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From 'Miracle' Rice Plants to Technology Hybridization: My SRI Journey

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Abstract

This paper is prepared based on the author's experiences in working with SRI ideas and methods in diverse agroecological and socioeconomic contexts in Nepal and abroad. I have found that rice farmers used diverse field management strategies to incorporate SRI into their farming systems. Some farmers used all of the SRI practices introduced during their training, i.e., young seedlings, single seedlings, wider spacing, alternate wetting and drying irrigation, mechanical weeding, and the use of compost. However, the majority modified their methods to be appropriate for their farming situation. Farmers used younger seedlings in areas where irrigation was reliable and drainage facility was better. The use of mechanical weeding was very effective for higher yield; however, its effectiveness and productivity were not the same everywhere. Similarly, many farmers did not follow the advice to use compost (alone, or with fertilizer). It was interesting to note that the poorly-producing farmers were using more fertilizer than required. By contrast, the farmers who attended the SRI training have reduced their fertilizer use. In short, the introduction of SRI methods influenced the traditional rice farming system, but not in a uniform way. After years of experience, the majority of farmers adjusted these practices to fit their personal farming situation. Most farmers who changed their rice farming system were following neither SRI nor traditional practice, but rather a hybrid of methods, and they developed a hybrid system that is more feasible and productive in Nepal.

Keywords: Rice, SRI, hybridization, technology, diversity

Introduction

Agricultural intensification, which makes more productive use of available resources, is thus vital for food security and for better livelihoods of farmers. This is particularly true for rice intensification, in order to produce more of this major staple grain for domestic use. Rice demand has been increasing year after year everywhere because of population growth, improved access to rice in the different geographical areas due to better road-network and transportation facilities, and greater purchasing power of the people through non-agricultural sources of income. Increasing domestic rice demand explains why the government puts the priority on rice production and the production of other food crops by increasing productivity. But the priorities of farmers are changing in an opposite direction because of the low-profit margin in rice farming.

Due to the wide diversity in agroecological and socio-economic conditions, and hence in rice-farming systems, it is evident that there is not one single solution that suits all farmers and all fields. Rice intensification is not achievable as a general strategy. Rice intensification, and SRI in particular, is, therefore, more of a choice, an option, than an imperative. Solutions for individual farmers should be appropriate for local situations, and this location-specificity includes both the agroecological and socio-economic contexts. Farmers try to modify or re-shape any new technologies and incorporate appropriate parts of them into their farming systems to suit their respective situations (Uprety, 2016).

Nutrient management is a very important aspect of rice farming. Government policies (fertilizer subsidies) encourage increased fertilizer use but its efficient utilization is always questionable. Results indicated that the use of higher amounts of inorganic fertilizer did not increase yields (Uprety, 2018). Irrigation management is another important factor for better rice yield. But the reliability of the water supply is more important than its amount. A reliable water supply makes land preparation easier and on time. Water availability makes land preparation, early transplanting, and mechanical weed control become easier.

Agricultural training can play a vital role in technology dissemination and agricultural intensification. The

introduction of SRI brings several changes in rice farming, but only part of the farmers has adopted such technologies, and adoption has been only in part of their fields. Other farmers have incorporated some of the SRI practices into their conventional practices. Later rice-growing practices became hybrid practices, conforming neither to the norms of conventional practice nor to the perfect type of SRI.

In order to reform rice farming, we need to recognize that different farmers, with different livelihood strategies, and with access to different kinds of fields, need different forms for agricultural intensification. Even though some agencies and organizations might try to promote SRI in a formulaic manner, the original ideas of SRI have always been to be adaptive and to encourage farmer experimentation and adaptation. There is an ideal type, but the methodology of SRI (not a technology) is to utilize available resources more productively, recognizing that getting more output is not a direct function of using more inputs, but of managing inputs differently and more appropriately.

