International Journal of Agricultural Sciences
Volume 12 | Issue 2 | June, 2016 | 234-237 ■ e ISSN-0976-5670
☞DOI:10.15740/HAS/IJAS/12.2/234-237
Visit us : *www.researchjournal.co.in*

RESEARCH PAPER

Study on the impact of the system of rice intensification in less water endowed areas of Tamil Nadu

V. MANIVANNAN*, K.R. JAHANMOHAN[1], B.J. PANDIAN AND C. HARISUDHAN[2]
Tamil Nadu Agricultural University, COIMBATORE (T.N.) INDIA
(Email : manivannangingee@gmail.com)

Abstract : System of rice intensification (SRI) is a novel method of rice cultivation based on a set of simple synergistic practices. They aim to change the management of rice plants and soil, water and nutrients that supports them in simple but specific ways. Success of SRI depends on strict adoption of its five major components *viz*., young seedlings with mat nursery, single seedling planting, square planting, alternate wetting and drying of irrigation management and mechanical weeder usage. Among the five components, raising young seedling in the mat nursery, planting single seedling and square planting are the most important components that paves the way for increasing the yield of rice crop in irrigated rice systems. Proponents of SRI have reported that the average rice yield with SRI can be doubled from the current average yield level and there exists potential to the tune of increasing the yield level by three to four times. An attempt was made to evaluate the impact of adoption of SRI practices on rice yields, its economics in rice cultivation and labour inputs based on field research conducted in Varahanadhi Sub Basin, Villupuram and Tiruvannamalai districts, Tamil Nadu State, India. Rice yields with SRI were higher than those under conventional paddy cultivation by 34.35 per cent and net returns were higher by 33.24 per cent. SRI adoption enabled farmers consistently to enhance rice yields, increase returns and save labour cost and enhance productivity with respect to the key inputs in terms of rice output per unit of seed, water and fertilizer. SRI promises to be a significant alternative not only for raising rice yields, but also for managing rice based farming in wet lands ecosystem.

Key Words : System of rice intensification (SRI), Rice yield, Tamil Nadu

View Point Article : Manivannan, V., Jahanmohan, K.R., Pandian, B.J. and Harisudhan, C. (2016). Study on the impact of the system of rice intensification in less water endowed areas of Tamil Nadu, India. *Internat. J. agric. Sci.*, **12** (2) : 234-237, **DOI:10.15740/HAS/IJAS/12.2/234-237.**

Article History : Received : 25.01.2016**; Revised :** 18.02.2016**; Accepted :** 21.04.2016

INTRODUCTION

Rice feeds more than half the world's population. More than 400 million people, however, endure chronic hunger in rice producing areas of Asia, Africa and South America. According to the United Nations the demand for rice increases with population which is expected to rise by a further 38 per cent within 30 years, (Satyanarayana, 2005). Rice cultivation requires large amounts of water and due to growing scarcity of water in many arid and semi-arid regions farmers are shifting to cultivation of less water-demanding crops (Thiyagarajan, 2001). Declining profitability owing to

*** Author for correspondence:**
[1]State Planning Commission, CHENNAI (T.N.) INDIA
[2]Regional Research Station, Virudhachalam, CUDDALORE (T.N.) INDIA

increasing input costs on one hand and declining prices of produce *viz*., rice is also forcing to farmers' withdrawal from paddy cultivation, and thus, jeopardizing future rice supply (Thiyagarajan, 2001). There is a need to make rice cultivation more efficient in terms of returns on farmer investments and use of water resources thereby making the rice cultivation a profitable venture.

SRI has generated considerable discussion with respect to its potentiality to enhance the yield levels. An attempt was made to estimate the yield potentials of SRI method in a general farmers' field through the adoption of key components, through a systematic field study. The objectives of the study were to assess the impact of SRI adoption on: cultivation practices, the output of paddy and straw and economics of paddy cultivation.

