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SRI IS THE ANSWER FOR FOOD SECURITY & MITIGATION OF WATER IRRIGATION

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ABSTRACT

As opportunities to enhance the irrigation basefor raising food production in the country are dwindling,India needs a more concerted effort to increase the efficiencyand productivity of its irrigation systems. This study, basedon an analysis of experience from the state of Tamilnadu,addresses the potential of the System of Rice Intensification(SRI) to contribute to systemic corrections in presentpaddy cultivation, both with regard to agronomic productivityand irrigation water use efficiency. This study points tothe considerable increase in rice productivity and farmerincomes, which is being achieved in Tamil nadu withsubstantial reduction in irrigation water application, labor,and seed costs through utilization of SRI methods. Potentialpublic savings on water and power costs could be drawnupon not only for promoting SRI but also to effect systemiccorrections in the irrigation sector, to mutual advantage.

Keywords: *Irrigation efficiency, System of Rice Intensification, Water requirements , Bio fertilizers*

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INTRODUCTION

In SRI, rice plants are transplanted early, after just 8-12 days in an unflooded nursery, and they are Planted singly, rather than in clumps. Planting is a precision task, done in a square pattern with relatively wide spacing: 25-30 cm between plants. This increases the sunlight each receives and gives roots more room to grow. Fields are ideally kept damp rather than completely flooded, creating a more aerated environment, which promotes root development and diversity of soil organisms. This also allows more weed growth, but this problem is addressed by using conical weeders - rotating, spiky drums which are rolled between the rows of plants, burying the weeds and aerating the soil. Because SRI seedlings are planted in a square grid, weeding along and across the rows is possible, also giving better soil aeration. This regular weeding has boosted plant vigor, eliminating competition from weeds and encouraging the infiltration of moisture and nutrients into the root zone. With SRI, fertilization is done before planting, using compost or well-decomposed livestock manure spread on the fields prior to ploughing. Using crop residues, for example, may remove the need for chemical fertilizers completely. In addition, farmers report and researchers have verified that SRI crops are more resistant to most pests and diseases, and better able to tolerateadverse climatic influences such as drought, storms, hot spells or cold snaps. The length of thecrop cycle (time to maturity) is also reduced, with higher yields. Resistance to biotic and a biotic stresses will become more important in thecoming decades as farmers around the world have to cope with the effects of climate change and the growing frequency of "extreme weather events." The resistance of SRI rice plants to lodging caused by wind and/or rain, given their larger root systems and stronger stalks, can be quite dramatic. Research has also found that the best SRI results come from improved rice varieties. In general, SRI methods have shown to reduce the agronomic and economic risks that farmer's face.

MATERIALS AND METHODS

What is SRI:

SRI is a different method of cultivating Rice plant. 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 cm); 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).

Early Transplanting:

Seedlings 8-12 days old, when plant has only two small leaves, before fourthPhyllochron. More tillering potential when used in conjunction with other SRI practices and also more root growth potential in conjunction with tillering.

Careful Transplanting:

Remove plant from nursery with the seed, soil and roots carefully and Place it in the field without plunging too deep into soil. It minimize trauma in transplanting.

Wide Spacing:

This is important for better growth of roots and sunshade. We noted above the recommendation of one plant per hill established in a square pattern, starting out usually with 25x25 cm distances between rows and hills. If the soil is not very fertile, for the first year or two, farmers can get somewhat higher yield with two plants per hill and perhaps 20x20 cm spacing. But as SRI practices build up soil fertility, through root exudation and additions of organic matter to the soil, sparser planting will give higher productivity (per square meter as well as per plant). It is counterintuitive that reducing plant populations by as much as 80-90% can give higher yield, but this is the result, provided that the other SRI practices are also followed. The higher yield with reduce population results from the increase in panicle-bearing primary tillers per unit area, and also more spikelets and filled grains per panicle, as well as usually higher grain weight.

Nutrient Management:

For SRI, it is recommended to use compost or manure rather than chemical fertilizers, which are expensive and too little to enhance the biological life in the soil.Good organic fertilizer for the soil is crucial for thesuccess of SRI, to give good root growth. SRI was developed in the 1980s with fertilizer use, and this does enhance yield. But soil that is enriched with compost or manure will usually have better structure so that plant roots can grow more easily and deeply, and soil organic matter supports the growth ofmicrobial populations and greater biodiversity within the soil. Compost releases its nutrients more slowly than chemical fertilizer so plants usually get more benefit. Thecompost can be made from any biomass (e.g., rice straw, plant trimmings, weeds and other plant material), with some animal manure added if available. We think that SRI soil management practices (no flooding, the use of compost, and rotating-hoe weeding) help increase the populations of micro-organisms in the soil which can produce nitrogen for the plant. They can also assist with phosphorus solubilization. Also there is more oxygen in soil which has more worms, ants, termites, etc., which are less abundant in chemically fertilized soil.