SRI journey

Miracle rice plant and the start of my SRI journey

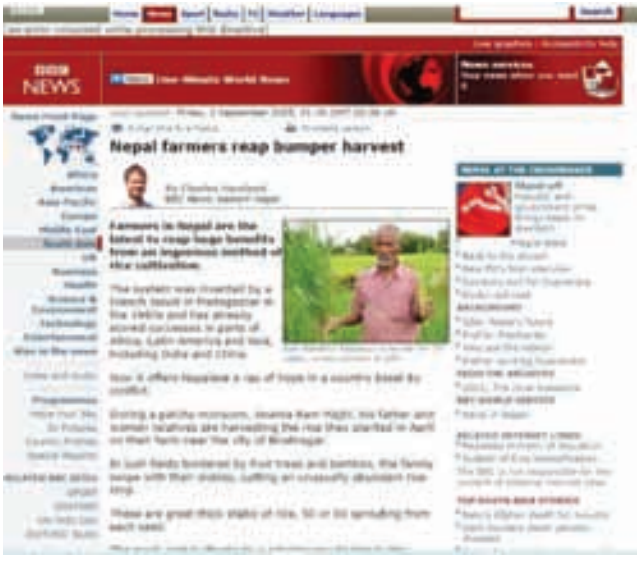
One February afternoon in 2002 a photo of a rice plant published in LEISA, which seemed unusually big, attracted me to read that article written by Norman Uphoff (LEISA magazine, Vol. 16.4, December 2000) which was surprising and interesting to me. I was especially attracted to the possibility of obtaining higher rice yields by using available rice varieties, without increasing the dose of chemical fertilizers and other additional investments (Uprety 2009). That article linked me with Norman and some more information from him I prepared myself to start the SRI journey from eastern Nepal.

In the beginning, I had little confidence in such an unbelievable story. No one farmer is interested to test SRI with me. At last one farmer was ready to try it in a small plot (100 m2), and we grew seedlings out of a handful of Radha-12 (155 days' variety) rice seeds. When we transplanted the 10- day seedlings, at a 30 x 30 cm distance, the field looked empty and sad when we finished transplanting. After two weeks of regular farm management practices (such as weeding), the whole field started to look better: all plants were looking healthy and attractive. The plants' development seemed amazing, and by the end, we had a very attractive rice field. We harvested the equivalent of more than 7 t/ha, more than double that of the surrounding rice fields. The first trials gave me more excitement, energy, and confidence to intensify my efforts.

SRI fields and rice plants advertised our work

Next season, we replicated SRI trials in more numbers of fields in larger areas. All fields performed well and attracted the attention of farmers and the media, and we got encouragement to spread more (Uprety, 2006). Later I got Nepal Development Marketplace Award 2005 for SRI

Rajendra Uprety, District Agricultural Development Office, Morang District receiving $20,000 award in Nepal Development Marketplace competition



Photos: NDM award ceremony and BBC report

promotion organized by the World Bank. It provides 20000 US$ for our project work. Our area increased, the number of farmers increased, and increase our excitement (Uprety, 2009). Our SRI work got coverage in several prestigious national and international media, including BBC World Service.

After those work and media support, the SRI movement has been going on, and all users and promotors promote it as a "silver bullet" and used a "copy and paste" type strategy. Everyone from every corner was reporting about higher yield, bigger plants with more and more tillers, bigger root systems, handsome panicles, and hundreds of grain numbers per panicle.

We also found similar results. But with the majority of better results, there were some results were not as expected. These were bigger plants with higher tillers numbers, larger root systems, and larger panicles with higher numbers of grain, but the final yield per unit are was not as expected or lower than expected. Somewhere, weed management became a problem; in other areas, AWD was not effective; in some places, wider spacing reduced yields. No SRI promotor had reported this type of result or discussed how to manage those negative consequences. But in working with farmers and connecting to their day-to-day work, we need to find and share solutions to address those problems. So, we started to search out context-specific solutions, and our SRI journey innovated several versions (hybrids) of SRI which will better fit specific situations and give SRI benefits to the farmers (Uprety, 2013b).

Learning from farmers: a participatory approach for SRI hybridization

By maintaining regular interactions with the farmers, researchers and extension agents learned what works and what does not. We found that the farmers with the most productive fields used younger and fewer seedlings of photo-insensitive varieties spaced wider apart. The type of land and the availability of water greatly influenced the approaches the farmers chose. A majority of farmers only used SRI methods in the higher parts of their fields. Farmers used younger seedlings in areas where irrigation and drainage can be controlled better, responding to the evidence that transplanting young seedlings in water-scarce areas is riskier. Water availability also determines the timing of land preparation and transplanting. When the rains are late or when water is not available, the preparation of the field is delayed while the seedlings continue to grow in the seedbeds.

