

STUDIES ON NUTRIENT UPTAKE BY DIFFERENT VARIETIES OF SORGHUM AT VARYING LEVELS OF N AND P*

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Field experiments were conducted with 5 different sorghum varieties viz., CO 18, CSH 5, CSH 6, CSV 4 and composite IX with graded levels of N and P. Potassium application was common. Uptake of N was the highest at maturity stage and lowest at seedling stage. Uptake of N was more with increasing levels of N. Varietal variation with regard to N uptake was also seen. Nitrogen had a favourable effect on P uptake. The variety CSH 6 recorded highest P uptake. Uptake values of K showed similar trend of results as in the case of N and P.

Apart from the yield, a knowledge on the uptake pattern of nutrients by sorghum is important. This would facilitate formulation of suitable fertilizer schedule. Even in this respect, experimental evidences are fewer and sporadic. Roy and Wright (1974) opined that this aspect had been dealt with only in a fragmentary manner in spite of the fact that sorghum occupies a pre eminent position in tropical agriculture. Hence the present study was aimed at

MATERIAL AND METHODS

A field experiment was conducted on red loam soil at Bhavanisagar, adopting split plot design, with three replications. The levels of N (0, 60 and 120 kg N/ha and the levels of P (0, 60 and 120 kg P₂O₅/ha) were assigned to main plot treatments and the varieties to sub-plot treatments. The five varieties of sorghum tried were CO 18, CSA 5, CSH 6, CSV 4 and composite IX. Plant samples were

collected at different physiological stages of crop growth viz., seedling, boot leaf, flowering and maturity stages. The grain and straw yields were also recorded. The plant samples collected at different stages as well as grain and straw were analysed for N, P and K contents. From the data the progressive uptake of nutrients was worked out. The relationships among various plant characteristics were also deduced in working out the correlation coefficients.

RESULTS AND DISCUSSION

Nitrogen uptake

Generally, the dry matter production had a dominant role in deciding the pattern of uptake. Raheja and Krantz (1958) reported that the shape of N uptake curve was similar to that of the shape of dry matter production except that N uptake curve was steeper during 7th week. In the present study, the results (Table 1) showed that the uptake of N was the highest

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at maturity stage and lowest at seedling stage. Uptake of N also tended to increase with increasing dose of applied N. Jacquinot (1964) and Korikanthimath (1975) reported similar effect on uptake of N. The variety composite IX recorded the highest uptake value. Ramachandran (1971) also reported similar differences of N uptake due to varieties. Positive and significant interaction between N and P also revealed that the highest level of N recorded the highest N uptake at all levels of P. Uptake of N in grain followed a similar trend as dry matter production. CSH 6 recorded the highest uptake of N in the grain. Incidentally this variety accumulated more N at 120 kg N/ha.

Phosphorus uptake

Uptake of P was also the highest at maturity stage and least at seedling stage. Quinby *et al.*, (1958) reported similar results.

The highest N level (120 kg N/ha) recorded the highest P uptake. This indicated that N had a favourable effect on P uptake. Roy and Wright (1974) made a similar observation. Earlier work by Singh and Pancholy (1967) also revealed similar effect. With reference to P uptake by grain, once again N levels exercised a favourable and significant influence in increasing the P uptake by grain. The variety CSH 6 recorded the maximum uptake of P (Table 2).

Potassium uptake

Uptake values of K showed similar trend of results as in the case of up-

take of N and P. Potassium uptake was maximum at maturity stage. The results (Table 3) further showed that P had no effect on K uptake but N levels had a significant influence. Shukla (1972) held the view that increasing N levels also favoured the absorption of soil and fertilizer K in corn. Among varieties, CSH 6 recorded highest K uptake.

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Table 1
Nitrogen uptake in plants (kg/ha)

Stages	S ₁	S ₂	S ₃	S ₄	C. D. (0.05)	
	23.10	25.53	66.19	101.31	3.53	
Varieties	V ₁	V ₂	V ₃	V ₄	V ₅	C. D. (0.05)
	48.32	54.64	56.24	51.58	57.35	3.94
N levels	N ₀	N ₁	N ₂	C. D. (0.05)		
	40.94	56.31	63.64	3.06		
N x P levels	N ₂		N ₁		C. D. (0.05)	
	P ₀	39.78	58.40	59.59	5.29	
	P ₁	43.87	57.92	63.32		
	P ₂	39.17	52.59	67.98		
Nitrogen uptake in grain						
Varieties	V ₁	V ₂	V ₃	V ₄	V ₅	C. D. (0.05)
	31.85	53.52	62.15	31.63	48.08	6.24
N levels	N ₀	N ₁	N ₂	C. D. (0.05)		
	33.90	47.84	54.59	6.98		

Table 2.
P uptake in plants (kg/ha)

Stages	S ₁	S ₂	S ₃	S ₄	C. D. (0.05)	
	4.28	5.67	15.23	28.58	1.21	
N levels	N ₀	N ₁	N ₂	C. D. (0.05)		
	11.30	13.78	15.27	1.05		
P uptake in grain						
Varieties	V ₁	V ₂	V ₃	V ₄	V ₅	C. D. (0.05)
	7.77	13.21	15.24	7.37	11.69	1.46
N levels	N ₀	N ₁	N ₂	C. D. (0.05)		
	8.33	11.83	13.01	1.90		

Table 3.
Potassium uptake in plants (kg/ha)

Stages	S ₁	S ₂	S ₃	S ₄	C. D. (0.05)	
	25.7	50.4	46.8	151.5	6.1	
Varieties	V ₁	V ₂	V ₃	V ₄	V ₅	C. D. (0.05)
	67.7	71.8	66.2	61.1	76.1	5.36
N levels	N ₀	N ₁	N ₂	C. D. (0.05)		
	58.8	70.8	76.2	5.3		
N x P levels	N ₀	N ₁	N ₂	C. D. (0.05)		
	P ₀	53.4	73.9	68.9	9.1	
	P ₁	65.3	69.6	78.7		
	P ₂	57.8	68.9	80.9		
Potassium uptake in grain						
Varieties	V ₁	V ₂	V ₃	V ₄	V ₅	C. D. (0.05)
	5.9	9.3	10.5	5.2	8.5	1.2
N levels	N ₀	N ₁	N ₂	C. D. (0.05)		
	5.85	8.29	9.51	1.29		