SRI: A Corrective Method of Rice Production

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The System of Rice Intensification, popularly known as SRI was developed in Madagascar by a Jesuit priest, Father Henri de Laulanie, twenty years ago while working with the rice farmers. Since its first trial outside of Madagascar in 1999-2000, it has been slowly receiving attention of the rice farmers, researchers and policy makers alike and gaining acceptance and popularity in the farming community in view of the associated benefits viz., saving seed, water, cost, increased soil health and grain yields vis-à-vis traditional method of rice cultivation. Presently SRI is adopted in 28 countries including Bhutan (http://ciifad.cornell.edu/sri/countries) and many countries are expected to join the SRI network.

SRI is a new and promising resource saving method of growing rice under irrigated and rain-fed conditions. Studies in a number of countries have shown significant increase in rice yield, with substantial savings of seeds (80%), water (25-50%) and cost (10-20%) compared to conventional methods. SRI is not a technology, but a set of simple ideas or principles drawn as a corrective measure to the conventional method. The ideas are:

1. **Transplant young seedlings**: In SRI method, 8-12 days old or 2 to 3 leaf stage seedling depending on available growing environment, are transplanted to preserve and protect plants' growth potential (Fig.1). Direct seeding is also becoming an option. But in the conventional method, seedlings are transplanted when they are 45 days or more reducing the plant's ability to produce tillers, which in determines the quality of the grain.

2. **Transplant carefully**: This involves avoiding trauma to the roots by removing young seedlings with a trowel, unlike the transplanting-shock of uprooting, transporting and transplanting associated with conventional method that reduce the potential growth of rice plants. It also involves ensuring the seed sac is attached to the root of the seedling's initial source of nutrition, transplanting immediately after uprooting, shallow transplanting (2-3 cm deep) with minimum downward push. This is because if seedlings are transplanted with great downward thrust, the roots are abnormally positioned, requiring longer time to reposition. This results in delayed tillering.

3. **Plant single a seedling with wider spacing**: Plant one plant per hill with wide spacing (>20x20cm) in square pattern, unlike in conventional method that is random and close. This not only saves the amount of seeds required, but also reduces the competition for nutrients, water and sunlight. Further, when rice plants are set out singly, far from each other, with good soil conditions, their roots will have plenty of space to spread out resulting in large number of tillers (as high as 100) achieving the border effects throughout the field. Wider spacing also exposes plants to more sunlight, air and nutrients leading to greater plant growth. It also facilitates easier weeding. After transplanting (Fig.2), SRI Fields usually appear terrible for a month or so.

   Planting seedlings with precise spacing can be one of the difficult aspects of SRI at the beginning. But simple methods such as string with measured knots or bamboo sticks with paints can be used (Fig.2).

4. **Water management**: Rice is not the aquatic plant according to SRI. It does not encourage soil saturation with water as the conventional method does. At the most, SRI recommends to keep paddy soil moist in the beginning (at least for 2 weeks after transplantation) followed by alternate wetting and drying until the flowering stage. The former allows seedlings from dry soils to acclimatize slowly to the watery environment without

Fig1: Transplanting 3 leaf stage seedling

Fig2: SRI field after two weeks of transplanting

Fig3: Tillering

Fig4: Large number of tillers from a hill

getting its root suffer from hypoxia conditions. The alternate wetting and drying process allows the roots to grow deeper, enabling to reach for water, air and nutrients.

5. **Actively aerate the soil**: Aerate the soil as much as possible because this too enhances recycling of nutrients. A rotary weeder or cono weeder is recommended for better effects.

6. **Soil organic matter fertilization**: Fertilizer is beneficial with SRI practices, but it does little for soil structure or enhancing the diversity of soil organisms to better enlist their benefits.

While practice stages 1-3 stimulate plant growth, 4-6 enhance the growth and health of roots, and soil biota resulting in better and bigger phenotype, yield and productivity as well. Apart from all these benefits, higher grain quality, high pest and disease resistance, absence of lodging, drought tolerance and reduced grain maturity time by 1-2 weeks are also the positive aspects of SRI. The techniques of SRI, although name implies for rice only, can also be used for other crops such as finger millet, sugarcane and wheat.

Unlike Green Revolution, SRI is often hard to be accepted because it does not depend on either of the two main strategies: change in genotype and increase use of external inputs. However, global agriculture is now at the crossroads. In the face of declining resource bases (land, water and labour), deteriorating soil health, increasing environmental concerns and increasing cost of cultivation, the Green Revolution may or is already losing its momentum. SRI on the other hand, might mitigate and could overcome such concerns that rice sector needs in 21st century. Although, there is nothing magical about SRI it produces "More with Less" inputs. Moreover, SRI being an emerging set of ideas offers us a lot of research opportunities in the future.

Brief Biography

Karma Lhendup joined the Faculty of Agriculture at the end of April 2007. Before joining CNR, Karma taught at Sherubtse College in the Department of Chemistry for almost 3 years until his inter college transfer. He has a Master Degree in Soil and Crop Sciences, from Cornell University in New York, USA.