core principles should be taught to the farmers in experiential mode. There is no other methodology except Farmer Field School (FFS) to teach farmer on farming system approach. Hence, SRI should be instrumental for all the actors to reach similar destination of 'potential yielding environment' for other crops too, which is possible if farming system approach is understood.

SRI could be one of the vital approaches needed to address several problems in irrigation projects like water conflicts, equity, water logging, salinity, tail-end deprivation and poor livelihoods at macro level and at farm and farmer level. It would play major role in saving the natural resources especially the water and improve the farm efficiently in production output thereby improving the livelihood status of farm families.

11. References

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10. The website of Association Tefy Saina, Antanarivo, Madagascar (www.tefysaina.org)
11. Cornell International Institute for Food, Agriculture and Development (CIIFAD) – (ciifad.cornell.edu/SRI)
12. *System of Rice Intensification in India* by WWF International-ICRISAT Dialogue project

Annexure

List of Places Visited:

1. Kudumbam, Odukkampatti village of Pudukottai district
2. World Vision, Mannarkudi Area Development Project.
3. KVKs of Tamilnadu met at their Action plan meeting at TNAU, Coimbatore.
4. BEST, Pudukottai
5. AME, Foundation Tiruchi
6. All India Radio, Tiruchi
7. Meeting with Farmers Interest Group (FIG), DoA, Perambalur
8. Farmer fields at Tanjore, Tiruchi, Salem and Pudukottai

Address for the purchase of battery operated weeder:

Battery operated weeder is designed and produced by TamilNadu Agriculture Engineering College. A weeder cost is Rs. 10,000/- and the address is as below:

The Dean
College of Agriculture Engineering
TNAU, Kumulur-621 712. Tiruchy. Ph: 0431-2541218