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# Studies on the Effect of Nitrogen and Potassium on the Nitrogen Uptake By Bhendi Fruits at Successive Stages of Pickings

S. MANI and K. M. RAMANATHANS

The results of a field experiment conducted to study the effect of N and K fertilizers on the N uptake by bhendi fruits at successive stages of picking are presented Application of both N and K increased the N uptake in bhendi fruits. The uptake of N was the highest at 8th picking and the lowest was at the last picking of the crop.

The essentiality of fertilizer for increasing the crop yield is well known. But there is rather dearth of information regarding the changes in plant composition and uptake of nutrients during crop growth. It is of importance to determine whether the use of fertilizers increase merely the yield or helps to increase the mineral content of bhendi fruits on which the quality of crop produce depends. The present investigation wes directed to study the effect of N and K interaction on the uptake of N by bhendi fruits at successive stages of pickings.

# MATERIAL AND METHODS

A field experiment was conducted on a red sandy clay loam soil with varying levels of N and K fertilizers on the uptake of N by Co 1 bhendi fruits at successive stages of pickings in the Tamil Nadu Agricultural University Farm at Coimbatore. The soil was low in available N, medium in available P and rich in available K. The treatments

included all possible combinations of N and K each at five levels viz., N at O 20, 40, 60 and 80 kg/ha and KaO at O. 15, 30, 45 and 60 kg/ha. Half the dose of N in the form of urea was applied at the time of sowing and the remaining half was applied 30 days after sowing. The entire dose of K was applied basally as muriate of potash. Uniform level of P at the recommended dose of 50 kg PaOs/ha was also applied basally as superphosphate. The design of the experiment was  $5 \times 5$  randomised block design with three replications. The marketable bhendi fruits were harvested periodically at three to four days intervals and the fresh yields were recorded. A total of 14 pickings were taken up during the crop growth period and the representative fruit samples collected for analysis, Nitrogen in bhendi fruits was estimated by micro kjeldahl method (Humphries 1956). The N uptake value was calculated by multiplying the N concentration with the dry matter yield of bhendi fruits.