MATERIAL AND METHODS

SRI consists of a set of management practices that were mainly developed through participatory on farm experiments. The management practices include (i) Transplanting young seedlings, 15 days old during 2nd or 3rd phyllochrons (ii) Widely spaced transplanting (25 cm × 25 cm) with one seedling per hill (iii) Integrated nutrient management practices (iv) Intermittent irrigation (alternate wetting and drying) (v) Mechanical weed control starting 10 days after transplanting and continuing until the canopy closes. Proponents of SRI have reported that the average rice yield with SRI has doubled the current average yield and yield level could be increased by three to four times. Data on grain yield and benefit cost ratio from 563 farmers from 65 villages in the Varahanadhi Sub Basin with 9 blocks of Villupuram and Tiruvannamalai districts of Tamil Nadu, contemporaneously practicing both SRI and the conventional method of rice cultivation in 2009-2010 revealed promising results. Labour charges and other inputs were collected throughout the crop cycle, starting from land preparation to final output. Observations were recorded for farming operations like land preparation, seed, seed treatment, sowing, transplanting, weeding, irrigation, agro chemicals application, harvesting and post harvest operations in the SRI and non-SRI farms. For every farmer, information was collected at a fortnightly interval. Observations on grain and straw yield were recorded over the study area for both SRI and conventional methods to evaluate the impact of adoption of SRI practices on rice yield and to work out the economics of rice cultivation based on field research.

RESULTS AND DISCUSSION

All the farmers adopted the requirements of SRI *viz.*, early transplantation, single seedling per hill and wide spacing of seedlings. Most farmers have adopted the management practices in water, fertilizer, hoeing and weeding. More attention was given on drainage channel preparations, which is crucial to facilitate alternate wetting and drying. Rice yields with SRI were higher than those under conventional paddy cultivation by 34.35 per cent and benefit cost ratio was higher by 33.24 per cent. The percentage in yield increase ranged from 23.53 to 51.14 across the selected blocks (Table 1). Evidence from the field suggested that SRI is economically attractive and the productivity of land, capital and labour has increased significantly Senthilkumar *et al*. (2008) and Yasuhiro Tsujimoto *et al.* (2009) also reported similar results. Similarly, the percentage increase in the benefit cost ratio ranged from 23.44 per cent to 48.59 per cent with an average increase of 33.24 per cent (Table 2).

Table 1 : Production of rice grain and straw yield (kg ha^{-1}) on SRI and conventional fields in Varahanadhi Sub Basin, Tamil Nadu

Name of the district	Name of the block	Grain yield (kg ha^{-1}) (n=563)		Per cent yield increase	Straw yield (kg ha^{-1}) (n=563)	
		Conventional	SRI		Conventional	SRI
Villupuram	Vikravandi	5206	6765	30.81	6000	8223
Villupuram	Gingee	4949	6774	38.82	6120	8092
Villupuram	Koliyanur	5151	6724	31.91	6020	8286
Villupuram	Vallam	4916	6700	38.09	5795	8700
Villupuram	Kandamangalam	5688	7388	29.89	6322	9204
Villupuram	Melmalaiyanur	5072	6690	33.32	6249	8029
Villupuram	Vannur	5492	7233	31.68	6584	9106
Thiruvannamalai	Thellar	5556	6858	23.53	6389	8619
Thiruvannamalai	Peranamallur	4610	6850	51.14	5375	8532
	Average	5182	6887	34.35	6095	8532

Table 2 : Economics of SRI and conventional fields in Varahanadhi Sub Basin, Tamil Nadu

Name of the district	Name of the block	BCR		Per cent BCR increase
		Conventional (n=563)	SRI (n=563)	
Villupuram	Vikravandi	2.37	3.07	29.95
Villupuram	Gingee	2.25	3.08	36.87
Villupuram	Koliyanur	2.34	3.06	30.53
Villupuram	Vallam	2.23	3.05	36.30
Villupuram	Kandamangalam	2.59	3.36	29.89
Villupuram	Melmalaiyanur	2.31	3.04	31.92
Villupuram	Vannur	2.50	3.29	31.71
Thiruvannamalai	Thellar	2.53	3.12	23.44
Thiruvannamalai	Peranamallur	2.10	3.11	48.59
	Average	2.36	3.13	33.24

Hence, SRI promises to be a significant alternative not only for raising rice yields, but also for managing rice based farming in wetland ecosystems.

Acknowledgement :

The authors are thankful to TN-IAMWARM project which provided excellent platform for spread of SRI in Tamil Nadu.

REFERENCES

Chopra, N.K. and Chopra, N. (2000). Effect of row spacing and nitrogen level on growth, yield and seed quality of scented rice (*Oryza sativa*) under transplanted conditions. *Indian J. Agron.*, **45**(2) : 304-308.

