

STUDIES ON THE PERFORMANCE OF KARUNA TO DIFFERENT LEVELS OF NITROGEN AND SPACING UNDER KERALA CONDITIONS*

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For attaining increased production of rice in Kerala, introduction of high yielding varieties has played a dominant role. IR-8 and Taichung Native-1 are only some of the examples. Recently it had been reported that a variety Karuna evolved by crossing IR-8 and Adt-27 was gaining popularity in the near by Tamil Nadu State. So an investigation was undertaken to study the suitability of this variety under Kerala conditions. Other objectives of this experiment were to assess the requirement of N and spacing for this variety. A popular improved strain of Kerala, Annapurna with almost the same duration was included for the purpose of comparison.

Materials and Methods

The experiment was conducted at the Agricultural College, Vellayani during the *Kharif* season 1970. The experimental soil was clayey loam with 0.104 per cent total N, 0.002 per cent available P_2O_5 , 0.002 per cent available K_2O and had a pH of 5.0. The two varieties received four levels of N viz. 50, 75, 100 and 125 Kg/ha and were planted at spacings of 10 cm X 10 cm and 15 cm x 10 cm- The 16 treatments were fitted in a factorial combination in randomised block design with three replications. The plot size was 7.5 m X 4.2 m with an area 31.559 m².

All the plots received farm yard manure at 5000 Kg/ha P_2O_5 as superphosphate and K_2O as muriate of potash at 50 Kg/ha each, as basal dressing. N was applied as ammonium sulphate. Half of the N was given as basal dressing, one-fourth at the active tillering stage and the rest ten days after the second dose. Two seedlings were planted per hill. The observations on growth characters, yield attributes, yield of grain and straw were recorded. Protein content of grain and N content of straw were also determined by Micro-Kjeldahl gunning method.

* From the M. Sc. (Ag) Thesis submitted to the University of Kerala 1970

Table 1

Yield and quality of grain and straw

Spacings (cm)	Yield of grain (MT/ha)			Yield of straw (MT/ha)			Protein content of grain (per cent)			N content of straw (per cent)		
	Karuna	Varieties Annapurna	Mean	Karuna	Varieties Annapurna	Mean	Karuna	Varieties Annapurna	Mean	Karuna	Varieties Annapurna	Mean
10x10	4.42	4.17	4.29	10.40	7.75	9.08	8.38	7.87	8.13	0.74	0.66	0.70
15x10	4.40	4.21	4.31	9.95	7.86	8.90	8.48	7.99	8.24	0.74	0.67	0.71
Mean	4.41	4.19	4.30	10.18	7.81	8.99	8.43	7.93	8.18	0.74	0.66	0.70
N leaves												
Kg/ha												
50	4.40	3.77	3.90	9.00	7.44	8.22	8.18	7.58	7.88	0.72	0.63	0.67
75	4.18	4.16	4.17	7.77	8.71	8.38	8.38	7.93	8.15	0.74	0.66	0.70
100	4.96	4.55	4.75	8.33	9.75	8.57	8.57	8.06	8.31	0.75	0.67	0.71
125	4.47	4.28	4.37	7.69	9.30	8.61	8.61	8.17	8.39	0.76	0.70	0.73
Mean	4.41	4.19	4.30	7.81	8.99	8.43	8.43	7.93	8.18	0.74	0.66	0.70
C. D. at 0.05 level for varieties and spacings = 0.27				C. D. at 0.05 level = 1.07			C. D. at 0.05 level = 0.02			C. D. at 0.05 level = 0.002		
Levels of N and combinations of varieties and spacings = 0.38				= 1.51			= 0.07			= 0.003		
Combinations of varieties and N levels = 0.53				= 2.12			= 0.10			= 0.004		

Table 2
Yield attributes

Spacing (cm)	Maturity stage of productive tillers		Length of panicles (cm)		No of grains per panicle		Thousand grain weight (g)	
	Karuna	Annapurna	Karuna	Annapurna	Karuna	Annapurna	Karuna	Annapurna
10x10	81.21	81.89	12.81	20.76	101.42	78.75	17.60	25.52
15x10	88.88	77.23	20.45	21.58	109.77	85.48	17.76	25.22
Mean	80.87	79.56	20.18	20.94	105.50	81.12	17.67	25.40
N levels								
Kg/ha								
50	84.78	78.56	19.54	20.61	98.50	75.75	17.78	25.42
75	80.87	80.58	12.75	12.03	104.00	72.46	17.82	25.46
100	82.24	81.24	20.64	21.81	102.54	87.22	17.49	25.27
125	88.58	77.17	20.58	21.41	110.68	81.28	17.61	25.68
Mean	82.87	79.56	20.16	20.24	105.52	81.12	17.67	25.40
D.F. at 0.05 level for various pairings								
			D.F. at 0.05 level		D.F. at 0.05 level		C.D. at 0.05 level	
			8.56		6.41		0.26	
Level of N and combination of N and N levels								
			0.76		9.07		0.87	
			7.18		12.84		0.52	

