

Effect of Nutrient Management in System of Rice Intensification (SRI) Cultivation Under South Gujarat Condition

PATEL VIPUL P.¹; MEHTA, H. D.¹ AND PATEL AMRUTBHAI²

¹Regional Rice Research Station, Navsari Agricultural University, Vyara-394 650(Gujarat),

²Office of Director of Research, Navsari Agricultural University, Navsari 396 450

email: vppatel13@gmail.com

ABSTRACT

An experiment was conducted under South Gujarat agro climatic condition at Regional Rice Research Station, Navsari Agricultural University, Vyara, (Gujarat) during *kharif*-2012 with a view to study the effect of nutrient management through organic and inorganic sources in SRI cultivation. The experiment was laid out in split plot design having two main treatments (Green manuring (G1) and without green manuring (G0)) and five sub treatments viz., no manuring (M1), 100% recommended dose of nitrogen (RDN) in the form of chemical fertilizer (M2), FYM (M3), bio-compost (M4) and vermicompost (M5). Green manuring (G1) treatment remained significantly better than without green manuring (G0) treatment for grain yield and majority of yield attributes. Green manuring significantly improve yield in SRI cultivation. Similarly sub treatment M2 (100% RDN) found significantly superior followed by bio-compost treatment (M4). Looking to yield and cost benefit ratio 100% RDN found best in SRI.

Key words Nutrient management, rice, south Gujarat

Rice is the life for million people in the world particular in the developing countries. It is livelihood crop of India. India has largest area of 42.75 million hectares with production of 105.24 million tonnes of rice and average productivity is 2462 kg ha⁻¹ (Anon., 2014). In Gujarat, most of the area under rice crop is confined in middle and South Gujarat comprising the districts of Kheda, Anand, Vadodara, Ahmadabad, Surat, Valsad, Tapi, Dang and Navsari. Rice is cultivated in 0.70 million hectares area with the production of 15.41 Lakh tonnes and a productivity of 2.198 tonnes ha⁻¹(Anon., 2013).

System of Rice Intensification (SRI) is emerging as a low input technology for increasing rice productivity with less use of water, seed and fertilizer. Organic manure are an integral component of SRI but availability is limited. Incorporation of organic manures might have helped in improving

the nutrient availability in the soil for a prolonged period on one hand and improving the soil physical condition on the other. There is a need to integrate organics with chemical fertilizers for sustainable crop production, maintenance of soil fertility and conservation of natural resources. Hence investigation was undertaken to study the effect of different organic and inorganic sources to supply nutrients in SRI cultivation under South Gujarat condition.

MATERIALS AND METHODS

An experiment was conducted under South Gujarat agro climatic condition at the Regional Rice Research Station (RRRS), Navsari Agricultural University, Vyara, Dist. Tapi (Gujarat) during *kharif*-2012 with a view to study the the effect of nutrient management through organic and inorganic sources in SRI cultivation. The soil of experimental field was clayey in texture, low in available nitrogen, medium in available phosphorus and medium in available potassium and slightly alkaline in reaction with 7.5 pH. Monsoon effectively commenced in first fortnight of July. Total rainfall received was 796 mm in a span of 50 rainy days. Overall rainfall was low compare to long term average. The experiment was laid out in split plot design having two main treatments (Green manuring (G1) and without green manuring (G0)) and five sub treatments viz., no manuring (M1), 100% recommended dose of nitrogen (RDN) in the form of chemical fertilizer(M2), FYM (M3), bio-compost (M4) and vermicompost (M5) The high yielding paddy variety 'NAUR-1" was used as planting material. Twelve days old seedling planted at 25 x 25 cm spacing. Unit plot size was 5 m x 5 m. Green manure crop of sunhemp incorporated one day before transplanting. 100 kg Nitrogen applied through manure application as per treatments based on chemical composition. Organic source viz. Vermicompost, Bio-compost and FYM contains, 1.00%, 1.03% and 0.42 % Nitrogen, respectively.

Table 1. Effect of green manuring and different manure application on growth and yield in SRI.

Treatment	Plant height (cm)	Number of panicle/sq.mt	Panicle length (cm)	Grain yield (kg/ha)	Straw yield (kg/ha)
Green manuring (G)					
G ₀ : Without G.M.	91.95	88	26.23	2330.1	2961
G ₁ : With G.M. incorporation	100.25	101	26.62	3137.4	3409
SEm ±	0.82	3.21	0.33	84.8	49.7
C.D. 5%	3.69	NS	NS	381.8	223.7
C.V. %	3.82	15.13	5.65	13.9	6.9
Manure application (M)					
M ₁ : No manure	92.25	92	25.55	2005.8	2757
M ₂ : 100% RDN	104.0	121	27.32	3955.2	4667
M ₃ : FYM	94.12	82	26.45	2361.4	2596
M ₄ : Bio compost	96.37	92	26.30	2715.7	2904
M ₅ : Vermi -compost	93.75	85	26.50	2630.6	3003
SEm ±	1.92	4.76	0.36	128.7	161.7
C.D. 5%	5.62	13.90	1.07	375.7	471.9
C.V. %	5.67	14.18	3.95	13.3	14.3
Interaction effect					
G x E	NS	NS	NS	NS	NS