Similarly, mechanical weeding appeared problematic. Although farmers used fewer seedlings and wider spacing, they were not laid out in the straight lines or square patterns necessary for mechanical weeding. Weed management, manual or mechanical, requires sufficient and skilled labour. Mechanical weeding was found to produce higher yields and increase the nutrient use efficiency of rice, but most of the farmers complained about the inefficiency of locally-made weeders. The heavy equipment was not suitable for predominantly female workers.

Extension workers saw that their own recommendations were not followed and started a process of reviewing the techniques with the farmers. This broke the traditional one-way deliverer-recipient system of learning. After joint trials and learning, mutual interactions became more common (Uprety, 2011). Such interactions helped reshape the general recommendations of the extension staff. When extension workers began making recommendations based on farmers' suggestions, other farmers became more interested in testing and disseminating the new approaches (Uprety, 2013a).

Local innovation and technology hybridization

Farmers and extension workers'/SRI workers work together and repackage different context-specific hybrid – SRI methods aiming to increase their rice production. Some examples are given here:

a. Older seedlings SRI

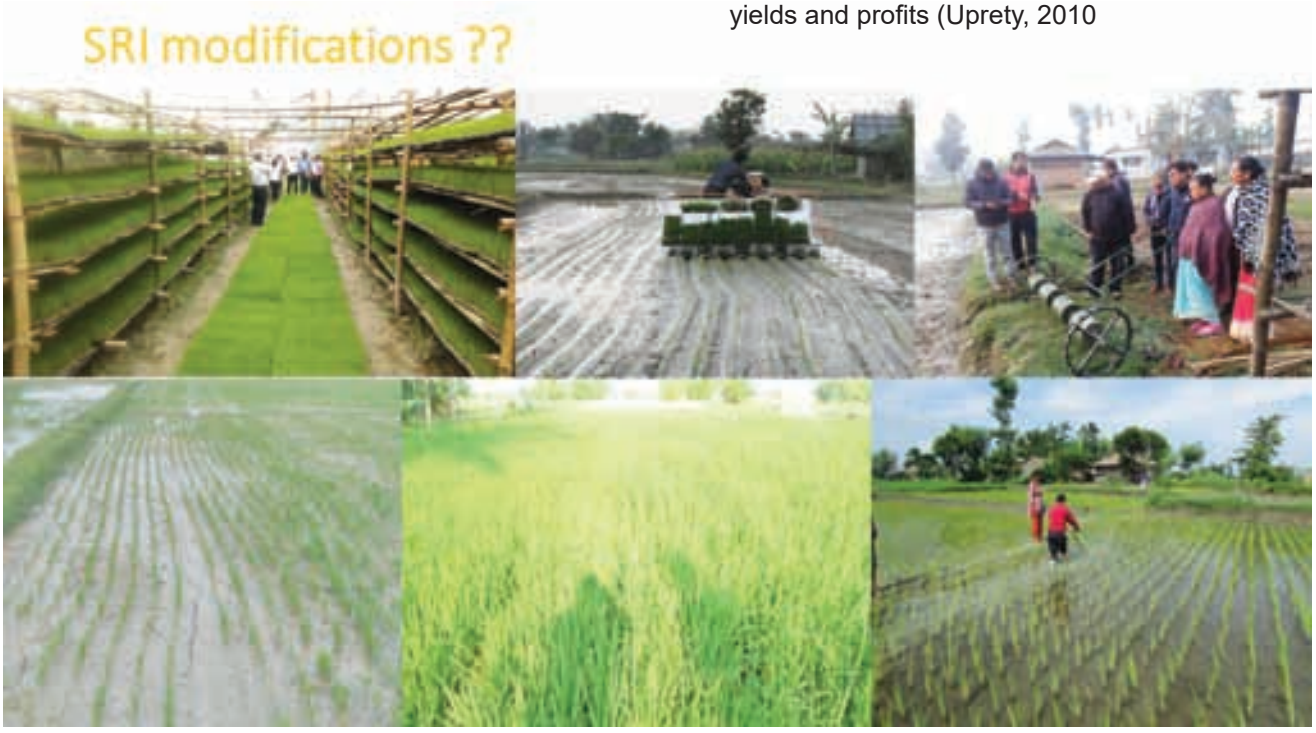
Sometimes seedlings become older because of the unavailability of irrigation water and delay in land preparation. Our farmers used older seedlings (even up to 45 days), planted 2-3 seedlings/hill at 25 cm spacing, and used mechanical weeding, AWD irrigation and got more than 600 kg/ha yield compared to the conventional method with less labour for weeding and other management.

a. Direct-seeded SRI by use of drum-seeder

To reduce production costs, some farmers used direct-seeded SRI by using plastic drum seeders. In better soil conditions and levelled fields, this method performs well, but in weed-problematic areas with unreliable irrigation facilities, it was not performed well.

