



Sri technology in different locations of Tamil Nadu: A case study

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Abstract

A case study on SRI technology in different locations of Tamil Nadu was carried out to assess the yield and economics of rice cultivation in comparison with conventional method of rice cultivation. The study revealed that system of rice intensification (SRI), was found to enhance the growth characters viz., plant height, leaf area, no of tillers and dry matter production as compared to conventional method of cultivation. The yield characters such as no of productive tillers/hill, panicle length, no of panicle/hill and panicle weight were also significantly higher than the conventional method of rice cultivation ultimately resulting higher grain yield, straw yield, gross income, net income and BCR under SRI. In addition to this there was considerable water saving (25-50%) under SRI technology as compared to conventional method of cultivation. The concept of SRI includes transplanting young seedlings, singly and widely spaced with soil kept well aerated. The major constraints of SRI was inundation due to monsoon and floods, improper maintenance of channels and main fields, lack of skilled labour for transplanting, non-availability of cono weeder and marker and insufficient training programmes.

Keywords: SRI, rice, cono weeder, yield and Tamil Nadu

Introduction

Rice is an important food crop, for more than 50 per cent of the people living in Asia, where 90 per cent of the worlds rice is grown and consumed. Asia's food security depends largely on the irrigated rice fields, which account for more than 75 per cent of the total rice production (Virak *et al.*, 2004) ^[12]. The increasing water scarcity, labour and increasing environment concerns, lack of integrated management practices, have given a wakeup call to develop and popularize innovative water saving technologies to produce more rice crop from every drop of water. There are few options such as zero tillage, direct seedling, aerobic rice and the System of Rice Intensification (SRI), which can help to save water and enhance yield with less input. The origin of SRI is Madagascar, during 1980's. Fr.Henry de laulanie rediscovered this novel small holdings oriented practice of SRI.

The components of SRI are

- less seed rate 7.5 kg ha⁻¹,
- raising mat nursery,
- young seedling (14-15 days old),
- single seedling transplanting per hill in wider spacing (25 x 25 cm),
- square pattern of transplanting
- mechanical weeding 4 times (10, 20, 30 and 40 DAT),
- limited irrigation and nutrient management through Leaf Colour Chart (LCC) were used for adoption.

SRI is a combination of plant, soil, water and nutrient management practices that are employed in SRI which enhances (1) robust root growth (2) corresponding increase in tillering (3) higher grain yield. (Ravindra babu, 2006)

Keeping these points in view a case study was carried out with the following objectives:

- To review the research work on SRI technology in Tamil Nadu.
- To assess the impact of SRI on the performance and yield of rice.
- To appraise the economics of SRI technology over conventional method of rice cultivation.

Review on SRI Technology practices

Growth characters

Sandra maria saju *et al.* (2019) ^[9] and Mohan kumar *et al.* (2020) studied the effect of high density planting on light interception, growth and yield of rice (*Oryza sativa* L.) under modified system of 11 rice intensification. The treatments comprised of T1-25× 25cm with 100% Recommended Dose of Fertilizer (RDF)(SRI), T2-25×

20cm with 100% RDF, T3-25× 15cm with 100% RDF, T4-25× 15cm with 125% RDF, T5-20× 20cm with 100% RDF, T6-20× 15cm with 100% RDF, T7-20× 15cm with 125% RDF and T8 Conventional cultivation with 100% RDF. The result revealed that plant height was higher in T4. The LAI was higher in conventional method of planting compared to all other treatments. Higher light interception was recorded with T5 over others but was statistically comparable with T6, T7 and T8, respectively. Grain yield was higher with T5, T4, T2 and T3 compared to other treatments.

Thavaprakash *et al.* (2020) aimed to study the effect of High density planting (HDP) on dry-matter partitioning and nutrient uptake of rice in TNAU, Coimbatore during late samba season (sep-jan) in 2018-2019. Eight treatments with different spacing (25 cm row spacing with 25 cm, 20 cm, and 15 cm intrarow spacing; and 20 cm row spacing with 20 cm, 15 cm, and 10 cm intra-row spacing) and fertilizer levels (100% and 125% Recommended Dose Fertilizer - RDF) were tested in randomized block design with 3 replications. This trial Results showed that higher dry-matter partitioning of leaf, culm, root and panicle were obtained under closer plant spacing of 20cm x 10 cm over other treatments while lower drymatter accumulation was recorded at wider crop geometry of 25cm x 25 cm. The nutrient uptake recorded at 25cm x 15 cm with 125% RDF was superior while the SRI method of planting (25cm x 25 cm) recorded lower nutrient uptake.

