System of Rice Intensification and Conventional Rice Culture: A Demonstration Trial at VSU Campus, Baybay City, Leyte, Philippines

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Introduction:

The conduct of SRI demonstration at Visayas State University (VSU) campus was triggered upon many apprehensions of non-SRI advocates and practitioners from the academe and those who do not have the actual experience in implementing the system in Eastern Visayas region.

The SRI methodology was developed in Madagascar in the 1980s by the late Fr. Henri de Laulanie, S.J. and is presently promoted by Association Tefy Saina, a Malagasy NGO with which Cornell International Institute for Food Agriculture and Development (CIIFAD) has been advocating since 1994. It was reported that the system for raising rice yields is not viewed by Tefy Saina or CIIFAD as a technology, with a fixed set of practices that farmers are expected to adopt. Rather it is a methodology that applied certain principles and practices about how rice plants can be assisted to perform better. It improves their growing environment by introducing different practices for managing plant, soil, water, nutrient and microbial interactions (CIIFAD 2000-2001 Annual Report).

The conventional lowland rice management among Filipino farmers negates most of the SRI principles and practices. Contrary to SRI scheme, the conventional rice culture is almost always associated with constant irrigation from start to harvest besides using short distance between plants and more plants per hill. On the other hand, the SRI methodology adopts wider spacing, planting only one young seedling per hill, intermittent irrigation and use of organic fertilizers and compost as source of nutrients. SRI capitalizes on a built-in pattern of development in rice identified even before World War II by a Japanese researcher (Katayama, T 1951).

Rabenandrasama (2000) reported that the success of SRI is based on the synergistic development of both the tillers and root system – where there is vigorous root growth, the plant grows fuller and taller; consequently more access to nutrients and water for tiller and seed development. The experience of many farmers from Madagascar and other Asian countries resulting in increased rice productivity and sustainability as well as the significant results from the last two seasons SRI on-farm trials conducted in Eastern Visayas region (De la Rosa, 2005) certainly served as eye-opener and propellant for SRI adopters in the region. It is envisioned that farmers who are still skeptical about the SRI method will be convinced of its potential.

Objectives:

Specifically, the objectives of this study were to: (a) evaluate the performance of the rice plants grown under SRI and the conventional rice culture; (b) serve as a demonstration plot for students, farmers, agricultural technicians and other interested persons showcasing the potential of SRI as an alternative method in increasing rice productivity; (c) provide FARMI staff and other skeptical individuals in the region a first hand experience in increasing rice yield through SRI.

Methodology:

The comparative management practices reflected in Table 1 show how the rice plant during its entire growing period was managed following the SRI method and the conventional rice culture.

Table 1.**Comparative management practices between the SRI method and the Conventional rice culture.**

Management Practices	***SRI***	***Conventional***
Age of seedlings at transplanting	Transplant 8-12 day-old seedlings raised from seedbed thinly layered with organic fertilizer	Transplant 15 -30 day-old seedlings from wet seedbed pulled/sliced a day before transplanting
Density & spacing	Transplant 1 seedling per hill at 25cm x 25cm in square pattern	Transplant 4-7 seedlings in clumps per hill at 17.78 cm x 17.78 cm in square pattern.
Weed control	First rotary weeding starts 10 DAT. Second rotary weeding 10 days after followed by selective hand weeding	Rotary weeding starts 21 DAT plus application of pre-emergence herbecides .and handweeding
Water management	Intermittent irrigation just to keep the soil moist. Allow soil surface to crack. During panicle initiation 2-3 cm water level is maintained and the field drained 10-15 days before harvest	Early flooding. Water is maintained 5-10 cm water levels from vegetative stages up to almost maturity. Drain the field 10-15 days prior to harvest
Nutrient Management	Applied 4 bags (50kg/bag) organic fertilizer incor-porated during final harrowing. 2 bags side-dress & 2 bags top dress Prior to initiation stage	Applied inorganic fertilizer at the rate of 2 bags (50 kg /bag) per ha as sidedress and and topdressed at initiation at 2 bags/ha with 14-14-14.
Pest Management	Adopted IPM during the growing period.	Followed regular spraying using insecticides

DAT= Date after transplanting.

