DISCUSSION OF SRI TRIALS RESULTS AT BEFORONA, MORAMANGA

1- Research topic:

System of Rice Intensification and Rice Ratooning**.**

2- Main purpose:

Improvement of yields for lowland rice cultivation in a region that is blessed with good temperature and heavy rainfall, in order to fight against the "slash and burn upland" cultivation system that may lead to the imminent disappearance of forest areas nearby. Moreover, lowland crops at Beforona only represent 3% of the total surface. Therefore, the introduction of SRI and a ratoon crop system would not only improve the rice production in that region, but also help families deal with rice price fluctuations during the critical period of food gap between harvests.

3- Experiments:

Two trials were undertaken at Marolafa, near Beforona, to achieve these goals. The first experiment involved research on compost/manure doses that can favor root microorganisms' activities, including nitrogen fixation. An inoculation of "*Azospirillum sp*" colonies on seeds was done to determine its possible effects on tiller number and crop yield. The second experiment focused on the activation of tillering regeneration after the main crop harvest. Five major variables were studied: Variety, water management practices, manure doses for main crop and for ratoon crop, and cutting height.

3.1- Blocs and plots structure:

In order to reduce soil heterogeneity effects, blocs were almost square shaped. A bloc contained 6 plots for 5 treatments and 1 reference plot (control). Each treatment was applied in a rectangular plot of 4m x 2.5m (10sq.m).

3.2- Tested treatments:

Date of transplantation: November 2001.
Date of first harvest: April 2002.
Date of second harvest: June/July 2002.
Variety used: X265.
Spacing: 25cm x 25cm in a square pattern.
Age of seedlings: 8 days.
Seedlings per hill: 1.
Weeding: early and frequent, respectively at the 10^{th}, 30^{th}, 45^{th} days after transplantation, with rotating hoe. Done only for main crop.

321- First trial on manure doses and seed inoculation:
Main variable I: Inoculation of seeds.
Main variable II: Alternate drying and wetting.

Subsidiary variable: Manure doses.

- T0: reference plot (0t/ha of manure).
- T1: 1t/ha.
- T2: 2t/ha.
- T3: 4t/ha.
- T4: 6t/ha.
- T5: 1t/ha of manure + Hyper barren (Phosphorus)

322- Second trial for evidence on rice ratooning ability:
Main variable: Inoculation of seeds.
Main variable: Cutting height at main crop harvest.

- CH1: 30cm from ground level.
- CH2: 15cm.
- CH3: 5cm.

Subsidiary variable: Second manure applications (the same as above).
Water management: Water introduction at the 12th day after main crop harvest, and alternate drying and wetting lasting 3 days each.

4- Results and discussions:

4.1- Alternate drying and wetting:

Blocs	No inocul	With inocul
Treats	**3w-3d**	
0t/ha	8.35	6.98
1t/ha	10.73	12.03
2t/ha	9.36	12.15
4t/ha	9.30	12.28
6t/ha	8.76	13.07
1t/ha+HB	10.82	11.42
	6w-6d	
0t/ha	6.98	7.58
1t/ha	10.12	11.36
2t/ha	8.85	11.71
4t/ha	10.09	11.87
6t/ha	10.79	13.01
1t/ha+HB	10.47	11.11

There usually are no significant differences between the two water management patterns for the first series “no inoculation of seeds.”
Yet some differences of yield are noticed when *Azospirillum sp* inocula were applied. The table below shows that 3 days of wetting followed by 3 days of drying favored microorganisms’ activities for greater yield.

4.2- Inoculation of seeds:

Water	No inocul	With inocul
3w-3d	10.72	11.32
6w-6d	9.55	11.11

Yields are more improved with inoculation of seeds. This indicates the importance of nitrogen fixation by microorganisms, though more direct evidence remains to be established. This influence on yield, however, depends on the type of soil, especially its fertility as measured biologically as well as chemically. Poor soils show better responses than rich soils. The principle of inoculation requires the presence in advance of organic substances so as to support the action of the inoculum.

4.3- Doses of manure:

Results of experiments show that smaller amounts of manure/compost can give results similar to higher doses. No significant differences (SDL 5%) were noticed among yields with the five doses applied. Concerning the use of phosphorus (Hyper barren), its application had no effect on the main crop.

4.4- Ratoon crop yields:

The number of grain per panicle was mostly higher for the cultivar X265 than for other varieties. These range up to 205, and even more than 210 for some plots, which were fertilized with phosphorus at the planting of the main crop. Hyper barren applications, associated with nitrogen, have positive influence on tiller number, panicle numbers, grains per panicles, and weight of 1,000 grains.

Results show a positive correlation between main crop yields and ratoon crop yields. Higher tiller number in the main crop leads to higher availability of buds on the nodes of the sheath. These buds are then more likely to grow new tillers, giving new production even after a first harvest.

Finally, there were no significant differences between 30 cm and 5 cm cutting height. Harvesting at 5cm from the ground level gives a better tiller number, probably because tillers from the basal nodes have low C/N and react like young plants. But those from the upper nodes do more to determine the grain yield. Both of them were pretty much the same for 15cm cutting height.

4.5- Growth duration:

Without taking temperatures effects into account, growth durations including main crop and ratoon crop, are influenced by the N nutrition of the plant. Higher rates of N availability usually delay maturity, while the crop is producing more grain.

GROWTH DURATION	MAIN CROP	RATOON CROP
No inoculation.	135	95
With inoculation.	149	102

5- Conclusions:

Beside adopting SRI practices, the introduction of ratoon cropping may also provide a solution for small farmers for sustainable rice production. This study would emphasize analysis of several aspects of rice ratooning, especially for SRI. The productivity of labor, water and land area may be improved this way as less work is needed for the ratoon crop than the main croup

In multiple cropping areas, working out the economics of rice ratoon cropping alone will not be enough. Rather, each cropping pattern that will involve rice ratooning needs to be compared (as a whole) with the existing cropping patterns in these areas, in order to assess the scope for increasing ratoon rice cropping.