Water management:

SRI needs less water than the conventional method but there must be an assured irrigation facility. Alternate wetting and drying (AWD) irrigation is one of the main recommendations of SRI. In the early stage of rice growth, it was recommended that the soil should be kept moist without stagnation of water on the field, and drying soil 3-4 times (up to the cracking stage) during the growing stage.After the transplantation of seedlings at shallow depth slightly in a slanting position in well-puddled soil, following a square pattern, moist soil condition was maintained for about 2 weeks in all the experimental plots except the control, which was flooded. Then, a cycle of alternate wetting (up to 2 cm water level) and drying (about to crack) was executed during the vegetative phase. Initially, the duration of wetting was kept about 2- 3 days more than that of drying, due to high summer heat. About 5-7 cm water levels were maintained during the entire reproductive phase and the water was removed about 20 days before the harvest.

Fig 1:*Few weeks after Transplanting (with intermittent irrigation on SRI Field)*

Weeding and Aeration:

Weeding and Aeration is needed because no standing water is there. Usesimple mechanical "rotating hoe" that churns up soil. 2 weedings required, but 4 weedingsrecommended before panicle initiation, first weeding is 10 days after transplanting. Due to reducedweed competition and aeration of soil, giving roots more oxygen and Nitrogen. Each additionalweeding after two rounds results in increased productivity up to 2 tons per hector per weeding.

RESULTS AND DISCUSSION

Root growth:

All the farmers observed that the root growth in SRI method was denser and healthier (more in size and white in color).

Number of panicles per hill:

While in majority of the SRI plots 36-60 tillers were observed per hill, number of productive tillers ranged from 21 to 35. In conventional rice plots the number of panicles per hill ranged from 10 to 20.

Number of grains per panicle:

On an average the number of grains per panicle in SRI method was 182.

Yield and Varietal Response:

Farmers adopting SRI method obtained yields ranging from 28 to 40 q/acre compared to 15 to 25 q/acre under conventional system. On all yield related parameters like number of tillers, number of panicles, seed weight and huffiness SRI farmers had advantage. The same response was seen across all the traditional and improved varieties.

Benefits for the Environment:

SRI methods are not only beneficial for people but also for the natural habitat and biodiversity. The most direct benefit is through reductions in water requirements. Rice is the ‘thirstiest’ crop in the world, requiring several thousand liters of water to produce 1 kg of rice when using conventional rice-growing methods with continuous flooding.

CONCLUSION

Overall results of growth and yield parameters suggest that rice plants under SRI methods grow vigorously, producing more tillers and stronger root systems, resulting in more grain production compared to conventional methods of rice cultivation. Agronomy is the science of life, and life is autonomous. In rice cultivation, rice is the true master of the game, and the rice planter is its knight or in other words, its disciple. The environment is understandably important as this is shaped by the way that soil, fertilizer and nutrition treatments are managed. What is essential is the way that the rice itself is enabled to utilize its environment**.**

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REFERENCES

Moser C.M. and Barrett C.B., The Disappointing Adoption Dynamics of a Yield Increasing, Low External Input Technology: The Case of SRI in Madagascar; *Agricultural Systems*, pp.1085-1100,2003.

Rekha and Nai S.N and Prasad R., Pesticideresidue in organic and conventional foodriskanalysis. *Journal of chemical health and safety* .pp.12-19. 2006.

SatyanarayanaA., System of Rice Intensification – An innovative method toproducemore with less water and inputs", Paper presented in the session on SRIat 4th Annual IWMI TATA Partners Meet on 'Bracing up for the future', Anand Institute for Rural Management, PP.24–26,2005.

Sharma P.D. and Mohan Singh., Problemsand prospects of Organic farming;*Bulletin of the Indian Society of Soil Science*PP.14-41.(2004)

Thakur and UphoffN. and Antony E., An assessment of physiological effects of System of Rice Intensification (SRI) practices compared with recommended rice cultivation practices in India;*J. Exper.Agri*,PP. 77-98. 2009.

Uphoff N.T.,Update on the System of Rice Intensification SRI unpublishedCornellUniversity memorandum, 2004.

Vijayakumar M and Sundarsingh S.D and PrabhakaranN.K and ThiyagarajanT.M;Effect of'SRI'Practices on the yield attributes yield and water productivity of rice (Oryza Sativa L)", *Acta Agronomica Hungarica*, pp.399-408,2004.