Table 3

Growth characters

Spacings (cm)	Height of plants at harvest (cm)			Total No. of tillers per sq.m. at harvest		
	Karuna	Annapurna	Mean	Karuna	Annapurna	Mean
10x10	75.85	82.39	79.12	639.17	506.67	572.92
15X10	76.27	84.99	80.63	410.00	391.00	400.50
Mean	76.06	83.69	79.88	524.58	448.84	486.71
N levels Kg/ha						
50	71.97	78.79	75.38	472.33	449.33	460.83
75	75.52	85.05	80.28	502.50	477.50	490.00
100	77.76	85.45	81.61	558.67	421.50	490.09
125	79.00	85.46	82.23	564.82	447.00	505.91
Mean	76.06	83.69	79.88	524.58	448.84	486.71
C. D. at 0.05 level for Varieties and spacings.			1.75	G. D. at 0.05 level for 39.90		
Levels of N and combinations of varieties and spacings.			2.52	56.40		
Combinations of varieties of N levels			3.51	79.82		

Results and Discussion

The data on grain yield, straw yield, protein content of grain and N content of straw are presented in Table I. From the results, it can be seen that the variety Karuna recorded a grain yield of 4.41 MT/ha and was on par with Annapurna with an yield of 4.19 MT/ha. Karuna has lesser thousand grain weight and shorter length of panicles (Table 2j when compared to Annapurna.

With reference to spacing also there was no significant difference in grain yield between the two levels tried. The beneficial effect of more number of plants per unit area in closer spacing and a higher percentage of productive tillers (Table 2) observed in this spacing did not however result in any significant difference. This might probably have been increased by the increased length of panicle and more number of grains per panicle (Table 2) thereby reducing the difference in yield between the two. The response to N was significant and the grain yield increased up to the level of 100 Kg N for both the varieties beyond which a decrease was noticed. Eventhough under Coimbatore conditions, Karuna has responded up to 200 Kg N/ha (Kalyanikutty 1970), at Veliayani it gave response only up to 100 Kg N/ha. This might be due to the difference in soil conditions of the respective places. Similar responses up to 100 Kg N/ha for the variety Annapurna were reported by Adam (1969) at Veliayani.

Straw yield data presented revealed that Karuna was significantly superior to Annapurna. This was probably due to a significant increase in the number of tillers (Table 3) in Karuna. This differential varietal performance might be due to the ability of individual varieties to utilise the absorbed N for vegetative or for productive purposes (Tanaka *et al* 1964).

Different levels of spacing did not have any significant effect on straw yield eventhough the number of tillers and plants per unit area were more in closer spacing and the plant height was lesser in both the varieties (Table 3) under closer spacing. Similar observations were also made by Pillai (1969).

Straw yield responded only up to 100 Kg N/ha beyond which a decrease was noticed in both varieties. Similar responses to N up to a certain level were obtained by previous workers like Chin and Li (1965) and Ahammed (1970).

The protein content of grain and N content of straw were significantly influenced by different treatments. The variety Karuaa was superior

to Annapurna. The closer spacing recorded a significantly low protein content than wider spacing probably because of more competition and lesser photosynthetic activity at reproductive stages, as reported by Murata *et al* (1957). There was also a significant increase in protein content of grain and N content of straw with increasing levels of N. This corroborated with the findings of Basak *et al* (1961), Chin and Li (1965) and Ahammed (1970).

Summary and conclusion

An investigation was conducted at the Agricultural College, Vellayani, during 1970 to study the performance of Karuna, a popular variety of Tamil Nadu under Kerala conditions to different levels of N and spacing in comparison with a popular variety Annapurna of Kerala. The 16 treatment combinations were replicated thrice in a factorial randomised block design. The results are summarised below.

The variety Karuna recorded a mean grain yield of 4.41 MT/ha as compared to 4.19 MT/ha in Annapurna.

The grain and straw yield gave responses for N application only up to 100 Kg/ha in both the varieties beyond which a decrease was noticed.

The different spacings tried did not influence the grain or straw yield in both the varieties.

The protein content of grain and N content of straw were significantly influenced by different treatments.

Thus from this trial, it was seen that Karuna could be successfully grown under Kerala conditions during Kharif season.

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