Short Communication **Oryza Vol. 46. No.3, 2009 (254-256)**

Integrated nitrogen management for seed production of hybrid rice

S. P. Singh*, B. Sreedevi and R.M. Kumar

Crop Production Division, Directorate of Rice Research, Rajendranagar, Hyderabad –500 030, Andhra Pradesh, India

ABSTRACT

The effect of organic and inorganic fertilizers on seed yield and yield attributes of rice hybrid DRRH-1 was studied. Seed yield differences were significant among different treatments. The mean maximum seed yield of 2.60 t ha^{-1} was recorded with vermicompost or neemcake along with 50% recommended nitrogen. Integrated Nutrient Management recorded 55 and 48 per cent higher seed yield over organic and inorganic sources, respectively. The maximum net profit of Rs. 52,302 ha^{-1} was recorded by integrated nutrient management treatment (Vermmicompst + 50% N) followed by Neem cake + 50% N.

Key words: *organic, inorganic, nutrient sources, hybrid rice*

Hybrid rice technology is one of the options for increasing the rice production under high productivity areas. Hybrid seed production is a recurrent process and therefore, success of hybrid rice technology depends on efficient and economic quality seed production in large scale. Keeping in view the high prices of inorganic fertilizer, their high losses and the soil health, efforts were made to refine the seed production technology of hybrid rice.

Integrated Nutrient Management in rice has played a very important role in the present context of increasing demand for food supply and the increasing environmental concerns. Backer *et al.,* 1995 reported that, green manure legumes showed N accumulation of 80 – 100 kg ha^{-1} while Singh and Singh (1992) reported about 25 – 36 N kg ha^{-1} by one crop of Azolla. Combined application of urea, FYM, green manure, Azospirillum, and growth regulators significantly reduced the sterility and increased the yield of rice (Peeran and Sree – Ramulu 1995). The present study was carried out to increase the seed productivity of rice hybrid DRRH-1 through use of organic and inorganic fertilizers in vertisols of Deccan plateau region of Andhra Pradesh.

The field experiment was conducted during wet and dry seasons of 2003-04 in the research farm of Directorate of Rice Research, Rajendranagar, Hyderabad, India. The soil of the experimental plot was clay with a pH of 8.2 and available N (255 kg ha^{-1}), phosphorus (30 kg ha^{-1}) and potash (450 kg ha^{-1}). The experiment with seven treatments viz., Control (without organic and inorganic fertilizer); 33% of recommended nitrogen each at basal, tillering and panicle initiation; 50% N at basal, 25% N at tillering and 25% N at panicle initiation stage; Neem cake (2.5 t ha^{-1}); Vermicompost (2.5 t ha^{-1}); Neemcake (2.5 t ha^{-1}) + 50% N and Vermicompost (2.5 t ha^{-1}) + 50% N was laid out in randomized block design with four replications. Recommended dose of fertilizers was applied at the rate of N P_2O_5 120:60:40 K_2O kg ha^{-1}, respectively. Nitrogen, Phosphorus and Potassium were applied as Urea, Single superphosphate and Muriate of potash, respectively. Total quantity of phosphorus and 75% of potassium was applied as basal and remaining potassium was applied at panicle initiation stage. Neemcake and vermicompost were applied basally. Recommended agronomic practices were followed uniformly throughout the crop season.

Healthy seedlings of DRRH-1 parental lines – R (IR40750) and A (IR 85025) were transplanted in 2:8 ratio. Keeping 15 x 15 cm spacing in A X A lines, 30 X 15 cm line spacing between R X R line and 20 cm spacing between R X A lines. Three week old seedlings were transplanted with 1–2 seedlings hill^{-1} Observations on seed yield and yield attributes (panicle no. m^{-2} and panicle weight) were recorded at the time of harvest. Seed yield was adjusted at 14% moisture after drying

of seed. Economic returns were also worked out by considering the cost of cultivation of Rs. 23,000 ha^{-1} and price of the seed Rs. 30 kg^{-1}.