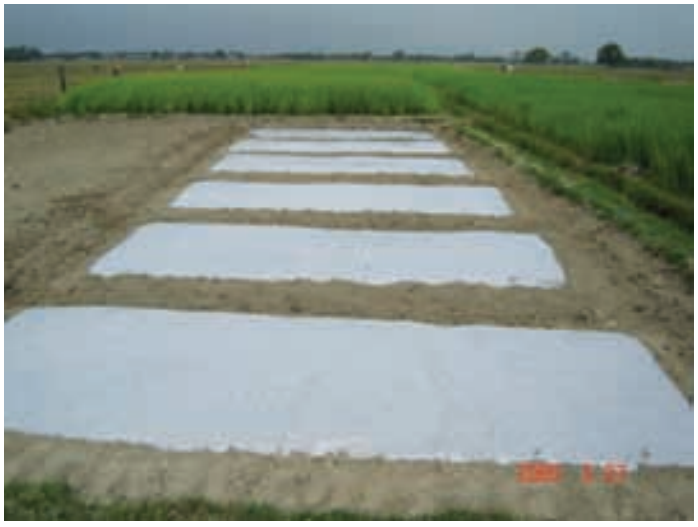
b. Mechanical SRI by using rice transplanter

Because of labour scarcity and high labour wage rates, many farmers are attracted to mechanized rice farming. The rice transplanter used younger seedlings (10-12 days) and planted 2-3 seedlings at 24-30 cm line spacing (it is adjustable) and 15 cm plant-to-plant spacing. It reduces transplanting costs by up to 40%, facilitates mechanical weedings, and gives higher yields and profits (Uprety, 2010



c. Solarization of healthy seedlings with the SRI method

Healthy seedlings are very important for rice farming as well as the SRI method. So in root-knot nematode-affected rice areas, we encourage farmers to use the solarization method for nursery bed treatment. Its effect was very positive on rice seedlings, growth, and production.



Photos: Solarized rice nursery and seedlings from treated and untreated nursery beds

Conclusion: The journey of learning is never-ending

SRI's journey is evolving and evolving rice farm management around the world. Its environment is becoming favorable day by day. I already completed two decades of working and struggling for this movement. We face several challenges and modified/improve our SRI movement many more. There are hundreds of research articles published from around the world and making our knowledge treasury very rich. But still, we are behind to use it.

We are excited to publish more and more but we are behind in utilizing that knowledge to innovate more and more context-specific possibilities or hybrid SRI which will be more doable, more scalable, and more productive to uplift rice farmers' situations and to save our environment and make rice farming sustainable.

References

Uphoff N. 2000. Update on the System of Rice Intensification. LEISA Magazine 16.4, December 2000.

Uprety R. 2006. SRI takes root in Nepal. LEISA Magazine 22(4): 25-27.

Uprety R. 2009. The large impact of a small article. LEISA Magazine 25(1): 18-19.

Uprety R. 2010. Meshing mechanization with SRI methods for rice cultivation in Nepal. Oral paper presented at 3rd International Rice Congress, November 8-12, Hanoi. http://sri.ciifad.cornell.edu/countries/nepal/IRC2010_Uprety_%20paper.pdf

Uprety R. 2011. Participatory learning for technology shaping and its dissemination: a case from Nepal. Extension Farming System Journal, Volume 7(1): 37-40.

Uprety R. 2013a. Learning from farmers. Farming Matters 29(1): 20-22.

Uprety R. 2013b. Hybridizing Technology: The Case of Rice Farming in Nepal. http://peoplefoodandnature.org/blog/sri_nepal/ - accessed 18.02.2016.

Uprety R. 2016. Agricultural intensification in Nepal, with particular reference to systems of rice intensification. 2016. Ph.D. dissertation. Wageningen University, the Netherlands

Uprety R. 2018. Low rice yield and varieties and fertilizer use situation in Nepal. Oral paper presented at 5th International Rice Congress, 15-17 October 2018, Singapore.