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System of Rice Intensification (SRI): Present Status and Future Prospects

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Abstract

The System of Rice Intensification (SRI) has emerged as a transformative agricultural innovation aimed at enhancing rice productivity while conserving water, reducing input costs and promoting environmental sustainability. Developed in Madagascar during the 1980s, SRI is based on principles such as early transplanting, wider spacing, intermittent irrigation and active soil aeration. This article explores the scientific basis, agronomic practices, advantages and challenges associated with SRI, with a focus on its applicability in India and other rice-growing regions. With growing concerns over resource depletion and climate change, SRI offers a viable alternative to conventional rice farming, ensuring food security and resilience for smallholder farmers.

Keywords: **System of Rice Intensification (SRI), Sustainable Agriculture, Rice Productivity, Water Conservation, Agronomic Innovation, Climate Resilience etc.**

Introduction

Rice (Oryza sativa L.) is among the most significant cereal crops belonging to the Poaceae family. It is a dietary staple for over 60% of the world's population, followed by wheat. Asia produces and consumes around 90% of the world's rice. Rice is a submerged crop that consumes the most water and irrigation. To produce 1 kg of rice grain, the crop uses 3000–5000 liters of water. In Asia, more than half of the developed freshwater resources are used for

irrigation and about half of it is used for rice production (**Dawe *et al.*, 1998**). Rapid depletion of water resources threatens the sustainability of irrigated rice and consequently, the food security and livelihoods of rice producers and consumers (**Tuong *et al.*, 2004).** There is strong evidence that water scarcity has arisen in rice-growing areas, where rice farmers need technologies to tackle water scarcity (**Tuong and Bouman, 2002**). One of the most promising technologies that save water and the environment in rice cultivation is the System of Rice Intensification (SRI), developed in the 1980s by French priest Father Henri de Laulanié in Madagascar.

SRI Practices

- Step 1: Nursery preparation using available input methods. Pre-soak seeds in water for 24 hours. Sow in a well-drained, garden-like nursery. Line sowing of seeds helps faster germination.
- Step 2: Transplant seedlings at 2-3 leaf stage. Carefully remove with soil and transport without drying.
- Step 3: Transplant single seedlings at shallow depth (2-3 cm) in a slanting position, 25x25 cm apart, into well-puddled and leveled fields.
- Step 4: Keep the field moist without flooding for 12–14 days post-transplanting. Follow alternate wetting and drying till flowering.
- Step 5: Maintain wetting and drying cycles to encourage root growth. Post-flowering, maintain water depth of 3–5 cm.
- Step 6: Conduct first weeding at 12–14 days using a rotary weeder. Repeat every 2 weeks until canopy closure.
- Step 7: Use FYM or compost to improve soil fertility, biodiversity and reduce environmental impact.
- Step 8: Plants are ready for harvesting after 110–120 days.

Advantages of SRI

- Increased Yields: Yield increases of 20–50% due to enhanced tillering and panicle size (**Uphoff *et al.*, 2018**).
- Water Use Efficiency: Reduces water use by up to 40% via intermittent irrigation (**Prasad *et al.*, 2021**).
- Reduced Input Costs: Lower seed, chemical and water use leads to higher profits.
- Environmental Benefits: Less methane emission, improved biodiversity and organic inputs enhance sustainability.
- Farmer Empowerment and Resilience: Improves knowledge, decision-making and climate resilience among farmers.

Challenges in Adoption

- Knowledge and Skill Requirements: Requires training and motivation.
- Labor Intensity: Single seedling transplantation and mechanical weeding need more labor.
- Resistance to Change: Traditional beliefs and skepticism hinder adoption.
- Initial Yield Variability: Inconsistent early results may discourage farmers.

Role of Extension Services and Policy Support

Agricultural extension services are pivotal in SRI dissemination through farmer training, demonstration plots and field schools. In India, programs like the National Food Security Mission (NFSM) and Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) provide labor and input support (**Ministry of Agriculture, 2023**). Collaborations with the International Rice Research Institute (IRRI) and the Food and Agriculture Organization (FAO) further amplify SRI's reach, offering technical expertise and funding.

Conclusion

The System of Rice Intensification is a holistic and eco-friendly approach to rice farming

that conserves resources and enhances productivity. Its alignment with sustainable agriculture goals makes it vital for food security. With continued research, extension support and policy backing, SRI can transform rice farming for millions of smallholders.

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