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System of rice intensification (SRI)

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Water is an important natural resource which is becoming scarcer because of population pressure and inefficiency of the developed water infrastructures. Rice cultivation consumes 70% of water available for Agriculture hence economizing water use in rice production has become important. The System of Rice Intensification offers much scope in that direction. The System of Rice Intensification is an alternative to the existing practices where field are kept wet and not flooded with water. This system seems to be promising to overcome the shortage of water in irrigated rice. The practices of SRI are helpful in improving soil quality and soil biodiversity. It appears to be an environment friendly approach of rice cultivation

History of SRI : SRI methodology for growing rice, was developed by a French priest, Fr. Henri de Laulanie, S.J. in the early 1980 in Madagascar, after 20 years of working with farmers to assess and learn from their rice-growing practices. With SRI methods farmers in Madagascar-where rice yields average about 2 tons/ha even with irrigation-have been able to get yields averaging around 8 tons/ha, with top yields in the 15 to 20 tons/ha range, above what has usually been considered to be the biological maximum

What is SRI ? : The System of Rice Intensification is a methodology for increasing the productivity of irrigated rice by changing the management of plant, soil, water and nutrients. This methodology which is based on agro-ecological principles with good scientific foundation is of interest because of its potential to achieve higher yield of lower cost of production along with saving of water.

Priciples of SRI :

– Rice is not an aquatic plant. Although rice can survive when growing under flooded (hypoxic) conditions, it does not really thrive in such a soil environment. Under continuous submergence, most of the rice plant's roots remain in the top 6-10 cm of soil and most degenerate by start of the plant's reproduction phase.

– Rice seedlings lose much of their growth potential if they are transplanted more than about 15 days after they have emerged in their nursery. Their potential for greater tillering and root growth can be preserved by early transplanting in conjunction with the other SRI practices.

– During transplanting, avoid trauma to seedlings and especially to their roots. Stresses such as drying out seedling roots, will delay the resumption of plant growth after transplanting and reduce subsequent tillering, root development and grain filling. If germination is high enough, direct seeding can be used with SRI practices instead of transplanting as direct seedling can avoid root trauma entirely. Wider spacing of plants will lead to greater root growth and associated tillering, provided that other favourable conditions for growth, such as soil aeration are provided.

– Soil aeration and organic matter create beneficial conditions for plant root growth and for consequent plant vigor and heath. These results from having a greater abundance and diversity of microbial life in the soil, helping plants resist pest and disease damage. Increased root exudation enhance soil biotic populations

Useful features of SRI: The CAU evaluation of SRI in a Sichuan village found that SRI reduced water requirements by 45.8% with increased yield.

The TNAU evaluation of SRI in Tamiraparani delta of India found that SRI reduced water requirement by 40-50%.

From the data in the IWMI evaluation of SRI in Sri Lanka, it can be calculated that the hours of irrigation were reduced by 21%. Given higher SRI yields, water productivity (kg of rice produced per irrigation hour) increased by 90% with SRI.

SRI is more resistance to other biotic and abiotic stresses besides drought thereby reduces farmers' risk : A cold spell in Andhra Pradesh in February 2004 had no effect on SRI plots, while it had an adverse impact on conventionally-grown rice.

Farmers in many countries report that their SRI crops are more resistant to pests and diseases, perhaps because of the more robust root systems. The CNRRI calculated that in its Zhejiang trials, SRI methods reduced the incidence of sheath blight, the main disease affecting rice in that province, by 70%.

Table 1 : The main differences in cultural measures between SRI and TRC

Practice	SRI	TRC
Seedling age (days)	8-12	25-35
Seedling/hill (no.)	1	5-6
Plant spacing (cm)	25×25 - 50×50	16.7×20 - 20×26.7
Weeding (no.)	4	3
Types of fertilizer	Organic source	Organic and chemical fertilizer
Irrigation pattern	Discontinuous irrigation (unflooded)	continuous irrigation (flooded)

Researcher at TNAU have documented significant decrease in rice pests, both in nurseries and in the field: cutworm, thrips, green leaf hopper, brown plant hopper, whorl maggot and gall midge.

SRI Works with Hybrid Varieties and HYVs: Because SRI reduces seed requirements by 80-90%, it can reduce the higher costs of production when adopting hybrids or HYVs which have more expensive seed. SRI not only gives higher yield from these seeds but very few seeds are needed to plant the crop.

SRI work as diversification : Many rice farmers consider SRI to be an important means for diversifying their rice-based farming system. As soon as they can harvest higher yield from their small plot, farmer can convert some of their rice field to grow other upland crops or dig a pond and canal to produce fish.

Advantages of SRI:

– *Higher Milling Outturn:*

SRI paddy gives less chaff (fewer unfilled grain) and there is less shattering (fewer broken grain)

SRI paddy gives 16% more milled rice as compared to conventional grown rice.

– SRI reduces seed requirement by 80-90%
– SRI reduces the costs of production
  Organic Agriculture
  Save water
  Labour
– SRI plant matures quickly:

SRI paddy matures 7-10 days earlier than the conventionally grown rice.

SRI improve environment quality and human health: Reduced use of agrochemical should enhance the health of cultivators and will also by diminishing chemical residue on rice.

In SRI application of nitrogen fertilizer can be reduced, this should enhance ground water quality by diminishing nitrate concentration.

– **Limitations**
  Root feeding nematodes
  Depletion of soil nutrients

Conclusion and future perspectives: SRI shows that there is huge biological potential in rice plant that remains to be tapped.

This potential can be effective exploited if knowledge to improve plant, water, soil, nutrient and pest management is shared with farmers. Better management captures synergies between root and tiller growth, which in turn lead to greater grain filling.

SRI is not just a way to maximize rice yield, but also as a way to diversify the rice based farming system in the rainfed low land. This is essential for the improvement of nutrition, income and landscape diversity.

By getting much higher yield from small unit of land, SRI can enhance food security, drought resistance is of special relevance to poor farmers, who usually are more vulnerable to this catastrophe.

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