
SRI
System of Rice Intensification
A New Approach to Raise Production of Rice

Essence of SRI

Rice yields for any variety can be at least doubled, and often yields can be increased by considerably more than this, if the plants are grown with SRI methods. When these develop a large root system in well-aerated, healthy soil, the plants produce many more tillers, more of which will become fertile, and these fertile tillers each produce many more grains

What is SRI ?

SRI considered as a set of practices and a set of principles rather than as a "technology package."

SRI is not a technology like the seed of high-yielding varieties or like a chemical fertilizer or insecticide.

It is a system for managing plants, soil, water or nutrient together in mutually beneficial ways, creating synergies.

With SRI, management practices control or modify the environment so that existing genetic potentials can be more fully expressed and realized

Philosophy Behind SRI

Rice plants are to be treated carefully -- as *living creatures* that have much potential to grow, to protect themselves, and to produce abundant grain, if their growing conditions are the best possible.

Origin of SRI

In 1961, a Jesuit priest named Fr. Henri de Laulanie came to Madagascar and worked with and learned from Malagasy farmers

In 1980, the priest established a small agricultural school, and in l983, experimented with transplanting very young plants, just 15 days old, instead of more common 30 to 60 days old because of draught conditions. The resulting rice plants were much bigger and more productive

The father and students tested early transplanting again with good results, and they tried transplanting even younger seedlings, becoming persuaded that this was a good practice. From this experimentation was crystallized the *System of Rice Intensification (SRI).*

Conventional Thinking in Rice Cultivation

Planting large, mature seedlings seems like it should reduce the risk of mortality after transplanting.

If several seedlings are planted together, at least some of these should survive.

Planting more plants seems like it should give more yield.

Maintaining standing water on the field seems to guarantee plant survival, and it does suppress weeds.

SRI Changes Four Practices

Modifying conventional management of plants, soil, water and nutrients for rice production

Instead of planting fairly mature, robust seedlings, 3-4 weeks old or older, with SRI one plants very young seedlings, just 8-12 days old, when the plant has put out just two small leaves and the root is very simple, with the seed still attached.

Instead of planting seedlings in clumps of 3-4 plants, and sometimes more, one plants single seedlings.

Instead of planting seedlings fairly densely, seedlings are widely spaced and put out in a square pattern.

Instead of keeping rice fields flooded throughout the growing season, with SRI, fields are kept moist but not flooded during the vegetative growth phase.

SRI Practices

Transplant young seedlings that are 8, 10, or 12 days old, less than 15 days.

Transplant carefully and gently, getting plants from the nursery and into the field quickly.

Plant seedlings far apart -- 25x25 cm, even up to 50 cm apart.

Plant single seedlings, rather than clumps of several seedlings

Keep the rice field well-drained, never flooded, up to the time of flowering, and after that the field should have just a thin layer of water on it, just 1-2 cm.

Weed field at least twice by hand or better with a rotary hoe.

Add compost to the field, or manure, to give it more organic matter.

Transplanting Techniques for SRI

Young seedlings are removed very carefully from the nursery, lifting them out with a trowel keeping the seed still attached with root

Seedlings are transplanted quickly to the field and kept moist

Seedlings are transplanted within 15-30 minutes, so that the roots don't become desiccated

Seedlings are not plunged down *vertically* into soil to avoid the root tip becoming inverted; the seedling is slipped sideways into soil very gently and close to the surface, so the root lies *horizontally* in the moist soil. This makes the shape of the transplanted seedling more like an L rather than J.

Why the Vastly Greater Tillering with SRI

Normal rice plants will have 5-10 tillers, maybe up to 15 or 20 under best management, but within SRI the average tillers can be 30 to 50 per plant, and with best management, up to 70 or even 100 per plant.

SRI capitalizes upon an in-built pattern of physiological development in the rice plant which puts out tillers in a regular sequential pattern which is analyzed in terms of *phyllochrons.* A phyllochron is a recurrent period of plant growth (for all grass family plants) during which time the plant puts out from its meristem one or more phytomers, i.e., units of a tiller, a root and a leaf. For maximum tillering, the plant has to complete as many phyllochrons of growth as possible during the vegetative phase.

Each tiller produces another tiller two phyllochrons later, provided that the growing conditions are conducive. This makes the tiller growth curve potentially exponential.

When the plant is transplanted carefully at the initial growth stage, trauma is minimized and the result is rapid growth with short phyllochron. When seedlings are transplanted at 3 or 4 weeks of age, their "biological clock" is slowed, and plants' phyllochrons are longer, resulting in less growth before flowering.

If the plants are transplanted later than the 3rd phyllochron (having more than just 2 tiny initial leaves), they will lose much of their potential for tillering.

