SUNSHINE AGRICULTURE
e-Newsletter

ISSN (E): 2583 – 0821

Sun. Agri.:e- Newsletter, (2024) *4*(11), 4-6

Article ID: 343

System of Rice Intensification (SRI): A Sustainable Approach for Enhancing Rice Productivity and Environmental Health

Jatin Badwal[1], Sonakshi[2] and Ishwar Singh[1]

[1]Department of Agriculture, Maharishi Markandeshwar (Deemed to be University) Mullana, Ambala-133207, Haryana

[2]Department of Plant Pathology, CCS Haryana Agricultural University, Hisar- 125004

Open Access

Available online at
http://sunshineagriculture.vitalbiotech.org/

Article History
Received: 10. 11.2024
Revised: 17. 11.2024
Accepted: 21. 11.2024

INTRODUCTION

The rapid global population growth coupled with shrinking agricultural land has created an urgent need for enhanced food crop production. To address this, farmers are increasingly relying on chemical fertilizers, intensive irrigation, and pesticides, which adversely impact soil quality and productivity. Consequently, rice cultivation is becoming less attractive to resource-poor farmers due to its declining profitability from rising input costs. An alternative method that minimizes input expenses, enhances soil health, and protects the environment is essential. The System of Rice Intensification (SRI) emerges as a promising solution for rice growers.

What is SRI?

The System of Rice Intensification (SRI) originated in Madagascar and was conceptualized in 1983 by Fr. Henri de Laulanie, a French Jesuit priest. SRI is a set of management techniques designed to improve productivity by optimizing the use of land, labor, and capital. As a sustainable agricultural model, SRI minimizes inputs, conserves water, enhances soil structure, and boosts yields. It emphasizes precise transplanting of young seedlings at wider intervals, promoting robust root development and vigorous tillering.

Features of Enhanced Productivity

Reduced Seed Rate:

The seed requirement under SRI is minimal, with a recommended rate of 5kg per hectare. This reduces seed costs and ensures the use of high-quality foundation seeds. The method also supports a higher seed replacement ratio.

Transplanting Young Seedlings:

Seedlings are transplanted at the two-leaf stage (10-12 days old), retaining their intact endosperm. This minimizes transplant shock and accelerates establishment. The uninterrupted tiller production leads to increased yields.

Single Seedlings Planted with Wider Spacing:

A single seedling is planted at 25cm x 25cm spacing, allowing for better access to sunlight, air, and nutrients. This fosters robust root systems, profuse tillering, longer panicles, and higher grain yields with better grain weight.

Field Saturation Maintenance:

Unlike conventional methods that rely on standing water, SRI employs intermittent irrigation to maintain soil saturation. This aerates the rhizosphere, extending root functionality and enhancing nutrient uptake, leading to healthier root systems.

Weed Management via Mechanical Weeding:

Weeding is conducted mechanically, incorporating weeds into the soil as organic matter. This improves soil aeration, promotes root growth, and increases yields.

Use of Organic Manure:

Organic manures improve the physical, chemical, and biological properties of soil. Increased microbial activity facilitates nutrient mineralization and enzymatic activity, resulting in healthier crops and higher yields.

SRI Practices

Site Selection:

SRI thrives in leveled lands with good water control and fertile soils. Saline soils are unsuitable as they require flooding, which SRI does not allow. In saline conditions, drying soil can lead to harmful salt accumulation.

Nutritional Management:

SRI prioritizes natural growth environments supported by organic manures over chemical fertilizers. Organic matter enhances microbial activity, providing readily available nutrients. Farmyard manure (FYM), green manure crops, vermicompost, and biofertilizers are commonly used. A combination of organic and 50% of the recommended chemical fertilizers can ensure yields in less fertile soils.

Nursery Preparation:

Seedlings are raised on well-prepared, raised nursery beds near the main field. Beds are covered with powdered FYM for easy root penetration and separation. Pre-soaked, sprouted seeds are sparsely sown and covered lightly with FYM or soil. Seedlings are watered carefully and become transplant-ready in 10-12 days.

Main Field Preparation:

The field is dry plowed, puddled, and leveled. Beds and channels are prepared for effective water drainage and management. Seedlings are transplanted with tools or markers to ensure a consistent 25cm x 25cm spacing.

Transplanting:

Carefully uprooted young seedlings (10-12 days old) are transplanted individually, minimizing stress. Their roots are positioned in an "L" shape, promoting quick establishment and healthy growth. Immediate gap filling ensures uniform plant distribution.

Weed Management:

Frequent mechanical weeding (every 10-12 days) is essential in SRI due to increased weed growth under non-flooded conditions. Weeds are turned into the soil as organic matter, enhancing aeration and promoting microbial activity. Chemical herbicides are avoided.

Water Management:

Water is applied intermittently to keep the soil moist, avoiding standing water. Aerobic conditions support deeper and healthier root growth, benefiting microbial activity. From the panicle initiation stage to maturity, one inch of water is maintained, which is drained after 70% of grains have hardened.

Pest Management:

Wider plant spacing and organic nutrition foster healthier plants with natural resistance to pests and diseases. Organic solutions like "Amrit Pani" are used to control pests while providing essential nutrients.

Harvesting:

Grain maturity occurs even as plants remain green. Harvesting is typically advanced by 7-10 days compared to traditional methods, ensuring timely and efficient crop collection.

Benefits of SRI

- Water savings of 25-50%
- Reduced seed and production costs

- Healthier plants with stronger tillers and larger root systems
- Lower pest and disease incidence
- Enhanced environmental sustainability

Challenges

Despite its advantages, SRI faces challenges such as limited water control, difficulty in transplanting young seedlings, increased weed growth, seedling mortality, and insufficient availability of organic manures.

Opportunities

The potential of SRI can be harnessed for programs like seed production, aromatic rice cultivation, organic farming, and small-scale rice production.

CONCLUSION

Traditional flooded rice cultivation has reached a plateau, contributing to soil degradation and environmental harm. Given rice's central role in regions like Orissa, an alternative like SRI offers a sustainable pathway. While SRI is still evolving, collaboration among scientists, extension workers, and farmers will refine it further, enhancing productivity and ensuring sustainability.

REFERENCES

Adhikari, P., D. Sen and N. Uphoff (2010). System of Rice Intensification as a resource conserving methodology: Contributing to food security in an era of climate change. SATSA Mukhapatra, Annual Technical Issue, Vol. 14. State Agricultural Technologists Service Association, Kolkata, West Bengal.

Jagannath, P. et al. (2013). Meta-analysis evaluating water use, water saving, and water productivity in irrigated production of rice with SRI vs. standard management methods; Taiwan Water Conservancy, **61**:14-49.

Mahender Kumar, R. et al. (2007). System of Rice Intensification (SRI): A Water-Saving and Productivity-Enhancing Strategy in Irrigated Rice. Directorate of Rice Research, Indian Council for Agricultural Research, Hyderabad, India.

Mishra, A., M. Whitten, J. W. Ketelaar and V. M. Salokhe (2006). The System of Rice Intensification (SRI): A challenge for science and an opportunity for farmer empowerment toward sustainable agriculture. *International Journal of Agricultural Sustainability*, **4**, 193-212.

Shambu Prasad, C., K. Beumer and D. Mohanty (2007). Towards a Learning Alliance: SRI in Orissa. Xavier Institute of Management, Bhubaneswar and WWF-ICRISAT Dialogue Project, Hyderabad, India.

Sinha, S.K. and J. Talati (2007). Productivity impacts of the System of Rice Intensification (SRI): A case study in West Bengal, India. *Agricultural Water Management*, **87**, 55 60.