

A Comparison between System of Rice Intensification and Conventional Cultivation Methods

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The System of Rice Intensification (SRI) is a new cultural system from Madagascar for growing lowland rice. It contrasts in many respects with conventional cultivation methods in China, although some of the practices used with SRI are said to have been used in China in ancient times. Which system offers more high-yielding advantage? Using the super high-yielding combination Eryou-pei 9 and the hybrid Sanyou 63, we did comparison experiments at Changsha in 2001.

1. Materials and Methods

1.1 Basic conditions in the experimental field

The field elevation is 600 meters. The soil is sandy with medium fertilizer and with good conditions in terms of irrigation and drainage. The field area was 0.2 ha..

1.2 Experimental design

The area of 0.2 ha. was divided into two parts: 0.12 ha. was used for the comparison experiment of SRI methods with conventional ones, with each plot area 20 m². The other 0.08 ha. was planted to examine SRI effects with Eryou-pei 9 compared with those seen for Sanyou 63.

1.3 Cultural practice

1.3.1 SRI

These plants were sowed in a plastic tray, 1 grain per hole, May 1, 2001, and were transplanted May 12. The spacing was 33.3×33.3 cm. The basic fertilizer included manure at a rate of 15ton/ha. and 225 kg of compound fertilizer. Top dressing was done on June 8 with 60 kg/ha of urea and 240 kg/ha of compound fertilizer 240 kg/ha, and 300 kg/ha of compound fertilizer with 60kg/ha of urea (on a later date?). [Note: this is much more than SRI recommends]

According the SRI, before the heading stage, adequate soil moisture is to be maintained but no standing no water on the field. On June 15, the field was dried in order to control the tillers' growth and it was irrigated again on June 30 (there was 4 rainy days).

1.3.2 Chinese conventional culture

These plants were sowed in a flooded nursery on May 1, 2001 and were transplanted May 30. Spacing was 16.7×26.7cm. The basic fertilizers were manure 15t/ha, ammonium carbon-hydrate 750kg/ha, calcium phosphate 525kg/ha, and KCL 195kg/ha. The top dressing was urea 90 kg/ ha on May 6 and compound fertilizer 300kg/ha and compound fertilizer 150kg/ha on July 12. The field was kept flooded throughout the growing cycle. [is this correct? should be stated explicitly]

2. Results and analysis

2.1 SRI can increase the grains per panicle, seed set rate, and 1000-grain weight. With Eryou-pei 9 super-hybrid, the grains per panicle, seed set rate, 1000-grain weight, and harvesting yield with SRI practices were respectively 199.7 grains, 94.0%, 26.1g, and 12.401 t/ha. They were, respectively, 6.8%, 6.6%, 4.4%, and 10.97% higher than produced with conventional cultural practices. Sanyou 63 grains per panicle, seed set reate, 1000-grain weight, and harvesting yield were, respectively, 175.1 grains, 96.3%, 12.9g, and 11.726t/ha . This was an increase over conventional practice of, respectively 5.7%, 12.9%, 1.7%, and 8.21% (see Table 1).

2.2 SRI cultural methods can promote tiller growth. At the same stage, the plants per hill with SRI was as twice as that of the control (see Table 2).

2.3 SRI methods can increase plant height. The height of Eryou-pei 9 with SRI was 1.5 cm higher than that of the control. Sanyou 63 height with SRI was 7.0 cm higher than that of the

control.

2.4 SRI does not have an influence to growth duration and growth speed of the leaves (see Tables 2 and 3). The growth duration of Eryou-pei 9 with the two methods was the same, 143 days. It was because of the over-application of N that the growth duration of Sanyou 63 was longer with conventional culture.

3. Discussion

3.1 Organic fertilizer is better for high yield from super-hybrids with SRI methods

3.2 SRI methods can promote tillering, but the amount of tillers must be controlled. Otherwise, the grains per panicle, seed set rate, and 1000-grain weight will decrease. Eryou-pei 9 was the highest with 5.4 million/ha or so plants.

