Experiments with the System of Rice Intensification in The GAMBIA

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The Gambia is a small country in West Africa of 11,700 km², surrounded on three sides by Senegal, situated between 13.2 and 13.7° N latitude. The country is a 50-km-wide ribbon of land that extends eastwards 475 km from the coast and bisected by the River Gambia. It lies within the Sahelo-Sudan climatic zone with 900 to 1400 mm of average annual rainfall, with the rainy season extending from late May to early October.

In The Gambia, the rice production systems can be grouped into five categories: upland, lowland rainfed, irrigated (pump and tidal), freshwater swamps, and seasonally saline mangrove swamps. Production constraints differ naturally from one environment to another, and accordingly, farmers need a variety of technological alternatives.

Rice is the staple food in The Gambia, with average annual consumption per capita of 70 to 110 kg. Domestic production lags behind consumption by 60%, with the balance needing to be met by importation. National average yields of rice are only 2 t/ha.

SRI was introduced to The Gambia in the rainy season of 2000 as part of a thesis research project for a PhD program in Crop and Soil Sciences currently being undertaken by the author at Cornell University. Farmers were invited to visit the first SRI trial site at the Sapu station of NARI, and the positive interest that they expressed after seeing the new potentials of their local varieties made it possible to conduct a series of on-farm trials in 2001.

Evaluations

On-station trials

During the first year of experimentation with SRI, three different plant population densities were investigated with several varieties. Yields ranged from 5.4 to 8.3 t/ha. In 2001, in addition to a plant population-density trial, there were also SRI trials with fertilizer variations and on-farm trials involving 10 farmer households. The on-station SRI trials were conducted under pump irrigation, and on-farm trials under tidal irrigation.

The plant population densities investigated were of the following spacing distance:

- 20 x 20cm
- 30 x 30cm
- 40 x 40cm

Two rice varieties IET3137 and ITA306 were used in the trial.

The SRI fertilizer trials assessed the following fertilizer treatment rates:

- 70-30-30 NPK (the national recommended rate)
- 140-30-30 NPK
- 280-30-30 NPK

The objective of these trials was to find out if the available nutrients in The Gambian lowland soils are a limiting factor for maximising yields under the SRI production system. The SRI components used in these trials were 30 x 30cm spacing, water control, and young seedlings (age assessed by leaf stage). IET3137 and ITA306 rice varieties were used in the experiment.

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On-farm trials

The SRI on-farm trials were farmer-managed and researcher-supervised. SRI results were compared to those with farmers' practice. Farmers transplant much older seedlings, 28-40 day-old seedlings. Three or four seedlings are transplanted per hill, with 30-35 seedlings per m^2. Older seedlings are preferred because they are taller and can be transplanted in uneven fields with poor water control and thus a lot of flooding.

Results and Discussion

On-station trials

Spacing: Differences in population density gave relatively similar grain yields between 20 x 20cm and 30 x 30cm spacing. Stover yield increased with an increase in spacing, but this did not correspond to an increase in grain yield. Spacing at 30x30cm is more economical in terms of seed and labor requirements; it is much faster than transplanting at 20x20cm spacing. Transplanting at 40x40cm spacing gave the highest stover mass, but the lowest grain yield. Spacing at 30x30cm is thus being recommended to farmers in The Gambia.

Fertilizer Applications: These trials indicated that under SRI management, the nationally-recommended fertilizer application rate of 70-30-30 NPK is as effective as doubling the rate. While tripling the rate gave higher yields, this is not economically profitable.

On-farm trials

These gave exciting results, showing *a tripling of yield* compared with the production using farmers' present practices. The trials were conducted in a communal tidal irrigation scheme. Other non-participating farmers had the opportunity to observe the trials.

The most acute problem facing farmers in their effort to adopt SRI in The Gambia is land preparation. Extra effort had to be put into land preparation in order to prepare the fields for SRI. For some farmers, this will be a problem for undertaking these new methods.

Farmers in The Gambia still do not have a well developed culture of water control. Fields are simply kept flooded after transplanting until the rice plants reach maturity. Fertilizer application and weeding are done under submerged conditions. So these practices would conflict with adoption of SRI.

Table 1. Grain yields from SRI on-farm trials, The Gambia, 2001

Farmer	Farmers' Practice (T/ha)	SRI Practice (T/ha)
1	3.7	8.5
2	2.0	7.8
3	2.5	9.3
4	1.8	9.4
5	1.6	9.0
6	1.4	8.0
7	2.8	6.0
8	2.5	7.0
9	3.8	7.6
10	2.5	1.8
Average	2.5	7.4

In one instance (Farmer No. 10 above), the bund between the area with the farmers' own practices and the SRI half of his plot gave way, submerging the 1-week-old SRI seedlings and resulting in seedling mortality and retarded growth. All the other SRI plots performed much better than those with conventional practices, averaging a little more than 8 t/ha.

Prospects

High returns from SRI practices were clearly demonstrated to farmers in The Gambia. Prospects are that farmers will start utilizing at least one or two SRI components in their production systems and reaping its benefits. However some fundamental factors will limit utilization of several or all SRI components effectively.

Policies in The Gambia and Sahel region regarding extensification of irrigation schemes is to a great extent influenced by the amount of water available to support production, taking into consideration the massive demand of current production systems. In the more arid regions of the Sahel, rivers are already failing to fully support irrigation schemes.

Land preparation under SRI in more intensive, and although SRI gives three times more grain yield than current practices, adoption of SRI will to a great extent depend on access to extra man-days of labor for land preparation or power-tiller time.

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