Yield characters

Gideon Too *et al.* (2020) [2] revealed that SRI provided an opportunity of yield improvements in rice production. This study was undertaken in Ahero Irrigation Scheme to compare yield production of conventional and SRI rice production for IR 2793-80-1 cultivar. The experiment was laid out in a randomized complete block design with three replications. SRI experiments recorded higher number of effective tillers with experiment having a spacing of 20cm by 20cm and transplanted at 8-11 days gave 321 per m² as compared to 226 effective tillers/m². Seed yield/plant was highly significant in SRI (39.61 g) as compared to a traditional paddy system (17.32). Transplanting at the age of 8 to 11 days and at 20cm by 20cm spacing recorded highest seed yield/ha of 4.7 t/ha as compared to traditional flooding which recorded 2.7 t/ha. These results imply that planting young rice seedlings improves grain yield because of increase in number of tillers per square meters, plant height and better plant rooting ability.

Yield

Kavitha *et al.* (2020) [4] demonstrated the Green manure - System of Rice Intensification (GM-SRI) in 10 ha farmer's fields of Theni district in Tamil Nadu during Sep 2018 – Feb 2019 under Tamil Nadu Irrigated Agriculture Modernization Project (TN-IAMP). Totally 21 demonstrations were carried out. In GM-SRI recorded higher yield 17%, number of productive tillers m⁻², length of panicle, numbers of grains panicle 29 % of water saving with an additional net profit of Rs. 53643 /ha than conventional method.

Water Use Efficiency

Pandian *et al.* (2014) revealed that water requirement was less under SRI (885 mm) as compared to conventional (1180 mm). WUE was 7.31 kg/ha/mm. The water productivity in SRI was found to be 1,398 litres/kg as against 2,274 litres/kg in conventional irrigation. Govinda rao *et al.* (2017) [3] conducted a study in farmer's fields in different mandals of Vishakapatnam district to check the performance of water saving method of rice cultivation and concluded that SRI consumed less water (977.0 mm) compared to farmers practice (1332.0 mm).

Weed management

Nandhini *et al.* (2019) [5] conducted the experiments on puddled and un-puddled field condition to evaluate different weed management practices for paddy under SRI. The results showed that puddled field was better at 10 day after transplanting (DAT), whereas un-puddled field was better than puddled field at 20 & 30 DAT. Therefore, the application of pre-emergence herbicide pretilachlor @ 1.5litres/ha on 3 DAT followed by cono-weeding @ 10, 20 & 30 DAT recorded lesser weed density, weed dry weight and higher weed control efficiency as well as lower weed index in puddled and un-puddled field.

Tavseef Mairaj Shah *et al.* (2021) [10] examined the effect of intercropping beans with rice under SRI management on the growth of weeds and on the different plant growth parameters. Intercropping led to a 65% decrease in weed infestation. In addition to the water saving of about 40% due to the SRI methodology, the innovation led to an increase in rice yield by 33% and an increase in the net income of farmers by 57% compared to the conventional rice farming method. The results indicate that intercropping can be a positive addition to the rice farming system, hence contributing to social-ecological sustainability.

Economics

Narayanamoorthy *et al.* (2019) [6] carried out the study at Pudukkottai district of TN. The data collected from a total of 300 sample farmer's (both SRI and non-SRI) from three different settings in Tamil Nadu. The study shows that SRI farmers are able to save 34% of water in canal irrigated setting, about 41 % in tank irrigated setting and about 45% in groundwater irrigated setting as compared to non-SRI farmers. Through saving of water, fertiliser and other inputs, about 23 per cent of reduction in the cost of cultivation were also realised by SRI farmers. Because of increased productivity and reduction in cost of cultivation, SRI farmers were able to

generate an additional profit of Rs.17,169/acre over the profit earned by farmers cultivating paddy under conventional inundation method.

Anbumani *et al.* (2020)^[1] conducted the On farm trial on the project of World Bank funded Irrigated Agriculture and Water Bodies and Management project in river basins to produce more yield with less input in Tamil Nadu. There were three treatments i.e. conventional method (20x10 cm), SRI method, machine planted (except planting with all components of SRI). Results showed that SRI method with all components performed superior over conventional and machine planting. Higher net income of Rs.64,630/ha and higher water productivity of 8.38kg/ha were obtained in SRI method with all components. Benefit cost ratio (BCR) ratio was higher in machine planted SRI.

Conclusion

System of Rice Intensification (SRI) is a promising and successful It technology in increasing the growth and yield as well as economics of rice cultivation as compared to conventional method. It has not yet become a major method of cultivation owing to existing institutional and behavioural factors. Some of the principal challenges are resistance to accept SRI, non-co-operation of planting labourer, inadequate land preparation and undulating land, lack of training and extension facilities, absence of precise water management, non-availability of essential tools. If we address these issues, SRI would be a successful technology to boost the rice yield and the income of farmer.

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