Koshta, L.D., Sachidanad, B., Raghu, J.S. and Upadhyaya, V.B. (1987). Effect of seedling age and soil submergemce on the performance of paddy. *Oryza*, **24** : 226-230.

Makarim, A.K., Balasubramanian, V., Zaini, Z., Syamsiah, I., Diratmadja, I.G.P.A., Handoko, Arafah, Wardana, I.P. and Gani, A. (2002). System of rice intensification (SRI): evaluation of seedling age and selected components in Indonesia. Water-wise rice production. Proceedings of the International Workshop on Water-wise Rice Production, 8-11 April 2002, Los Baños, Philippines. Los Baños (Philippines): International Rice Research Institute, 129p.

Namara, R.E., Weligamage, P. and Barker, R. (2003). *Prospects for adopting system of rice intensification in Sri Lanka*: A socio-economic assessment. Research Report 75. International Water Management Institute, Colombo, SRI LANKA.

Nayak, B.C., Dalei, B.B. and Choudhury, B.K. (2003). Response of hybrid rice to dates of planting, spacing and seedling rate during wet season. *Indian J. Agron.*, **48**(3) : 172-174.

Paddalia, C.R. (1981). Effect of age of seedling on the growth and yield of transplanted rice. *Oryza*, **18** : 165-167.

Ramasamy, S. and Babu, R. (1997). Effect of plant density, number of seedlings and nitrogen on the productivity of aged rice seedlings. *Oryza*, **34** : 310-313.

Samal, P. and Pandey, S. (2005). Climatic risks, rice production losses and risk coping strategies: A case study of a rainfed Village in Coastal Orissa. *Agril. Econ. Res. Rev.*, **18** : 61-72.

Satyanarayana, A. (2005). System of rice intensification-an innovative method to produce more with less water and inputs. In: Paper Presented in Fourth IWMI-Tata Annual Partners' Meet, IRMA, Anand, India, February 24-26.

Senthilkumar, K., Bindraban, P.S., Thiyagarajan, T.M. de Ridder, N. and Giller, K.E. (2008). Modified rice cultivation in Tamil Nadu, India: Yield gains and farmers' (lack of) acceptance. *Agril. Syst.*, **98** : 82-94.

Stoop, W.A., Uphoff, N. and Kassam, A. (2002). A review of agricultural research issues raised by the system of rice intensification (SRI) from Madagascar: opportunities for improving farming systems for resource-poor farmers. *Agric. Syst.* **71** : 249-274.

Thiyagarajan, T.M., Senthilkumar, K., Bindraban, P.S., Hengsdijk, H. and Ramasamy, S. (2002). Crop management options for increasing water productivity in rice. *J. Agric. Res. Mgmt.*, **1** : 169-181.

Uphoff, N. (2001). Scientific issues raised by the system of rice intensification: A less-water rice cultivation system. Proceedings of an International Workshop on Water-Saving Rice Production Systems, April 2-4, Nanjing University, China, pp: 69-82.

Uphoff, N. (2002). System of rice intensification (SRI) for enhancing the productivity of land, labour and water. *J. Agric. Res. Mgmt.*, **1** : 43-49.

Uphoff, N. and Randriamiharisoa, R. (2002). Reducing water

use in irrigated rice production with the Madagascar System of Rice Intensification. In: Bouman, B.A.M., Hengsdijk, H., Hardy, B., Bindraban, P.S., Tuong, T.P., Ladha, J.K. (Eds.), Water-Wise Rice Production. IRRI, Los Banos, Philippines, pp. 71–87.

Yasuhiro Tsujimoto, Takeshi Horie, Hamon Randriamihary, Tatsuhiko Shiraiwa and Koki Hommaa (2009). Soil management: The key factors for higher productivity in the fields utilizing the system of rice intensification (SRI) in the central highland of Madagascar. *Agril. Sys.*, **100** : 61-71.

WEBLOGRAPHY

Thiyagarajan, T.M. (2001). Saving water in lowland rice cultivation while improving profitability: Transition in rice cultivation, *http://www.waterforfood.nl/docs/ Water_less_ rice/TNAU_Policy_Brief.pdf.*