Closely spaced plants, in soil that is too dry or too wet and nutritionally deficient will have longer phyllochrons.

Seedlings transplanted in well-aerated, healthy soil develop larger root systems, and the plants develop many more fertile tillers with more grains per panicle.

Yield Advantage from SRI

With SRI methods, rice yields *of any variety* can be at least doubled one the practices are mastered and used well, and often yields can be increased by considerably more than this

Yields around the capital Antananarivo were increased from 3.2 to 6.3 t/ha and from 3.9 to 8.0 t/ha around Antsirabe (1995-96).

Yields of irrigated rice using traditional methods are about 2 t/ha. while with SRI over a five-year period the average was over 8 t/ha around Ranomafana National Park.

Farmers using HYVs and "optimum" fertilizer applications reached 6.2 t/ha in Northern Madagascar and Andapa, while 27 farmers in the area who used SRI got 10.2 t/ha (SOAMA).

Yields were 4.8 t/ha with “modern” practices in Northwestern Madagascar at Marovoay, while farmers who used SRI got 7.1 t/ha (FIFABE)

Constraints of SRI

Water control is very important, keeping the soil moist but not saturated during the growth phase, and a thin layer of water on the field during the reproductive period.

Seedling to be transplanted as an L shape rather than a J shape.

Rice seedlings to be transplanted very quickly.

Weeding is more critical and takes more time, but pays off.

More labor is required, 50-100% to begin, but less once the techniques have been mastered.

Field surface should be flat as much as possible to permit more precise application of minimum amounts of water.

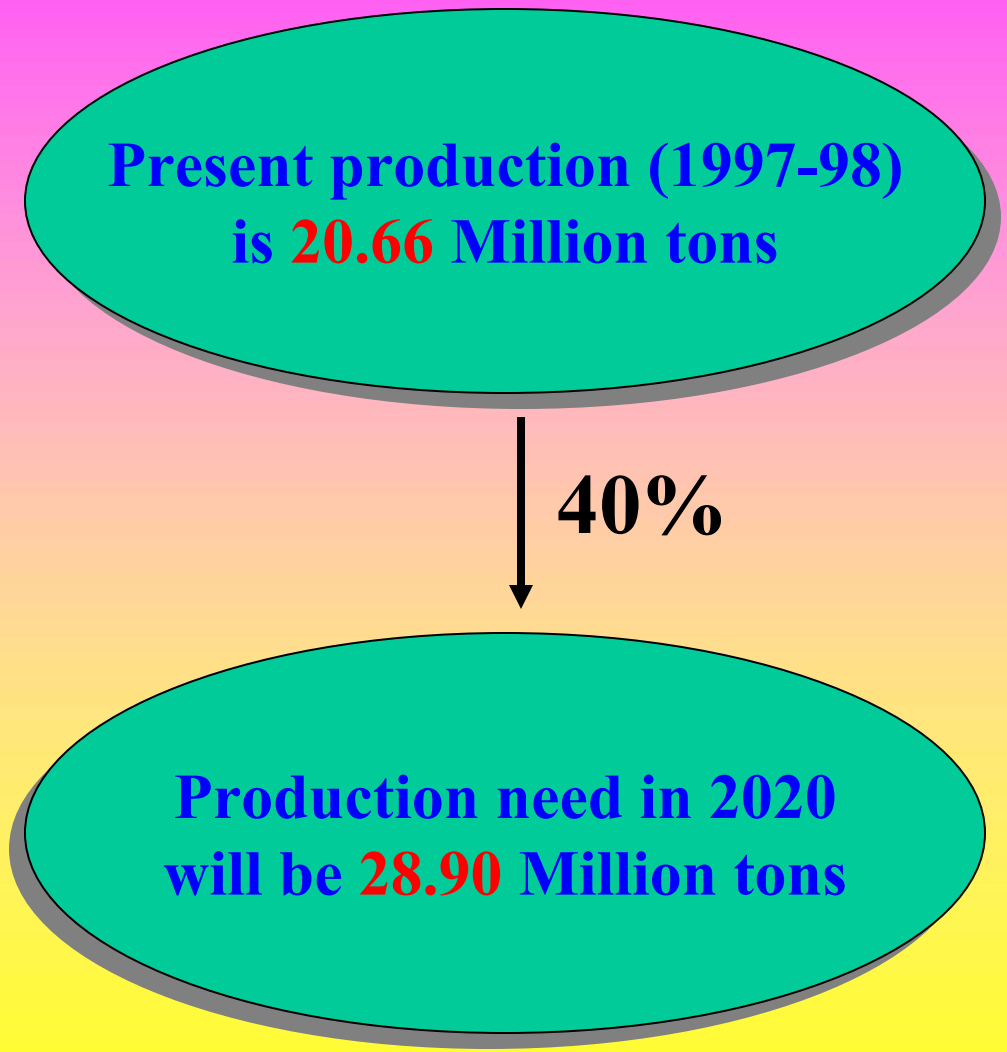
Challenges for Sustaining Food Self-Sufficiency

Rice will be under pressure from the non-rice sector in the future, to release land for non-agricultural uses and to use less water.