RESULTS AND DISCUSSION

Effect of green manuring : Study of the plant growth and yield of paddy crop gave significantly better result in the case of green manuring (Table-1). Application of green manuring treatment (G₁) recorded significantly higher plant height (100.25 cm) straw yield (3409 kg/ha) and grain yield (3137 kg/ha) compared to control. More number of panicles/sq.m. and panicle length(cm) recorded in green manuring treatment (G₁) over control treatment (G₀). Green manuring improve yield attributing traits resulted in improvement grain yield. Green manuring treatments have positive effect on growth parameters and yield of rice also recorded by Swarup, 1987, Sharma and Mittra, 1988 and Avudaitai and Somasundaram, 2011.

Effect of organic manure: Manure application data presented in Table-1 revealed that application of treatment M₂ (100% RDN) showed significantly higher plant height (104 cm), no. of panicle/sq.mt.(121), panicle length (27.32 cm), straw yield (4667 kg/ha) and grain yield (3955 kg/ha) followed by application of treatment M₄ (bio-compost) and M₅ (vermicompost) treatment M₃ (FYM). However, there was no significant treatment

difference between organic sources of nutrient application. Inorganic sources of nutrient application have positive effect for grain yield and its component traits also reported by Sarkar, *et al.*, 2003 and Saleque, *et al.*, 2004.

Economics

The different treatment influenced the net income under SRI cultivation. Among main treatments net realization of 17972 Rs./ha with CBR of 1: 1.49 is observed with Green manuring treatment (G₁). Among sub-treatments maximum benefit of 43618 Rs/ha recorded in treatment M₂ (10% RDN) with CBR of 1 : 2.69. Among organic sources, manure application in the form of bio-compost recorded net realization of 17300 Rs/ha with CBR 1 : 1.9 (Table 2).

Looking to the results significantly higher grain yield recorded by Green manuring treatment (G₁) compared to non green manuring treatment (G₀). Green manuring significantly improve yield in SRI cultivation. Similarly sub treatment M₂ (100% RDN) found significantly superior followed by bio-compost treatment (M₄). Looking to yield and cost benefit ratio 100% RDN found best in SRI.

Table 2. Economics of nutrient management

Treatments	Grain yield	Straw yield	Total income	Total cost	Net income	CBR
	(kg/ha)	(kg/ha)	(Rs/ha)	(Rs/ha)	(Rs/ha)	(Rs/ha)
Green manuring (G)						
G ₀ : Without G.M.	2330.1	2961.0	41514	32076	9438	01:01.29
G ₁ : With G.M. incorporation	3137.4	3409.0	54048	36076	17972	01:01.49
Manure application based on N content-100 kg/ha (M)						
M ₁ : No manure	2005.8	2757.0	36402	21200	15202	01:01.71
M ₂ : 100% RDN	3955.2	4667.0	69318	25700	43618	01:02.69
M ₃ : FYM	2361.4	2596.0	40776	33105	7671	01:01.23
M ₄ : Bio compost	2715.7	2904.0	46634	29334	17300	01:01.59
M ₅ : Vermi compost	2630.6	3003.0	45780	41200	4580	01:01.11

LITERATURE CITED

Anonymous 2013. <http://eands.dacnet.nic.in>

Anonymous 2014. Annual Report 2013-14, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, Krishi Bhawan, New Delhi pp. 2

Ayudathai, S. and Somasundaram, S. 2011. Effect of organic manures, biofertilizers, panchakavya and meem products on rice yield under sodic soil. *Green farming*. **2** (05) : 524-526.

Sarkar, S.; Sing, S. R. and Sing, R. P. 2003. The Effect of organic and inorganic fertilizers on soil physical condition and productivity of a rice -lantil cropping sequence in india. *The Journal of Agricultural Science*. **140** (04) :419-425.

Sharma, A. P and Mitra, B. N. 1988. Effect of green manuring and mineral fertilizer on growth and yield of crops in rice- based cropping on acid lateritic soil. *The Journal of Agricultural Science*. **110** (03): 605-608.

Swarup, A. 1987. Effect of presubmergence and green manuring (*Sesbania aculeata*) on nutrition and yield of wetland rice (*Oryza sativa* L.) on a sodic soil. *Bio fertile soils*. **5** : 203-208.

Saleque, M.A , Abedin, M.J, Bhuiyan, N.I, Zaman S.K and Panaullah G.M. 2004. Long-term effects of inorganic and organic fertilizer sources on yield and nutrient accumulation of lowland rice. *Fields Crop Research*, **86**(1): 53-65

Received on 18-12-2014

Accepted on 24-12-2014