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

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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 K_2O 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 P_2O_5/ha was also applied basally as superphosphate. The design of the experiment was 5 × 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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TABLE 1. *Summary of statistical analysis*

Total yield of bhendi fruits (kg/ha)

a. Nitrogen levels

N_0	N_1	N_2	N_3	N_4	S. E.	C. D.
6850	9424	12296	15771	17070	48.7	138.4

b. Potassium levels

K_0	K_1	K_2	K_3	K_4	S. E.	C. D.
12117	12111	12537	12165	12491	48.7	138.4

c. Interaction : Nitrogen × Potassium

	K_0	K_1	K_2	K_3	K_4		
N_0	6783	6760	6755	7021	6933	S. E.	C. D.
N_1	9220	9474	10215	9093	9118	108.9	309.5
N_2	12318	12171	11999	12669	12322		
N_3	15566	15268	16443	15 21	16558		
N_4	16698	16882	17272	16670	17526		

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

Sl. No.	Number of pickings/ treatment	1	2	3	4	5	6	7
1	N_0 K_0	0.98	1.12	1.24	1.37	1.57	1.82	2.02
2	N_0 K_1	1.00	1.10	1.24	1.37	1.57	1.78	1.94
3	N_0 K_2	0.98	1.13	1.23	1.36	1.56	1.86	2.02
4	N_0 K_3	1.01	1.17	1.31	1.40	1.61	1.86	2.11
5	N_0 K_4	1.03	1.17	1.32	1.42	1.59	1.89	2.06
6	N_1 K_0	1.36	1.74	1.96	2.19	2.37	2.67	3.02
7	N_1 K_1	1.41	1.83	2.09	2.27	2.45	2.72	3.13
8	N_1 K_2	1.49	1.99	2.31	2.63	2.88	3.15	3.47
9	N_1 K_3	1.33	1.73	1.93	2.22	2.37	2.71	3.08
10	N_1 K_4	1.36	1.72	2.08	2.22	2.41	2.68	3.08
11	N_2 K_0	1.66	1.94	2.93	3.32	3.63	4.23	4.66
12	N_2 K_1	1.70	2.04	2.88	3.33	3.68	4.32	4.62
13	N_2 K_2	1.69	2.01	2.84	3.28	3.61	4.21	4.54
14	N_2 K_3	1.79	2.28	2.96	3.57	3.92	4.41	4.75
15	N_2 K_4	1.67	2.14	2.99	3.60	3.84	4.33	4.80
16	N_3 K_0	2.47	2.49	3.20	4.65	5.39	5.78	6.87
17	N_3 K_1	2.38	2.64	3.23	4.58	5.33	5.65	6.68
18	N_3 K_2	2.47	3.06	3.35	5.02	5.60	6.07	7.00
19	N_3 K_3	2.35	2.36	3.07	4.63	5.42	5.63	6.77
20	N_3 K_4	2.48	3.06	3.50	5.06	5.65	6.37	7.09
21	N_4 K_0	2.59	3.35	3.66	5.09	5.88	6.49	7.19
22	N_4 K_1	2.67	3.28	3.63	5.27	6.02	6.65	7.20
23	N_4 K_2	2.70	3.44	3.74	5.38	5.88	6.95	7.38
24	N_4 K_3	2.60	3.46	3.73	5.18	5.86	6.52	7.31
25	N_4 K_4	2.80	3.48	3.74	5.49	5.84	6.93	7.41

TABLE 2 (Contd...)

8	9	10	11	12	13	14	Total uptake
2.11	1.52	1.41	1.07	1.04	0.93	0.90	19.04
2.15	1.51	1.39	1.06	1.04	0.98	0.88	19.04
2.18	1.46	1.49	1.04	1.02	0.99	0.86	19.18
2.29	1.60	1.42	1.08	1.05	0.96	0.92	19.74
2.25	1.54	1.37	1.08	1.03	1.01	0.86	19.60
3.27	2.41	1.92	1.83	1.69	1.22	1.00	28.70
3.41	2.52	2.05	1.92	1.73	1.28	1.05	29.52
3.54	2.59	2.15	1.96	1.76	1.26	1.08	32.20
3.28	2.45	1.92	1.86	1.61	1.32	1.00	28.84
3.29	2.43	1.92	1.83	1.63	1.36	1.03	28.98
5.11	3.23	2.54	2.28	2.13	1.50	1.18	40.18
5.27	3.28	2.59	2.23	2.00	1.49	1.20	40.60
5.22	3.13	2.57	2.20	1.98	1.53	1.22	39.90
5.46	3.27	2.78	2.27	2.12	1.59	1.15	42.28
5.38	3.24	2.61	2.29	2.06	1.53	1.15	41.58
8.03	4.23	3.19	2.54	2.40	1.61	1.40	54.18
8.00	4.19	3.14	2.43	2.37	1.58	1.43	53.62
8.58	4.38	3.29	2.71	2.47	1.77	1.50	57.26
7.88	4.41	3.03	2.21	2.19	1.54	1.36	53.92
8.69	4.44	3.33	2.72	2.40	1.75	1.52	58.10
9.01	4.63	3.55	2.86	2.59	1.75	1.58	60.20
8.91	4.85	3.73	2.89	2.55	1.91	1.59	61.18
9.25	4.97	3.84	2.97	2.60	1.96	1.57	62.58
9.01	4.82	3.69	2.96	2.61	1.82	1.69	61.32
8.76	4.97	3.93	3.13	2.62	2.14	1.64	62.86

RESULTS AND DISCUSSION

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_2O/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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Table 3 *Summary of statistical analysis*

Uptake of nitrogen by bhendi fruits (kg/ha)

a. Nitrogen levels

N_0	N_1	N_2	N_3	N_4	S. E.	C. D.
1.38	2.12	2.92	3.94	4.40	0.0063	0.018

b. Potassium levels

K_0	K_1	K_2	K_3	K_4	S. E.	C. D.
2.89	2.92	3.02	2.93	3.02	0.0063	0.018

c. 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
2.14	1.95	1.47	1.23

d. Interaction: Nitrogen x potassium

	K_0	K_1	K_2	K_3	K_4	S. E.	C. D.
N_0	1.36	1.36	1.37	1.41	1.40	0.014	0.039
N_1	2.05	2.13	2.30	2.06	2.07		
N_2	2.87	2.90	2.85	3.02	2.97		
N_3	3.87	3.83	4.09	3.78	4.15		
N_4	4.30	4.37	4.47	4.38	4.49		

(Continued)

TABLE 3 (Contd...)

e. Interaction: Pickings x nitrogen

Pickings	N_0	N_1	N_2	N_3	N_4	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		
8	2.20	3.36	5.29	8.24	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	2.58		
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_0	K_1	K_2	K_3	K_4	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	5.51	5.55	5.76	5.58	5.68		
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		