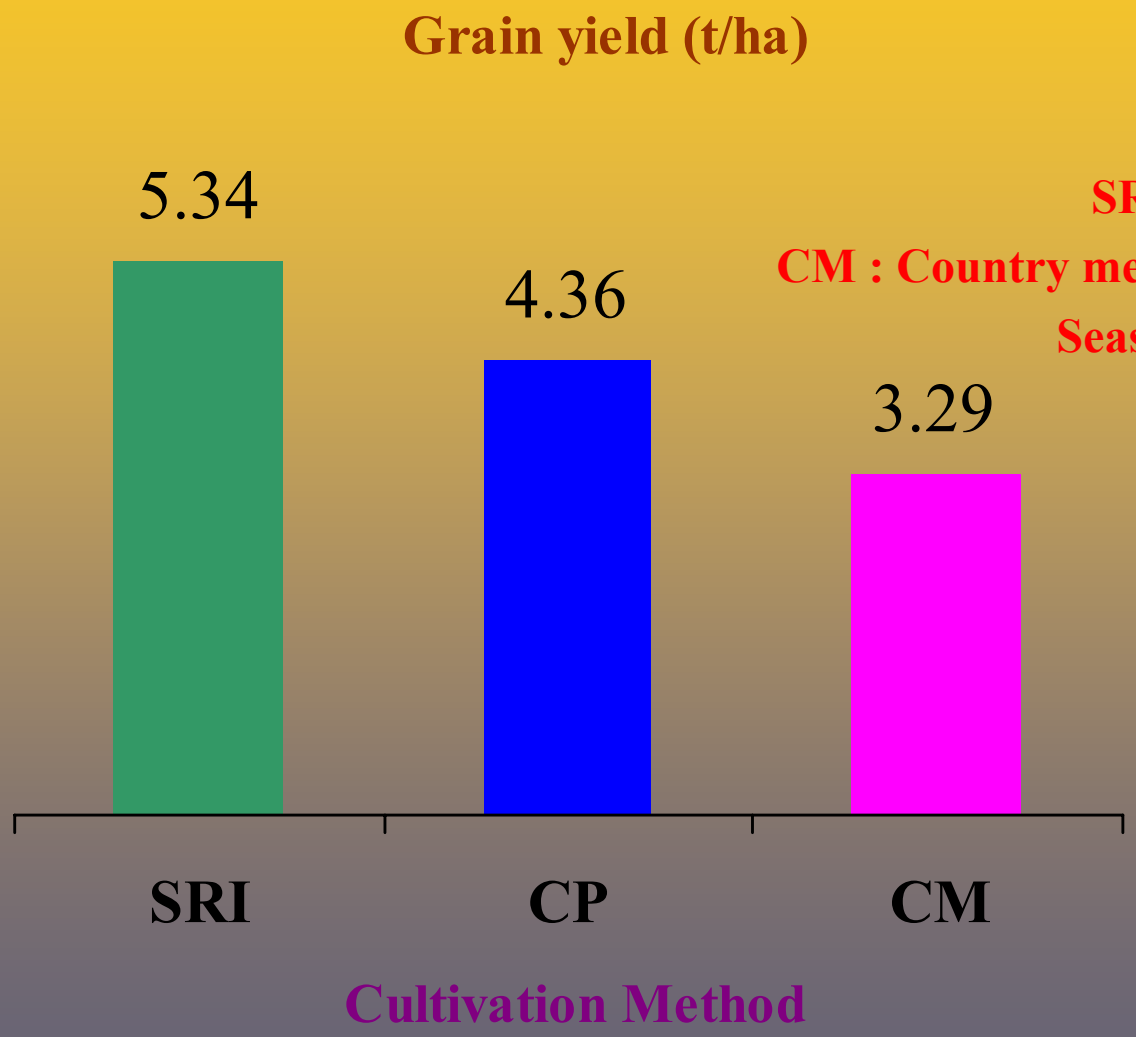
The potential to raise yield further by substituting local varieties with the modern varieties is exhausted

The yield level of HYVs appears to be on a plateau.

