SYSTEM OF RICE INTENSIFICATION IN HYBRID RICE – A REVIEW

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ABSTRACT

The lower average rice yield in India and Tamil Nadu can be attributed to poor soil fertility, improper spacing and nursery management. Intensive research has been initiated to solve the problems related to soil fertility and crop management through coordinated networks of research all over the country. This review is focused to evaluate the response of hybrid rice under System of Rice Intensification (SRI) cultivation method. Relevant literature on this subject is reviewed under various headings in this paper.

Key words: Rice, Hybrid, Fertility, System of Rice intensification.

Rice is a staple food crop of India, providing 43 per cent of calorie requirement for more than 70 per cent of Indian population. The area under rice in India (44 million ha) is the largest among all the rice growing countries, with an annual production of around 89 million tonnes. To meet the demands of increasing population and maintain the self-sufficiency, the present production level needs to be increased to 120 million tonnes by 2020. This increase in production has to be achieved in the backdrop of declining and deteriorating resource base such as land, water, labour and other inputs and without adversely affecting the quality of environment (Viraktamath et al., 2006).

India is the second largest country after China to deploy hybrid rice technology on a commercial scale. Rice hybrids yield about 20-25 per cent more than the promising high yielding commercial varieties (Meena et al., 2002). According to preliminary estimates, approximately 1.0 million ha rice area has been planted with hybrids during 2006, which is likely to add an additional 1.0-1.5 million tonnes of rice to our food basket (Viraktamath et al., 2006). However the productivity of rice is low in India (3,000 kg ha⁻¹) when compared to the world average of 4,004 kg ha⁻¹ and leading rice growing countries like China (6,289 kg ha⁻¹) (FAO, 2006). In Tamil Nadu the rice production was 3.22 million tonnes from an area of 1.40 million hectares with productivity of 2,308 kg ha⁻¹ during 2003-04 (GOTN, 2006).

The major constraints in rice production are lack of integrated management practices involving land, labour, crop, water and inputs such as seeds, fertilizers, optimum plant population etc., Therefore, a new method of rice cultivation must be tried aiming at higher crop productivity. System of Rice Intensification (SRI) is a new approach, now gaining popularity as it is found to increase the productivity and reduce the cost of cultivation.

System of Rice Intensification (SRI)

Origin and History : The SRI originated in Madagascar and it was first synthesized in 1983 by Fr. Henri de Laulanine, a French Jesuit Priest. The six major components of SRI are use of young seedlings at two leaf stage (8-15 days old), planting one seedling per hill, wider spacing, and a minimum of three mechanical weedings after transplanting, intermittent wetting and drying for soil aeration.
during the vegetative stage and addition of organic matter (Makarim et al., 1994).

The SRI is a system rather than a technology because it is not a set of practices. SRI involves a number of specific techniques that are to be tested and adapted according to local conditions, not simply adopted with the good use of these practices. The method is usually possible to increase rice yields by 50 to 100 per cent and yield increase of 200 to 300 per cent have been achieved where the level of production was low (Norman Uphoff, 2002). Until 1999, there was little knowledge and no use of the SRI outside the Madagascar, where it was developed in 1983. Four years after, the SRI trials were conducted first in China at Nanjing Agricultural University and then in Indonesia by its Agency for Agricultural Research and Development and in India. (Satyanarayana et al., 2004).

Performance of Hybrid Rice under SRI: Hybrids possess a more vigorous and extensive root system and increased growth rate during vegetative period (Yamauchi, 1994). Hybrid rice cultivation is the most practical solution to increase production and to meet the growing demand (Subramanian and Sundaresan, 2000). Rice hybrids have a mean yield advantage of 10-15 per cent over varieties (Yang et al., 1999; Hari Om et al., 2000). Hybrids were developed and being commercially used in China since 1976. At present in India, 1, 20,000 ha is under hybrid rice (Subramanian and Sundaresan, 2000) and a scope for further increase in future.

Qingquan (2002) reported that rice hybrid was found to have the highest yield potential when grown in SRI method, due to profuse tillering capacity, lodging resistance, greater stress resistance, enormous yield potential and wide ecological adaptability. Norman Uphoff (2004) stated that high yielding varieties or hybrids produced more than 15 t ha⁻¹, while traditional varieties produced 6-12 t ha⁻¹ with SRI methods in Madagascar.

Effect of SRI practices on growth attributes

The SRI practice facilitated larger individual plants and resulted in better light distribution, taller plants, higher base internodes, weight bearing ability, larger total area and higher plant dry weight than conventional method. The yellow sheath in the base of the stem appeared later with SRI. This indicated that leaf senescence was delayed under SRI (Long Xing and Shaokai, 2002).

Barison (2002) optioned that appearance of more nodal roots for every newly formed tiller, as well as more developed root system which was the combined effect of better soil aeration provided by different water management practices and by transplanting of young seedlings.

Effect of SRI practices on pest and disease incidence

Zhu et al. (2004) found that the practice of intermittent irrigation in SRI reduced the humidity in the canopy which reduced the disease especially sheath blight by 70 per cent. Narasimha Reddy et al. (2006) reported that incidence of early stage insects' viz., thrips, whorl maggot was moderate, and their damage did not have any influence on tiller production in SRI. The stem borer incidence was less (10.4 per cent) as compared to that in normal planting (33.6 per cent) at 85 DAT in Rajendra Variety.

Effect of SRI practices on yield attributes

Balasubramanian and Devaraj (2004) recorded higher grain yields of 7.3 t ha⁻¹ and 8.4 t ha⁻¹ during kharif and rabi, respectively under SRI, when compared to conventional method of cultivation at Aduthurai, Tamil Nadu. This was mainly because of more number of productive tillers in SRI (545 and 488 m⁻² in kharif and rabi respectively).

Reports of Vijayakumar et al. (2004) indicated that grain yield and water productivity were significantly increased in the package of planting of
14 days old dapog seedlings at 25 cm × 25 cm spacing. Water saving and cono weeding helped to achieve the grain yield of 7 t ha⁻¹ with water saving at 34.6 and 34.9 per cent, respectively, during wet and dry seasons at Coimbatore, Tamil Nadu. Narasimha Reddy et al. (2006) observed better performance of rice hybrid KRH-2 and variety RNR-23064 cultivated under SRI method and reported that their grain yield of 8.9 and 8.5 t ha⁻¹, respectively, as compared to normal cultivation (6.8 and 6.4 t ha⁻¹).

**Economics of SRI techniques**

Bruno Andrianarivo (2002) obtained a positive impact on farmers’ income from diversified cropping with SRI through development of rotational cropping system. There was no significant difference in cost of cultivation between SRI and non-SRI but significant difference was obtained in terms of net returns between SRI (Rs.27, 923 ha⁻¹) and non-SRI (Rs.9222 ha⁻¹) in Andhra Pradesh during wet season. A net benefit of Rs.18, 700 ha⁻¹ was obtained in SRI (Rajagopalan and Krishnarajan 1987).

From the above cited literature, it may be concluded that the influence of modified mat nursery management, seedling age, crop geometry (planting pattern) practices on growth and yield of rice was highly significant. Research work on the combined effect of different components of SRI is scarce. The practices of SRI were found to vary according to the local conditions.

**REFERENCES**