3.3

Table 1. Yield and yield characteristics

Combinations	Eryou-pei 9			Sanyou 63	
	SRI	CK	SRI	SRI	CK
Measured area(m ²)	20	20	800	20	20
Hills 000//ha	90	225	90	90	225
Panicles/hill	29.1	12.2	28.8	26.7	12.4
Panicles 000/ha	2619	2745	2592	2403	2790
Grains/panicle	199.7	186.9	198.1	175.1	165.7
Effective grains/panicle	186.8	164.8	185.8	168.7	141.3
Seed set rate (%)	94.0	88.2	93.8	96.3	85.3
1000-grain wt (g)	26.1	25.0	25.6	29.9	29.4
Measured yield (t/ha)	13.651	11.309	12.329	12.121	11.590
Harvested yield (t/ha)	12.401	11.175	12.150	11.726	10.836
Over control (%)	10.97	--	8.72	8.21	--

Table 2 Growth speed of leaves and plant, and tillering dynamic

Month/ date	Leaf growth (cm)				Plant growth (cm)				Tillering number				
	Eryou-pei 9		Sanyou 63		Eryou-pei 9		Sanyou 63		Eryou-pei 9		Sanyou 63		
	SRI	CK	SRI	CK	SRI	CK	SRI	CK	SRI	SRI field	CK	SRI	CK
5/15	2.38		3.38						1.1	1.3		1.3	
5/18	3.78		4.32						2.1	2.5		2.8	
5/21	4.75		5.28		21.4		27.6		3.3	3.6		3.8	
5/24	5.61		6.26		26.0		31.9		5.8	5.4		5.1	
5/27	6.50		7.23		30.3		33.6		8.4	9.6		8.9	
5/30	7.11		7.79		32.6		38.4		11.1	12.3		13.3	
6/2	7.58	6.55	8.58	7.24	35.9	35.7	42.4	39.3	14.0	15.1	8.2	16.8	7.6
6/5	8.24	7.30	9.10	8.02	41.2	36.1	48.1	39.7	18.3	18.8	9.1	21.6	8.6
6/8	8.37	7.96	9.72	8.68	45.1	36.8	51.6	41.3	23.3	23.3	10.8	26.9	9.6
6/11	9.14	8.51	10.26	9.32	50.3	38.5	57.1	44.1	29.4	28.6	13.7	33.6	11.6
6/14	9.63	9.32	11.00	10.03	56.1	47.2	64.1	51.4	32.9	33.7	18.0	37.9	15.8
6/17	10.13	9.81	11.38	10.47	64.3	50.7	64.5	55.8	40.9	42.5	20.6	41.8	18.8
6/20	10.50	10.31	11.94	11.16	67.6	54.3	73.5	58.3	51.2	51.8	28.5	50.4	23.6
6/23	10.95	11.05	12.41	11.77	71.6	58.9	76.9	63.7	52.7	56.7	28.8	52.2	24.9

6/26	11.28	11.46	12.79	12.28	79.1	65.9	82.1	72.5	52.9	59.9	29.4	52.4	25.8
6/29	11.62	11.83	13.05	12.85	84.6	75.1	89.7	81.9	52.1	58.5	29.9	52.0	26.6
7/2	11.94	12.15	13.35	13.12	88.8		98.6		51.5	57.0	30.6	50.5	26.8
7/5	12.19	12.41	13.60	13.30	95.2	85.8	102.5	92.3	51.1	55.1	30.9	47.9	26.7
7/8	12.51	12.76	13.99	13.64	96.3		104.6		50.3	53.0	30.8	45.2	26.2
7/11	12.86	13.03	14.30	13.99		92.9	105.6	96.7			30.6		26.0
7/14		13.37	14.73	14.34							30.3		25.0
7/17		13.67		14.66		96.6		100.5			30.0		23.8
7/20		13.94		14.95									
7/23	14.20	14.21		15.22	103.1	101.5	114.0	104.1					
7/26			16.00	15.48									
8/1	15.00	15.01											
8/4													
8/7													
8/10					122.2	120.7	124.4	116.5	29.1	28.3	12.2	26.7	11.4

Table 3 Main growth stages (Units: month/day)

Combinations	Eryoupei 9		Sanyou 63	
	SRI	CK	SRI	CK
Cultural methods				
Sowing date	5/1	5/1	5/1	5/1
Transplanting date	5/12	5/30	5/12	5/30
Tillering initiated	5/15	6/5	5/15	6/5
Effective tillering stopped	6/11	6/10	6/8	6/11
Tallest plants	6/26	7/5	6/26	7/2
Heading initiated	8/8	8/8	8/2	8/4
Full heading	8/16	8/16	8/9	8/11
Ripening	9/20	9/20	9/20	9/11
Growth duration (days)	143	143	143	134
Leaves on main plant	15	15	16	16