**Report on System of Rice Intensification (SRI) Trials
at Lobesa and Sopsokha, Bhutan -- 2008 Season**

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Introduction

SRI methods of rice cultivation were evaluated in the 2008 season by College of Natural Resources researchers at two locations in West Bhutan, conducting trials on the CNR farm at Lobesa and on a farmer's field at Sopsokha using both the recommended SRI practices and conventional methods of rice cultivation. Trials at the CNR farm focused on verifying the performance of four different varieties with SRI practices: two released rice varieties (Bajo Maap 2 and Khangma Maap), an introduced rice variety (IR 64), and a local variety (Nyabja). At Sopsokha, only one variety (IR 64) was tested as this was the variety most cultivated by farmers at Sopsokha.

The design used for the evaluation at CNR farm was a simple randomized block design with four replications and five treatments, while at Sopsokha where one variety (IR64) was used, a portion of the farmer's field was cultivated with SRI methods while traditional methods were employed on the rest. A bund was constructed within the field separating the two areas to avoid spill-over of fertilizers and weedicides. A total of 7 bags of farmyard manure (FYM), each weighing 30-35 kilograms, was applied on each of the half terraces, 18 m long and 4 m wide. At the CNR farm, FYM applied was at the rate of 10 bags on each of the full-length terraces. The nursery was established using pre-soaked incubated seeds on 23rd May 2008 at both locations. For the SRI trials, transplanting of 3-leaf seedlings was done from 6th till 10th June at both sites, with spacing of 25 cm. A total of three weedings was carried out at both sites: 3rd week of June, 2nd week of July, and 1st week of August.

Agronomic Findings

Tables 1 and 2 present the respective results for yield-contributing parameters and for yield at CNR farm and Sopsokha. The average number of fertile (effective) tillers per hill was higher in SRI plots than in conventional/control plots. Among the four varieties tested at CNR farm, the highest number of productive tillers was found with Njabja (38) followed by IR 64 (30 tillers). This was an increase of 53% and 33% compared to conventional methods. The number of tillers for Bajo Maap 2 is close to IR 64. However, the number of tillers for Khangma Maap variety was found to be lower than others as this variety is more suited for higher altitudes. At Sopsokha (farmer's field), the highest number of productive tillers obtained was 32 with SRI management as compared to 11 with conventional methods. This was an increase of 66% for SRI methods. Average number of grains per panicle was not recorded at the sites.

Similarly, average yield performance was better on SRI plots than conventional plots in both sites (Tables 1 and 2). Among the four varieties, better yield response to SRI methods was observed with all four varieties at the CNR farm, similar to the observation on the farmer's field.

Table 1. Yield and yield-contributing parameters of trials at CNR farm (average of 4 replications).

Sl. No.	Parameters	Rice variety				Average
		IR 64	Bajo Maap 2	Khangma Maap	Nyabja	
1	Fertile tillers/hill					
	SRI methods	30	28	19	38	29
	Conventional methods	20	19	13	18	17.5
2	Plant height (cm)					
	SRI methods	91	115	150	100	114
	Conventional methods	90	110	155	96	113
3	Number of hills/6m^2					
	SRI methods	96	96	96	96	96
	Conventional methods	110	125	100	118	113
4	Yield (kg/6m^2) & MT/ha*					
	SRI methods	(6.1) 10.1	(5.8) 9.7	(3.1) 5.2	(5.8) 9.7	(5.2) 8.7
	Conventional methods	(5.2) 8.7	(4.0) 6.7	(2.2) 3.7	(5.0) 8.3	(4.1) 6.85

*Yield calculated at 14% moisture content

Table 2. Yield and yield-contributing parameters of trials at farmer's field, Sopsokha (average of three replications).

Sl. No.	Parameters	Rice variety
		IR 64
1	Fertile tillers/hill	
	SRI method	32
	Conventional method	11
2	Plant height (cm)	
	SRI method	92
	Conventional method	89
3	Number of hills/6m^2	
	SRI method	96
	Conventional method	211
4	Yield (kg/6m^2) & MT/ha*	
	SRI method	(5.6) 9.3
	Conventional method	(4.0) 6.6

* Yield calculated at 14% moisture content

The 10.1 tons/ha yield performance of IR 64 was the highest at CNR farm, followed closely by Nyabja and Bajo Maap 2 varieties, with 9.7 ton/ha each. The increase in yield with SRI methods compared to conventional practice was 29% on average for the four varieties. Further, the yield obtained for IR 64 and Bajo Maap 2 varieties with SRI methods was more than usually obtained from these varieties grown with standard practices at the Renewable Natural Resource Research Centre station in nearby Bajo. The average yield from IR64 there is usually 6-8 tons/ha (vs. 10.1 tons/ha) and from Bajo Maap 2, 6-7 tons/ha from Bajo Maap 2 (vs. 9.7 tons/ha) (MoA, 2008). On the farmer's field at Sopsakha, the yield differential from IR64 variety with SRI methods was relatively greater, i.e., 40% -- 9.3 tons/ha using SRI practices vs. 6.6 tons/ha with conventional methods.

Apart from the increase in yield, it was observed that there was a reduction in the prevalence of *shochum* (*Potamogeton distinctus* A. Bennett), a dominant and perennial fresh-water weed found abundantly in almost all the rice-growing districts at mid-altitude. It has been reported that in Bhutan, *shochum* reduces paddy yields by about 40%. Among the many districts, Wangdue and Punakha are the most severely affected by the prevalence of this weed. Thus, this is an area where further investigation of the effects of SRI methods is warranted.

Conclusion
The results of evaluations in the 2008 season showed a positive effect from SRI methods even greater than observed in my previous first and second set of SRI trials, conducted in two locations in the country. Further trials and demonstrations at various locations involving farmers and agricultural trainees are planned for the coming season to verify and demonstrate the benefits of SRI under more varied circumstances, comparing SRI results to conventional practices, thereby helping to build the trust and confidence among farmers to adopt these techniques. This will also provide a good platform to work closely with extension agents and researchers of the Ministry of Agriculture as well as carry out training of more agricultural trainees in our College for a multiplier effect as they will be working with farmers all over the country once they graduate in a year from now.

Glimpses of the 2008 trials

CNR farm

Four varieties of paddy at CNR farm

Field preparation

2-3 leaf stage seedlings

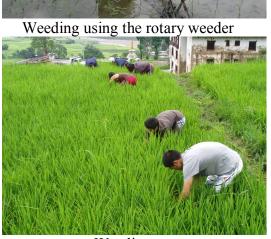Transplanting by trainees

Trainees transplanting

Weeding using the rotary weeder

Rice scientist investigating roots of SRI seedlings

Weeding

One seedling hill

Demonstration to trainees

Crop-cutting by trainees

Crop-cutting at farmers field

Crop-cut done

Highest number of tillers -- 97

Crop-cut taken

Shochum weeding by trainees

Roots of rice plants

Roots of SRI plant

Locally-made weeder

Shochum weed in farmer's field at Shenganang, Punakha