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# NITROGEN UPTAKE BY BHENDI

TABLE 1. Summary of statistical analysis

Nitrogen levels  No N1 N2 N8 N4 S. E. C. D.  6850 9424 12296 15771 17070 48.7 138.4  Potassium levels					Total yield	of bhendi fr	uits (kg/ha)		to redmula
Nitrogen levels  Ne N1 Na Ne N4 S. E. C. D. 6850 9424 12296 15771 17070 48.7 138.4  Potassium levels  Ke K1 K2 K3 K4 S. E. C. D. 12117 12111 12537 12155 12491 48.7 138.4  Interaction: Nitrogen × Potassium  Ke K1 K2 K6 K4  Ne 6783 6760 6755 7021 6933 S. E. C. D. N1 9220 9474 10215 9093 9118 108.9 309.5  Na 12318 12171 11999 12669 12322  Ne 15566 15268 16443 15 21 16568  N4 16698 16882 17272 16670 17526			, B	е	2			1	, reportant
No       N1       Na       Na       Na       S. E.       C. D.         6850       9424       12296       15771       17070       48.7       138.4         Potassium levels         Ko       K1       Ka       Ka       K4       S. E.       C. D.         12117       12111       12537       12165       12491       48.7       138.4         Interaction: Nitrogen x Potassium         Ko       K1       Ka       Ko       K4         Na       6783       6760       6755       7021       6933       S. E.       C. D.         N1       9220       9474       10215       9093       9118       108.9       309.5         Na       12318       12171       11999       12669       12322         Na       15566       15268       16443       15 21       16558         N4       16698       16882       17272       18670       17526									
No       N1       Na       Na       Na       S. E.       C. D.         6850       9424       12296       15771       17070       48.7       138.4         Potassium levels         Ko       K1       Ka       Ka       Ka       S. E.       C. D.         12117       12111       12537       12155       12491       48.7       138.4         Interaction: Nitrogen × Potassium         Ko       K1       Ka       Ko       K4         No       6783       6760       6755       7021       6933       S. E.       C. D.         N1       9220       9474       10215       9093       9118       108.9       309.5         Na       12318       12171       11999       12669       12322         No       15566       15268       16443       15 21       16558         N4       16698       16882       17272       16670       17526									
Potassium levels  K <sub>0</sub> K <sub>1</sub> K <sub>2</sub> K <sub>3</sub> K <sub>4</sub> S. E. C. D.  12117 12111 12537 12165 12491 48.7 138.4  Interaction: Nitrogen × Potassium  K <sub>0</sub> K <sub>1</sub> K <sub>3</sub> K <sub>6</sub> K <sub>4</sub> N <sub>0</sub> 6783 6760 6765 7021 6933 S. E. C. D.  N <sub>1</sub> 9220 9474 10215 9093 9118 108.9 309.5  N <sub>3</sub> 12318 12171 11999 12669 12322  N <sub>6</sub> 15566 15268 16443 15 21 16558  N <sub>4</sub> 16698 16882 17272 16670 17526		No	1	V 1	N.	Na	N <sub>4</sub>		C. D,
Potassium levels  K <sub>0</sub> K <sub>1</sub> K <sub>3</sub> K <sub>6</sub> K <sub>4</sub> S. E. C. D.  12117 12111 12537 12155 12491 48.7 138.4  Interaction: Nitrogen × Potassium  K <sub>0</sub> K <sub>1</sub> K <sub>8</sub> K <sub>6</sub> K <sub>4</sub> N <sub>0</sub> 6783 6760 6755 7021 6933 S. E. C. D.  N <sub>1</sub> 9220 9474 10215 9093 9118 108.9 309.5  N <sub>3</sub> 12318 12171 11999 12669 12322  N <sub>6</sub> 15566 15268 16443 15 21 16558  N <sub>4</sub> 16698 16882 17272 16670 17526			94	424	12296	15771	17070	48.7	138.4
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ter see as are ere and took to any			60.0	50 a	6.27				17 .17
				08.a	5.38 an		244	270	Ma K.
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		10.5		* <b>\$</b> B.d	6.49	3.74	3.48	63.1	14, 84

TABLE 2: Uptake of Nitrogen by Bhendi Fruits at successive pickings (Mean of three replications kg/ha)

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	Number of			bhengi frui				
SI. No.	pickings/ treatment	•	2	3	4	5	6	7
7	No Ko	C.98	1.12	1.24	1.37	1.57	1.82	2.0
2	No Ka	1.00	1.10	1.24	1.37	1.57	1.78	1.9
3	No Ka	0.98	1.13	1.23	1.36	1.56	1.86	2.0
4	No Ka	1.01	1.17	1.31	1.40	1.61	1.86	2.1
5	Na Ka	1.03	1.17	1.32	1.42	1.59	1.89	2.0
							alevel m	Parameter
6	NI Ko	1.36	1.74	1.96	2.19	2.37	2.67	3.0
7	Na Ka	1.41	1.83	2.09	2.27	2.45	2.72	3.1:
8	N <sub>1</sub> K <sub>2</sub>	1.49	1.99	2.31	2.63	2.88	3.15-	3.4
91	N <sub>3</sub> K <sub>8</sub>	1.33	1.73	1.93	2.22	2.37	2.71	3.08
10	N <sub>1</sub> K <sub>4</sub>	1.36	3.72	2.08	2.22	2.41	2.68	3 08
			K.	, x		Diameter 1		
11	Na Ke	1.66	1.94	2.93	3 32	3.53	4.23	4,66
12	Na Ka	1.70	204	2 88	3.33	3.68	4.32	4.62
13.	Na Ka	1.60	2.01	2.84	3.28	3.61	4.21	4.54
14	Na Ka	1.79	2.28	2.96	3.57	3.92	4.41	4 75
15	Nº Ka	1.67	2.14	2.99	3.60	3.84	4.33	4.80
16	Na Ke	2.47	2.49	3 20	4.65	5.20	89881	
17	Na Ka	2.38	2.64	3.23	4.58	5.39 5.33	5.78	6.87
18	N3 K <sub>2</sub>	2.47	3.06	3,35	5.02	5.50	5.65	6 68
19	Na Ka	2.35	2.36	3.07	4.63	5.42	5.63	7.00 6.77
20	Na K4	2.48	3.06	3,50	5.08	5.65	6.37	7.09
0.0								
21	N <sub>4</sub> K <sub>0</sub>	2.58	3.35	3.66	5.09	5.88	6.49	7.19
22	N4 K1	2.67	3.28	3.63	5.27	6.02	6 65	7 20
23	N <sub>4</sub> K <sub>2</sub>	2.70	3.44	3.74	5.38	5.88	6.95	7.38
24	N <sub>4</sub> K <sub>3</sub>	2.60	3.46	3.73	5.18	5.86	6.52	7.31
25	Na Ka	2.80	3.48	3.74	5.49	5,84	6,93	7.41

