Research Issues

SRI raises a great number of interesting issues and opportunities identified in several group discussions among researchers at the conference.

Plant Research Issues

At the plant level

Preferred plant type characteristics for SRI have not been established in any systematic way, so this is a promising area for investigation. There needs to be evaluation of factors such as:

- **Plant height** — balancing good straw yield with lodging resistance.
- **Tillering capacity** — having optimum plant tillering that gives maximum number of productive tillers per unit area, with minimum negative competition among tillers within the plant.
- **Effective tillering** — ensuring that this is over 70% to have efficient plant performance. One hypothesis that emerged from discussions was that with SRI practices, the heavy application of N fertilizer may reduce rather than enhance effective tillering. This should be evaluated systematically because if correct, one can save costs and increase output.
- **Panicle size** — having maximum grain filling with good grain weight.

At the population level

It will be important to know more about:

- **Seedling growth and crop establishment** — manipulation of nursery temperature, spacing and soil characteristics to create vigorous seedling growth and best growth in the field.
- **Varietal response** under SRI methods — evaluating compatibility of photoperiod-sensitive vs. photoperiod-insensitive varieties with SRI management practices; also responsiveness of glutinous vs. non-glutinous varieties, and of inbreds vs. hybrids.
- **Planting geometry, plant density and seedling age** interactions for SRI in different locations under varying climatic and soil conditions.

Soil, Water and Other Management Issues

- **Most effective water management** for SRI under different soil conditions should be studied, and also the advantages and disadvantages of moist and cracked soil.
- **Nutrient applications and soil fertility maintenance,** with and without organic manure or compost, should be evaluated in terms of **integrated nutrient management.** There is need to understand better the effects of different **timing and amounts of nutrient amendments,** and to improve **composting techniques**. There may be advantages with slowly-released, coated N fertilizer. Also, as suggested by research from Madagascar, **small amounts of organic matter** added to the soil may be able to produce good results with SRI practices.
- **Effective weed management practices** — possible use of non-persistent herbicides; costs and benefits of crop rotation and of green manure and cover crops (GMCCs).
- **Enhancing soil microbial activity** to promote SRI performance — possible species manipulation, and management opportunities, such as soil or seedling inoculation.
- **Differential response to pest and disease attacks** between SRI and conventional rice cultivation practices — understanding dynamics and principles to take best advantage of the insights SRI can provide for pest and disease reduction.

Ecological and Physiological Issues

- **Soil chemical changes and microbial dynamics** under the intermittent irrigation system used with SRI. The effects of **soil aeration** need to be better understood.
- **Nutrient-use efficiency** is a related matter of interest, as some research shows SRI plants being more efficient in their uptake of N, P and K compared to conventionally-grown rice.
- **Light interception and photosynthetic activity** are important for yield — what are the impacts of SRI practices on these.
- **Impact on rice grain quality** from SRI practices — grain weight, resistance to shattering, attachment of grains to panicles, and nutritional content. Some data from Sri Lanka suggest heavier grain weight per unit of volume resulting from SRI practices, apparently due to a reduction in unfilled grains.
- SRI was developed for irrigated lowland production, but its principles should be adaptable, at least to some extent, to **rainfed areas.** Some experiments in Madagascar, doing direct seeding instead of transplanting, and using leguminous shrub cuttings as a mulch instead of doing mechanical hand weeding, have given good results (4 t/ha) in an upland rainfed area. This could be a new direction for SRI research.

Economic Issues

- Socio-economic analysis of **rotational practices** in SRI-based cropping systems to understand the net benefits of different combinations and sequences, evaluated over time.
- Systematic evaluation of **costs of production** that affect the profitability of SRI adoption.
- Opportunities for **diversification** of smallholder farming systems once sufficient rice can be produced with less land and other resources to attain greater income, stability and nutritional benefit.
- With all of the above information, it should be possible to identify **the most suitable areas** for SRI practice, based on climate, soil, economic and other considerations. This will enable government agencies and NGOs to focus their efforts where the uptake of and benefits from SRI can be most rapidly and cost-effectively obtained.
- There is also need to begin now to establish **benchmark studies**, analyzing soil status and quality in chemical, physical and biological terms, and then collective agronomic and economic data as well as soil data over time, to monitor and understand **long-term effects** of SRI.

A further suggestion by researchers was that **their category** should be understood as **including farmers** who are interested in determining systematic cause-and-effect relationships with rice. With SRI, some very fruitful partnerships for advancing knowledge should be possible and should be promoted.