Land Preparation:

Sri Plot

An area of 600 sq. m was used for the demonstration plot. Rice straw and stubbles from the previous crop were evenly scattered in the plot before plowing using carabao-drawn plow. Two weeks after, harrowing was done using a hand tractor. This was followed by a tooth harrow and a leveling board (Fig. 1). Sufficient water level on paddies was maintained prior to the application of 4 bags of organic fertilizers (50kgs./bag) to thoroughly mix the fertilizer into the soil before leveling the field. Prior to planting, small ditches were constructed around the paddies for easy management of water specially during heavy rain and for easy collection of golden apple snail (kuhol). Kuhol usually in clusters at the lower/depressed portion of the field were gathered by hand

Figure 1. Final harrowing and leveling of SRI plot.

Conventional Plot

The conventional plot of the same size (600 sq.m) as the SRI plot was prepared . thoroughly using carabao-drawn plow. It was harrowed a week after plowing. The second harrowing was done at two weeks after the first harrowing.

Seed Bed Preparation:

SRI Plot

A 1m x 6m raised seedbed was prepared located conveniently in the center of rice field. Ditches were constructed around the seedbed. Two (2) kilograms of organic fertilizer was broadcast on the raised seedbed to produce healthy and vigorous seedlings. A kilo of pre-germinated seeds (RC-112 from VSU Seednet) was broadcast later part in the afternoon to minimize intense heat exposure of the germinating seeds during the day. Nylon nets were used to protect the seedbed from birds and other insects (Fig. 2)

Figure 2. SRI seedlings on a raised-seedbed enclosed with nylon net.

Non-SRI Seedbed

A raised seedbed measuring 1 m x 4 m was prepared. Two kilos of pre-germinated RC-112 inbred seeds from VSU Seednet was broadcast and protected from birds and rats by enclosing it with nylon net. Care and maintenance of the seedbed was done to produce vigorous seedlings (Fig. 3) .

Fig. 3. Non-SRI seedbed

Transplanting:

SRI Plot

Twelve (12) day-old seedlings were carefully uprooted and immediately transplanted in the afternoon at 1 seedling per hill. The distance of planting was 25cm x 25 cm in square pattern using a lining board (Fig. 4).

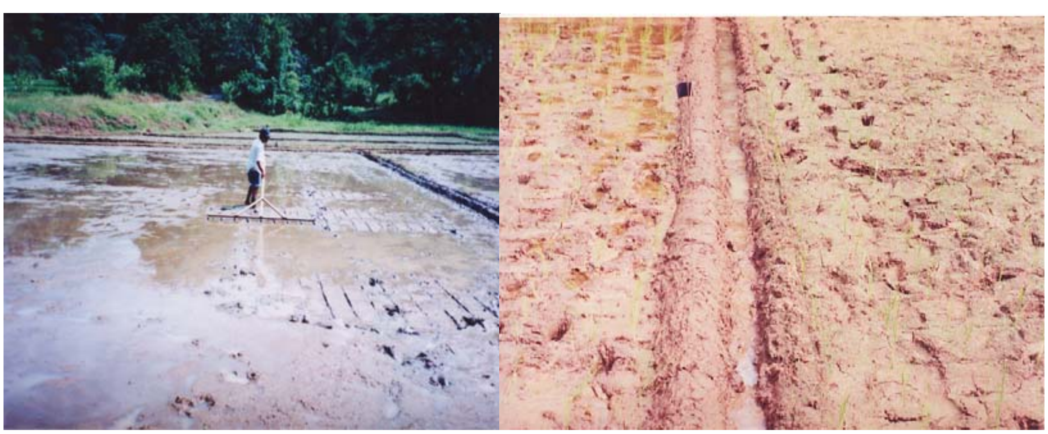


Figure 4. Planting 1 young seedling per hill at spacing distance of 25cm x 25cm.

Non-SRI Plot

Eighteen (18) day-old seedlings were sliced using a scythe a day before they were transplanted. With the use of a lining board, 5-7 seedlings in clumps were transplanted per hill at a distance of 17.78cm x 17.78 cm apart in square pattern. Transplanting started at 7:00 a.m. and was finished two hours after (Fig. 5).

Figure 5. Five to seven of eighteen-day old seedlings were planted in clumps at close spacing distance of 17.78cm x 17.78 cm.