Production Scenario



SRI in Bangladesh



Variety : BR26

Seedling age : 10 days

CP : Conventional practice

SRI: System of Rice Intensification

CM : Country mean, (BRRI, Annual report, 1993)

Season : AUS, 2000, BRRI, Comilla

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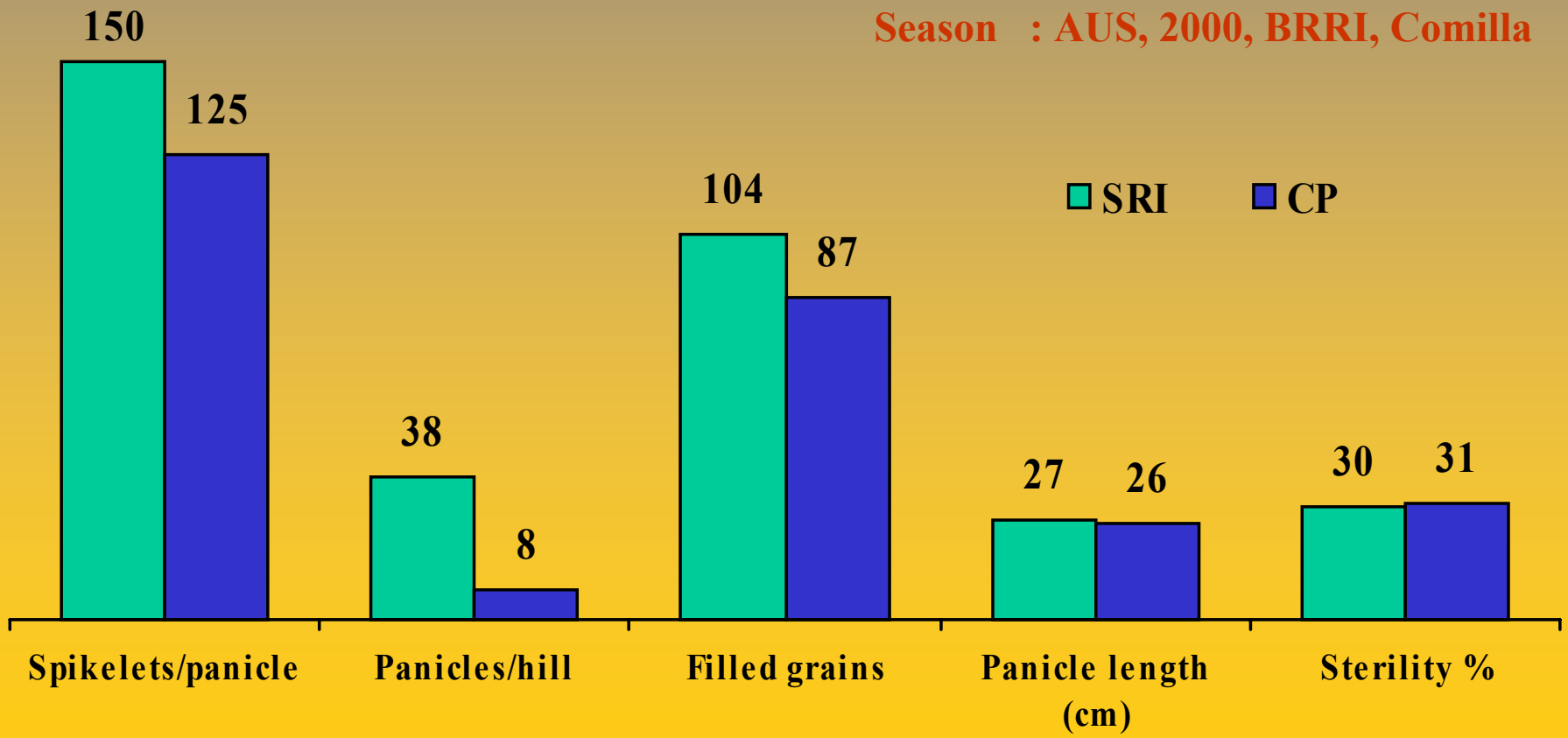

Possible Areas of SRI Intervention in B'desh

Seed production, especially for the newly released varieties and initial seed stock, is very limited. Lower seed requirement is an advantage.

Yield of local improved fine, aromatic varieties could be increased by SRI, giving good returns to farmers.

New practices need to be suitable for BPH prone area.

This could reduce the cost of seed, especially for hybrid rice.

Medium to high land area under aus and T. aman could be appropriate for SRI method due to minimum water requirement in SRI method.

Conclusion

Systematic evaluation should be done to assess the productivity and sustainability of SRI in Bangladesh environment.

SRI is not the solution to the problems of all farmers – its contribution may be most for giving researchers and farmers new insights regarding principles for increasing rice production.

Water Control in SRI


SRI Plot
Variety - BR26
Aus, 2000
BRRI, Comilla


SRI Field
Variety –BR26


Panicle in a single hill of SRI
Variety –BR26


Thanks to all