Exploratory experiment to test the SRI method under West-African rice growing conditions. *Willem A Stoop*

1. Background

The "System of Rice Intensification" (SRI) originated in Madagascar (the Antsirabe region at 1500m altitude) in the 1980s in response to a famine and the resulting shortage of rice seed. It was first brought to our attention by Dr. Norman Uphoff from the Cornell Intenational Institute for Food, Agriculture and Development (CIIFAD).

In Madagascar the system has been adopted by a fair number of small farmers, who have obtained impressive yields ranging from 6 to 12 tons/ha as compared with the 2 to 3 tons with the regular practices. The high yields were realised on rather unfertile soils and without large external inputs. The SRI method compensates for this absence of external inputs through a number of carefully timed and implemented practices. While the method was developed for irrigated rice systems in Madagascar, it is based on a number of principles, that may well have a general validity. Agronomic management in SRI seeks to maximise the tillering and rooting process per plant by optimising the conditions for early plant development through early transplanting, single plants, wide spacing and regular early weeding. These measures that minimise inter- and intra specific competition are combined with soil water management practices, that create moist, aerated soil conditions favouring also organic matter decomposition, and thereby a steady, low concentration, nutrient flow to individual plants. Irrigation is limited to situations where the plants start to show moisture stress symptonis.

The SRI method is based on synergistic effects between a number of cultivation practices. The method allows small farmers to economise greatly on the use of irrigation water and/or costly, often not even available chemical inputs (mineral fertilisers and pesticides), and yet obtain very high yields. The potential benefits of the method involve both production and environmental aspects. During the 1999 season an exploratory experiment was conducted to verify under West African conditions, the results obtained in Madagascar for systems operating under full water control (irrigated).

The experimentation resorts logically under Project 2.1.: "Improvement of ressource-use efficiency in irrigated rice-based systems", but has also close linkages to Projects 1.1. (sustainable intensification of lowland rice-based systems) and 1.3. (creating low management plant types for ressource poor farmers in rainfed ecosystems).

2. Objectives

a) verify the potential of the SRI method and its possible relevance to West African rice production systems (at this initial stage: irrigated systems), and

b) explore the impact of two critical production factors: rice cultivar types (early and late maturing) and seeding/transplanting dates (early and late) on the performance of the SRI method.

3. Experimental variables and design

Production method (M)

M 1: Conventional practices for irrigated systems,
M 2: SRI method

Seeding/transplanting date (D)

D 1: nursery seeding: 9 and 20 July; transplanting 30 July
D 2: nursery seeding: 9 and 20 August; transplanting 30 August

Rice varieties (V):

V 1: early maturing: BG 90-2
V 2: late maturing: Suakoko 8

The experiment had factorial combinations for M x D x V = 2 x 2 x 2 = 8 treatment combinations; the M x V effect was confounded with blocks and 4 replications were used.

4. Results and Discussion

This has been an exploratory trial; the research assistants and technicians were initially insufficiently aware of its complexity due to the many interacting variables (experimental and non-experimental as associated with the two methods), that affected the outcome. Notably the modified irrigation regime of the SRI method was incorrectly implemented for the first transplanting date and first 10 days of the second planting date. As a result SRI plots have been mostly water-saturated during this initial period.

Judging from the highly significant yield response for the "Method x Transplanting date" interaction (Figure), it is assumed that this incorrect water management in the SRI method has critically influenced the outcoume of the results.

When interpreting the results in Table 1, it should be kept in mind that for the SRI method

- the number of plants/m² is only one tenth of that in the conventional irrigated method (10 versus 100 pl/m²)
- the SRI treatments did not receive N fertilizer topdressings (totalling 40 kg N/ha for the conventional system)

Against that background the yield for SRI treatments show an interesting increase for the second transplanting date; for the conventional irrigated system this response was negative (Figure)

For both varieties the number of panicles/plant increased by some 20 % between first and second planting date in the SRI system, which may be attributed to the adjusted irrigation regime for the second transplanting date.

A significant interaction between V x D x M was recorded for plant height. Suakoko grew taller in the second planting date in particular under SRI than did the BG 90-2. Yet the increased height of Suakoko only led to lodging under the conventional irrigation system. These tentative results have led to a second series of experiments conducted during the 2000 rainy season.

Table 1 : Grain yields; yield components and general plant caractesistics for the exploratory trial comparing the conventional irrigated and SRI systems of rice production

	Yield kg/ha	Days to 50% flowering	maturity	Height (cm)	lodging	Pan./m²	Pan./pl	Grains/ panicle	1000 grain weight
Factors									
Method (M	**	NS	NS	NS		**	-	**	NS
Conventional irrigated (M)	6857	105	134	120	part	220	2	250	25.8
SRI (M2)	4629	106	133	112	0	165	15	226	26.1
Varieties (V)	NS	**	**	**		NS		**	**
BG 90-2 (V1)	5635	97	126	97	0	194	-	193	30.8
Suakoko 8 (V2)	5851	113	140	135	some	191	-	283	21.1
Transplanting date (D)	NS	**	**			**		*	NS
30 July'99 (D1)	5706	107	135	112	some	177	-	247	25.7
30 Aug. 99 (D2)	5780	104	132	120	some	207	-	229	26.1
Interactions									
MxV	*	N.S	N.S	N.S	Yes	*	-	N.S	N.S
MxD	**	*	N.S	N.S	No	(*)	-	**	N.S
VxD	*	N.S	N.S	N.S	No	N.S	-	*	N.S
MxVxD	N.S	N.S	**	**	No	N.S	-	N.S	N.S
C.V %	10.4								

* significance at 5% probability
** significance at 1% probability
N.S. non-significant

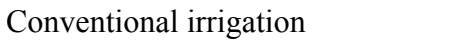

Figure : Interaction between irrigational method (conventional = m1 ; SRI = m2) and date of transplanting (30 July = D1 ; 30 August = D2)