Water, Weed and Nutrient Management:

Ten (10) days after transplanting, the SRI plot was irrigated (about 2cms.) just enough to make the mechanical rotary weeding easy (Fig. 6) After the first rotary weeding two (2) bags of organic fertilizers (100kgs) were immediately applied as side-dress to allow the fertilizer to be thoroughly mixed in the soil. This enhanced tillering and growth of the rice plants.

Figure 6. Ten days after transplanting rotary weeding was done and side-dressed with organic fertilizer.

Intermittent irrigation was practiced at 6-7 days interval to allow soil surface cracks and enhance emergence of more tillers (Fig 7). Second rotary weeding was done 20 days after transplanting. Hand weeding was also done 35 days after transplanting. To insure uniform plant growth, spot application of 100 kg organic fertilizer was done.

Figure 7. Rice paddy totally drained showing soil surface cracking to induce more tillers.

For the non-SRI plots, the conventional practices on water, nutrient, weed and pest management were followed. As a matter of fact, two to three days after transplanting, irrigation water at a depth of at least 3 cm was maintained Fig.8).

Figure 8. Standing water is maintained under conventional rice culture..

After the first rotary weeding, inorganic fertilizers (urea) at the rate of 2 bags (50 kg/bag) per ha. was side-dressed. This was followed with a second application at the same rate just after the first hand-weeding operation. Top-dressing of complete fertilizer (14-14-14) at the rate of 2 bags (50 kg/bag) per ha. was broadcast during the panicle initiation stage. Both SRI and conventional plots were drained 10 to 15 days prior to harvesting.

Pests and Diseases Monitoring:

Insect pest and diseases in the experimental area were regularly monitored. As observed, golden apple snails were prevalent after planting. Collection of golden apple snails (kuhol) manually from both plots was done every morning for at least two–three weeks. Gabi (*M. esculenta*) leaves were randomly placed in ditches or in depressed spots as "attractants" for kuhol. This practice was found most effective to minimize kuhol infestation.

Ditches and small canals (Fig.9) constructed around the paddies were found effective in minimizing mole cricket damage of plants near the dikes or leevis.

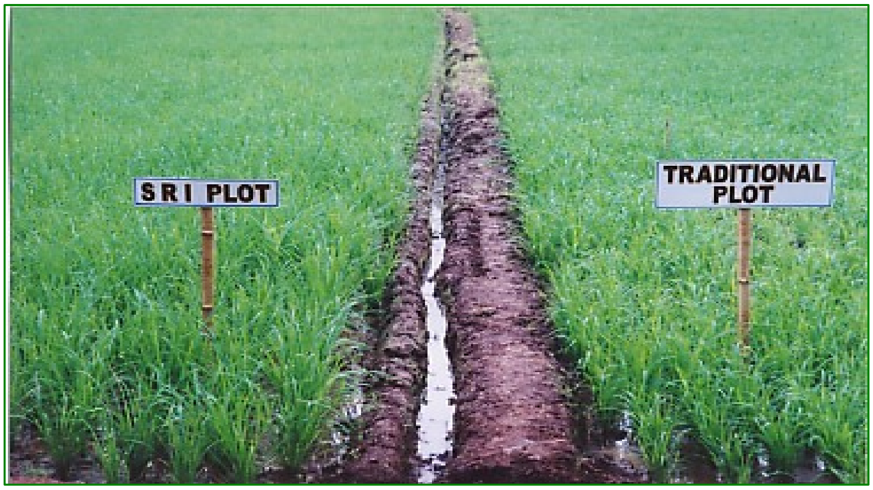


Figure 9. Ditches and canals are constructed around SRI plot.

. As observed, mole crickets burrowed on dikes tended to keep away from standing irrigation water along the dikes.. Monitoring and data gathering was done within 15 days interval.

Results and Discussion:

Results of the SRI demonstration trial at Visayas State University (VSU) campus showed marked differences between SRI and non-SRI plots in terms of plant growth and grain yield. The agronomic parameters shown in Table 2 such as plant height at maturity, number of productive tillers, length of panicle, number of spikelets per panicle and grain yield collected and monitored from both SRI and non-SRI plots exhibited obvious variation. It is interesting to note that the average tiller count from SRI after 45 DAT of 40 tillers (Fig.10) was drastically reduced to only 20 productive tillers after 60 DAT due to heavy stem borer infestation. The same observation was found in the control plot where the average tiller count of 38 tillers 45 DAT was reduced to only 14 productive tillers due to damage by stem borer infestation during the flowering stage.