## NITROGEN UPTAKE BY BHENDI

TABLE 2 (Contd...)

8	9	10	11	12	13	14	Total uptake
					Mario Person		
2.11	1.52	1.41	1.07	1.04	0.93	0.90	19.0
2.15	1.51	1.39	1.06	1.04	0.98	0.88	19.0
2.29	1.60	1.42	1.08	1.02	0.99	0.86	19.1
2,25	1.54	1.37		1,05	0.96	0.92	19.7
2,20	7.54	1.37	1.08	1.03	1.01	0.86	19.6
3.27	2.41	1.92	1.83	1.69	1.22	1.00	28.7
3.41	2.52	2.05	1.92	1.73	1.28	1.05	29.5
3.54	2.59	2.15	1.96	1.76	1.26	1.08	32.2
3.28	2.45	1.92	1.86	1.61	1.32	1.00	28.8
3.29	2,43	1.92	1.83	1.63	1.36	1.03	28.9
5.17	3.23	2.54	2.28	2.13	1.50	1.18	40.1
5.27	3.28	2.59	2.23	2.00	1.49	1,20	40.6
5.22	3.13	2.57	2.20	1.98	1.53	1.22	39.9
5.46	3.27	2.78	2.27	2.12	1.59	1.15	42.2
5.38	3.24	2.61	2.29	2.08	1.53	1.15	41.5
8.03	4.00	210	0.54	i Pin			
8.00	4.23	3.19	2.54	2.40	1.61	1,40	54.1
	4.19	3.14	2,43	2.37	1,58	1.43	53.6
8,58 7.88	4.38	3.29	2,7,1	2.47	1.77	1.50	57.2
	4.41	3.03	2.21	2.19	1:54	1.36	53.9
8.69	4,44	3.33	2.72	2.40	1.75	1.52	58,
9 01	4.63	3.55	2.86	2.59	1.75	1.58	60.2
8.91	4.85	3.73	2.89	2.55	1.91	1.59	61.1
9.25	4.97	3.84	2.97	2.60	1.96	1.57	62.5
9.01	4.82	3.69	2.96	2.61	1,82	1.69	61.3
8.76	4.97	3.93	3.13	2.62	2.14	1.64	62.8

# RESULTS AND DISCUSSION

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The total yield of bhendi fruits are presented in the Table 1. The N uptake of bhendi fruits at successive pickings and the summary of statistical analysis are presented in the Tables 2 and 3 respectively. The uptake of N was markedly increased by the N fertilization as it could be expected (Steineck, 1964, Ahmed and Tulloch-Reid 1968 and Gomi et al. 1970). Application of 80 kg N/ha recorded the highest N uptake, which was followed by the other levels in the decreasing order. Increasing levels of K showed a trend of increasing N uptake. The increase in N uptake at higher levels of K may be due to higher available N which was released by the higher levels of K. (Prohaszka and Hamar, 1976). The highest uptake of N was observed at 8th picking (5.61 kg/ha) and the lowest uptake of N was recorded at 14th picking (1.23 kg/ha), of fruits. It was note worthy that the 8th picking registering the highest yield of bhendi fruit has contributed for the highest uptake of N. This was quite obvious since the uptake is a function of the yield and the concentration of the nutrient.

