PROSPECTS OF THE SYSTEM OF RICE INTENSIFICATION (SRI) IN ASIA

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ABSTRACT

Basic concepts of the System of Rice Intensification (SRI) method are (1) transplanting of young healthy rice seedlings (8-12 days old), handling their roots carefully and transplanting them only 1-2 cm deep, preferably just one per hill; (2) wider planting distance, 25 x 25 cm or even wider with good soil fertility; (3) applying irrigation water intermittently, just keeping the soil moist, not continuously flooded. With SRI methods, fertilization can be 100% organic or 100% inorganic fertilizer or a mix of organic and inorganic fertilizers. Use of a simple mechanical hand weeder is recommended to control weeds because this also aerates the soil.

SRI method was first developed in Madagascar by a French priest, Henri.de Laulanié, in the early 1980s, and it was 'transplanted' to Indonesia and China 15 years later by Prof. Dr. Norman Uphoff from CIIFAD, Cornell University, USA. The first evaluation of SRI in Indonesia was carried out in 1999 during the dry season by Agency of Agricultural Research and Development (AARD) and its Rice Research Center in Sukamandi, West Java. Scientists reported that SRI paddy yields were 6.2 ton/ha compared to the control yield of 4.1 ton/ha. In the subsequent wet season, the SRI plot yielded 8.2 ton/ha (Gani *et al.* 2002). After further evaluations confirmed these results in other parts of Indonesia, SRI methods were incorporated into the AARD-recommended Integrated Crop Resource Management (ICM) strategy in 2002, although there was not much effective dissemination.

In 2002, evaluations of SRI methods began in the eastern region of Indonesia under the auspices of the Decentralized Irrigation System Improvement Project (DISIMP), executed by Directorate General of Water Resources, Ministry of Public Works and implemented with technical support from Nippon Koei, a Japanese consulting firm. From just 2 trials that year, the evaluation expanded over the next 9 seasons, aiming to improve the sustainable and efficient use of irrigation water. By 2006, SRI had been evaluated in 8 provinces in Eastern Indonesian in 12,133 on-farm comparison trials covering an area of 9,429 ha. SRI plots showed an average yield increase of 3.3 ton/ha, 78% more than on the comparison plots using farmers' current practices. There was a 50 reduction in applications of inorganic fertilizer as farmers used more organic fertilization. Seed requirements were reduced by 80% because plant populations were

drastically cut with wide spacing. Irrigation water was reduced by 40%, and costs of production were cut by 20% (Sato and Uphoff, 2007).

Based on recent research, Nareswari *et al.* (2009) and Ardi *et al.* (2009) have reported that SRI methods in their trials not only increased paddy yield by 30%, but also increased the populations of beneficial soil microbes such as *Azotobacter, Azospirillum* and phosphate-solubilizing bacteria. Further, SRI practice also reduced methane emissions from the rice field by 50%. Since 2005, the Ministry of Agriculture, Republic of Indonesia, in particular the Directorate-General for Land and Water Management (PLA), has been involved in SRI dissemination in Indonesia. In 2009, a significant SRI Program is being implemented by the PLA in 20 provinces and 53 districts throughout Indonesia.

SRI evaluations done in 8 countries by universities, international agricultural research centers, NGOs, government agencies, private sectors and donors showed that SRI method gave similar results. On average, SRI methods increased rice yield by 52% (21-105%), reduced water use by 44% (24 – 60%), reduced cost of production by 25% (2.2 – 56%), and increased net farmer income by 128% (59- 412%) (Uphoff, 2007). SRI methods have been reported also to raise the productivity of water (Ceesay et al., 2006; Satyanarayana *et al.*, 2007).

So far, the value and validity of SRI methods have been confirmed in 36 countries, mostly in Asia such as China, India, Indonesia, Vietnam, Bhutan, Nepal, Bangladesh, Sri Lanka, Malaysia, and Timor Leste. One of the characteristics of Asian agriculture is small area of rice cultivation, and SRI methods are well-suited to limited-resource farmers. However, larger farmers in several countries, including India and China, are practicing SRI methods on a larger scale, and several kinds of mechanization are being introduced to reduce labor requirements.

The most significant barriers to using SRI concepts and techniques have been, first, mental, as SRI requires new ways of thinking rather than costly new inputs, and second, sufficient water control to avoid continuous inundation of paddy fields. It has been thought that SRI is necessarily more labor-intensive. But the additional labor time is mostly required for learning the new methods, and thus transitory. Evaluations in India, China, Indonesia and Cambodia have shown that SRI is on average labor-neutral or even labor-saving once the methods have been mastered.

SRI is a work in progress. Adoption of SRI method in rice production by farmers is not an easy task. Restrictions come not only from the farmer side but sometimes from government officials who do not fully understand the principles of SRI. To change the culture of rice cultivation from flooded conditions and older seedlings to saturated-moist soil and young seedlings with wider spacing is not an easy to accept by many farmers. Fortunately, there are almost always some farmers in any community who are curious and open-minded. Once the benefits of SRI have been visibly demonstrated, acceptance of the new approach is much easier. Weed problems, pests and diseases, agronomy aspects, labor requirements, irrigation water management, fertilizer efficiency, and social, economic, cultural, gender and anthropological aspects should be studied more in the future. Therefore, active participation of all stakeholders is necessary and encouraged for the adoption of SRI by more farmers.

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