# Factors responsible for higher yields in SRI

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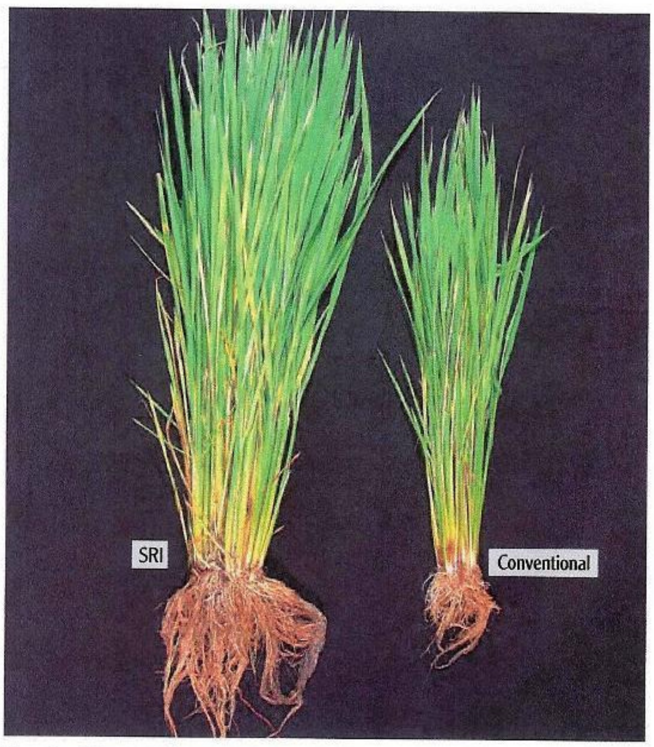
**Just by using the basic practices of SRI - starting with young seedlings; giving them wider spacing within and between hills; growing them in well-aerated soil; and with rich organic matter - it is possible to achieve at least 25-30 percent increase in yield when compared to the conventional agriculture, despite using significantly less seed, less water and even less chemical fertilizers. Bigger root mass and improved soil biological and microbiological activities were hypothesized as important factors responsible for higher yield with SRI management. Hence, the on-going SRI project (funded by WWF) is aimed to study the chemical, biological and microbiological properties of the soils of SRI and conventional method of rice cultivation.**

On-station experiments were conducted during the 2008 rainy season *(Kharif)* as well as 2008-09 post-rainy season *(Rabi)* at B1 field within the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) campus in collaboration with the Directorate of Rice Research (DRR), Hyderabad, India. Two treatments were evaluated, SRI and control (conventional methods), having three replications for each treatment.



The number of tillers are much higher in the SRI treatments when compared to control with conventional practices.

For the two seasons (*Kharif* 2008 and *Rabi* 2008-09), respectively, the nursery (variety *Krishna Hamsa*) was prepared on 28th June and 28th November 2008. The transplanting was performed on 8th and 23rd July 2008 for SRI (11d old) and control (25d old), respectively, for *Kharif*. For *Rabi* the transplanting was undertaken on10th for SRI (12d old) and 24th October 2008 for control (25d old). Soil samples (top 30cm layer of soil) were collected at vegetative growth stage (about 60 days from transplanting) and at harvesting, being then processed for soil chemical, biological and microbiological properties. Morphological observations of the rice crop were also made during the season and also at the time of harvesting.

Water productivity was found to be higher in the SRI treatments when compared to control and this was true in both the *Kharif* and *Rabi* seasons (Figure 1). With SRI, 45 percent less water was used when compared to the control in *Rabi*, whereas in the *Kharif* season it was reduced to 61 percent. The number of tillers (plant-1) was found to be much higher in the SRI treatments when compared to control with conventional practices. This was true in both seasons (34 vs. 20). However, tillers per unit area was found to be lower in SRI.

Plant height, number of panicles, grain weight and 1000-grain weight were also found to be greater in SRI when compared to the control treatments. Root length density and root dry weight was recorded as higher in the SRI treatments when compared to controls and these results were true for both seasons.

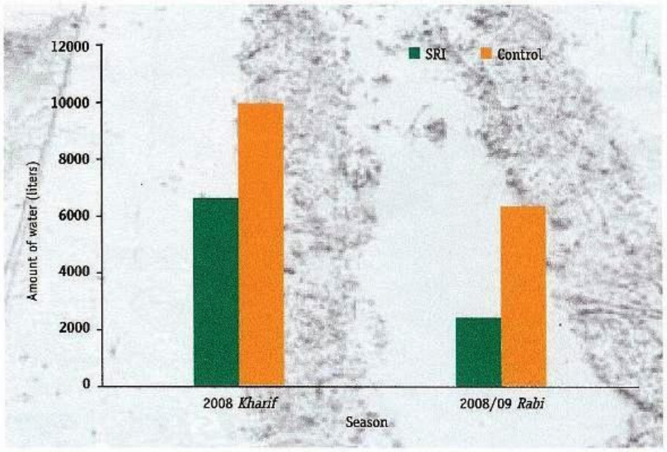
Microbial biomass carbon (MBC) was found to be much higher in the SRI treatments when compared to the control treatments

– an increase of 17 and 21 percent for the organic and inorganic plots of SRI, respectively. As expected, the dehydrogenase activity (microbial metabolic activity) was found to be lower in SRI when compared to control, which was true for both seasons, as under a nutrient-limited system, microbial activity will be less compared to balanced fertilization.

In the top 0-15cm soil profile, available P and total N were found to be greater in both seasons in SRI as compared to control, by 10-15 and 5 percent, respectively and this was true at both vegetative as well as harvesting stages. Not much difference was observed in any of the microbial counts studied (including total bacteria, fungi, actinomycetes, siderophore producers, fluorescent Pseudomonas, P-solubilizers and N2 fixers) in either season.

One reason for little difference could be that a few years are needed to build up the population of agriculturally-beneficial microorganisms in the soil when a field is converted to SRI practice from conventional farming, which has been dependent on inorganic inputs; this period is often referred to as the transition period. After a period of time (maybe after a few years), with reliance on organic fertilization, a clear-cut difference in the microbial populations between treatments might be seen. Also, the general problem confronts enumeration of microorganisms from soil samples in the available culturing methods can detect and identify usually less than 10 percent of the total microorganisms present in the soil. Hence, molecular estimation techniques should be considered for use in the future.

**Figure 1: Amount of water required for raising per kg seed (water productivity) during *Kharif* 2008 and *Rabi* 2008-09 season**




From the above observations and results, it can be concluded that significant water can be saved, between 40 and 50 percent, if the SRI method of rice cultivation is followed. Hence it can be the best-bet protocol for growing rice under rainfed but irrigated conditions or in lower-rainfall seasons when the wells and bore wells fail to recharge the underground water. Also, it can be concluded that big root mass and soil biological and microbiological activities play an important role in SRI compared to conventional method of rice cultivation. However, further studies, observations and repetitions of the above experiments should be done in order to confirm and refine these observations.


Root length density and root dry weight are recorded as higher in the SRI treatments when compared to controls.

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