The combined application of 80 kg N/ha with 60 kg K<sub>2</sub>0/ha recorded the highest uptake of N. In the interaction between N and stages of pickings it

was found that the application of 80 kg N/ha registered the highest uptake of N at all the pickings and the 8th picking registered the highest uptake of N irrespective of the N levels. Ignoring the levels of K, the 8th picking registered the highest uptake.

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### NITROGEN UPTAKE BY BHENDI

Table 3 Summary of statistical analysis

Uptake of nitrogen by bhendi fruits (kg/ha)

8.	Nitrogen lev	eis					
	No.	N <sub>1</sub>	N <sub>s</sub>	Ne	N <sub>a</sub>	S. E.	C. D.
	1.38	2.12	2.92	3.94	4.40	0.0063	0.018
b.	Potassium I	evels					
	K <sub>e</sub>	K <sub>B</sub>	Ka	K <sub>B</sub>	Ka.	3. E.	C. D.
	2.89	2.92	3.02	2.93	3.02	0.0063	0.018
						100	
€.	Pickings						
	1	2	3	4	5	S. E.	C. D.
	1.83	2.23	2.65	3,44	3.83	0.011	0.029
	6	7	8	9	10		
	4.31	4.81	5.61	3.28	2.59		
	11	12	13	14	. 31.47		
	2.14	1.95	1.47	1.23			

### d. Interaction: Nitrogen x potassium

	Ke	K <sub>1</sub>	K <sub>a</sub>	Ke	K <sub>4</sub>	S. E.	C. D.
No	1,36	1.36	1.37	1.41	1.40	0.014	0.039
N <sub>1</sub>	2.05	2.13	2.30	2.06	2.07		
N <sub>2</sub>	2.87	2.90	2.85	3.02	2.97		
N <sub>a</sub>	3.87	3.83	4.09	3.78	4.15		
N <sub>4</sub>	4.30	4.37	4.47	4.38	4.49		

(Continued)

TABLE 3 (Contd...)

e. Inter	raction:	Pickings	W	nitrogen

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Pickings	No	N <sub>1</sub>	N <sub>2</sub>	Na	N <sub>4</sub>	S. E.	C. D.
1	1.00	1.39	1.68	2.43	2,66	0.024	0.066
2	1.14	1.80	2.08	2.72	3.40		
3	1.27	2.07	2.92	3 27	3.70		
4	1.39	2.31	3.42	4.79	5.28		
5	1.58	2.49	3.72	5.48	5.90		
6	1.84	2.78	4.30	5.90	6.71		
. 7	2.03	3.15	4.67	6.88	7.30	7.34	
8	2.20	3.36	5.29	8.24	4 8.99		
9	1.53	2.48	3.23	4.33	4.85		
10	1.41	1.99	2.62	3.20	3.75		
11	1,07	1.88	2.25	2.52	2.96		
12	1.04	1.68	2.06	2.37	2.59		
13	0.98	1.29	1.53	1 65	1.92		
14	0.88	1.03	1.18	1.44	1.62		

### f. Interaction: Pickings & potassium

Pickings	K <sub>o</sub>	K <sub>1</sub>	K <sub>2</sub>	Ks	K <sub>4</sub>	S. E.	C. D.
1	1.80	1.83	1.85	1.82	1 87	0.024	0.066
2	2.13	2.18	2.33	2.20	2.31		
3	2.60	2.62	2.69	2.60	2.72		
4	3 32	3.36	3.91	3.84	3.87		
5	3.75	3.81	3.91	3 84	3.87		
6	4.20	4.22	4.45	4.23	4.44		
7	4.75	4.71	4.88	4.80	4.89		
8	5 5 1	5.55	5.75	5.58	5.68	1	
9	3.20	3.27	3.31	3.31	3.33		
10	2.52	2.58	2.67	2.57	2.63		
11	2.12	2.11	2.18	2.08	2.21		
12	1.97	1.94	1.97	1.92	1.95		
13	1.40	1.45	1.50	1.45	1.56		
14	1.21	1.23	1.25	1.23	1.24		