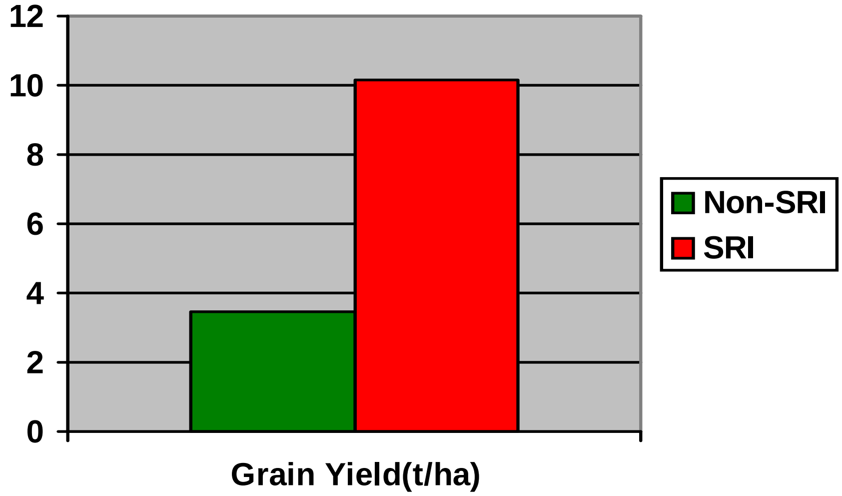
Figure 10. SRI plot showing more tillers at 45 DAT.

Nevertheless, despite the damage, the computed grain yield of SRI plot exceeded more than twice the control plot (Fig. 11). It is inferred that such marked difference could be attributed to the management practices followed in the SRI plot.

Table 2. Average plant height, productive tillers, panicle length, number of grains per panicle and grain yield (t/ha) from both SRI and non-SRI plots during the wet planting season (June 2005 – September 2005).

Cultural Management	Plant Height(cm) n= 5	Productive tiller (cm) n= 5	Panicle length(cm) n=5	Number of grains/panicle n = 5	Grain Yield (t/ha)
Non-SRI	108.20	14.00	20.00	110.00	3. 48
SRI	116.40	20.00	27.16	130.00	10.16

Figure 11. Grain yield (t/ha) of SRI and Non-SRI.



Conclusion and Recommendation:

The SRI demonstration plot which was the first of its kind ever conducted on VSU campus had satisfied the curiosity of the proponents (FARMI) of the project and other staff members of the University. It also provided a learning venue and observation plot to members of NGOs, POs, farmer-groups, agricultural technicians in the region who were skeptics on the potential of the SRI method (Fig. 12.

Figure 12. Farmers, agriculture technicians & CFTU members observed SRI and non-SRI plants at FARMI-VSU-Eco Farm.

Moreover, it afforded a site for a field visit to the members of the Conservation Farming for Tropical Uplands (CFTU) and Cornell University professors during the Association Liaison Office-VSU project dissemination workshop conference in August 2005 at VSU. Additionally, many farmers who used to attend the yearly VSU farmers' field day celebration as part of the major activity during the institution's founding anniversary were able to see the performance of the rice plants following the SRI methodology (Fig. 13). The visitors, especially farmers, were curious and expressed interest to try SRI in their respective places.

Figure 13. SRI Learning Field at VSU-ECO FARM.

The SRI demonstration at the VSU-ECO-FARM spearheaded by FARMI was convincing based on the yield and other observable agronomic parameters evaluated during the cropping season of June – September of 2005. However, SRI promotion nationwide has yet to be expanded considering the ecological diversity of many rice farms and the socio-economic culture of Filipino farmers. Moreover, the enthusiasm and skills of the rice technicians entrusted to promote appropriate production technologies in the region as well as the sustained support of the Department of Agriculture is vital in attaining food security of the country. The three cropping seasons of SRI on –farm trials conducted in Eastern Visayas (R & D Report, De la Rosa et. al 2005) and the result of the demonstration trial at VSU campus provided the author a strong basis for recommending adoption of SRI method nation-wide among small rice farmers in the Philippines.

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