Seed yield differed significantly during both the seasons by use of different sources of organic and inorganic fertilizer (Table 1). Maximum mean seed yield (2.60 t ha^{-1}) was recorded with vermicompost + 50% N followed by neemcake + 50% N and these treatments were significantly superior to other treatments (0.83 – 1.96 t ha^{-1}). The seed yield differences between organic sources as well among inorganic fertilizer treatments were non-significant. Lowest seed yield (0.83 t ha^{-1}) was recorded in control. Seed yield attributes (panicle number m^{-2} and panicle weight) also showed similar trend as that of seed yield. Maximum number of panicles (263 m^{-2}) and panicle weight (2.80 - 2.83 g) were recorded with vermicompost + 50% N and neem cake + 50 N, respectively. The reason for higher seed yield with application of organic + inorganic fertilizer might have improved the physico-chemical properties of soil and availability of plant nutrients for longer period (Khan *et al*. 1986). The percent increase in seed yield of treatment with vermicompost + 50% N was 213 over the control.

The maximum net returns of Rs. 52,300 ha^{-1} was recorded by Vermicompost + 50% N followed by Neem cake + 50% N (Rs. 51,700/ha) and the lowest net returns of Rs.2,980 ha^{-1} was recorded by control treatment (Table 2).

On the basis of these findings it can be concluded that to achieve maximum seed yield as well net returns of DRRH-1, vermicompost or neem cake + 50% N application is the best integrated nitrogen management for vertisols of Deccan plateau of Andhra Pradesh.

Table 1. Seed yield and yield attributes as influenced by organic and inorganic sources of Nitrogen

Treatments	Seed yield (t ha^{-1})			Panicle number (No. m^{-2})			Panicle weight (g)		
	Wet 2003	Dry 03-04	Mean	Wet 2003	Dry 03-04	Mean	Wet 2003	Dry 03-04	Mean
Control (without organic and inorganic fertilizer)	0.71	0.94	0.83	198	175	187	1.82	1.65	1.74
33% of recommended nitrogen each at basal, tillering and panicle initiation	1.48	1.60	1.54	219	220	220	2.52	2.45	2.49
50% N at basal, 25% N at tillering and 25% N at panicle initiation stage	1.95	2.00	1.96	225	230	228	2.59	2.60	2.60
Neem cake (2.5 t ha^{-1})	1.72	1.85	1.79	240	235	240	2.35	2.39	2.37
Vermicompost (2.5 t ha^{-1})	1.45	1.60	1.53	220	225	223	2.40	2.50	2.45
Neem cake (2.5 t ha^{-1}) + 50% N	2.56	2.60	2.58	265	260	263	2.80	2.85	2.83
Vermicompost (2.5 t ha^{-1})+50% N	2.50	2.70	2.60	260	265	263	2.77	2.82	2.80
CD (P=0.05)	0.62	0.71	0.56	15	18	17	0.17	0.19	0.18

Table 2. Economic returns Rs ha^{-1} under different sources of nitrogen

Treatments	Mean seed yield (t ha^{-1})	Cost of cultivation (Rs. ha^{-1})	Gross returns (Rs. ha^{-1})	Net returns (Rs.ha^{-1})	B : C ratio
Control (without organic and inorganic fertilizer)	0.83	21,920	24,900	2,980	0.14
33% of recommended nitrogen each at basal, tillering and panicle initiation	1.54	23,000	46,200	23,200	1.01
50% N at basal, 25% N at tillering and 25% N at panicle initiation stage	1.96	23,000	58,800	35,800	1.56
Neem cake (2.5 t ha^{-1})	1.79	29.420	53,700	24,000	0.82
Vermicompost (2.5 t ha^{-1})	1.53	29,420	45,900	16,480	0.56
Neem cake (2.5 t ha^{-1}) + 50% N	2.58	25,700	77,400	51,700	2.01
Vermicompost (2.5 t ha^{-1}) +50% N	2.60	25,700	78,000	52,300	2.04

REFERENCES

Khan SK, Mohanty SK and Chalam AB 1986. Integrated management of organic manure and fertilizer nitrogen for rice. J India Soc Soil Sci 34: 505 – 509

Krishnaiah K, Viraktamath BC, Ilyas Ahmed M, Ramesha MS and Mishra B 2004. Hybrid Rice – Indian scenario In: Recent developments in Rice Research, Tamil Nadu Agricultural University, Aduthurai.

Peeran SN and Sree Ramulu US 1995. Influence of urea, organic manure, Azospirillum and growth regulators on the yield of rice. Oryza 32 (1) : 28 – 32

Singh PK and Singh DP 1992. Azolla – A potential way towards organic farming in rice cultivation in Indian conditions In: Roy MM and Verma LN (eds) Proc Nat Seminar on Organic Farming, Jawalapur, pp 233 – 240