

Fertilizer Experiments on Cabbage and Bean in the Up-Country

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INTRODUCTION

FERTILIZER use is very common in the vegetable growing areas of the up-country, but there appears to be no systematised information on the fertilizer requirements of vegetables. Experiments on the response to fertilizers of two common vegetables, cabbage and bean, are reported in this paper.

Cabbage is described as a grossfeeder, particularly on nitrogen and potassium. There is experimental evidence to show that a crop of cabbage depletes the soil considerably (3). Haworth (1) reports that a progressive increase in the yield of cabbage was obtained from increasing rates of application of nitrogenous fertilizers up to 279 lb. N/acre. Westgate and Forbes (4) found that the greatest average weight of heads and highest total yields were obtained between 200 to 250 lb. N/acre.

Being a leguminous crop, the nitrogen requirements of bean are not high. Experiments (2) have shown that nitrogen application upto 80 Kg./ha (71 lb./acre) has given considerably higher yields.

The experiments reported here were to study the response of cabbage and bean to nitrogen, phosphorus and potassium.

EXPERIMENTAL

Fertilizer experiments with cabbage and bean were conducted at the Agriculture Research Station, Rahangala, on a sandy clay loam soil which had the following chemical characteristics :

pH (1 : 1, soil : water)	..	..	5.1
Organic Matter	..	..	2.48 per cent.
Nitrogen	..	..	0.14 per cent.
Available phosphorus (Truog)	..	..	18 lb. per acre
Cation exchange capacity	..	..	16.30 m.e. per 100 gm.
Exchangeable bases	..	..	2.50 m.e. per 100 gm.
Exchangeable potassium	..	..	0.14 m.e. per 100 gm.

(a) Cabbage

Trial (i)

Maha 1962/63

A $3 \times 3 \times 3$ factorial trial was carried out with the following fertilizer levels :

Level		N lb./acre		P_2O_5 lb./acre		K_2O lb./acre
0	..	0	..	0	..	0
1	..	50	..	100	..	60
2	..	100	..	200	..	120

Nitrogen as ammonium sulphate was given in split doses. One third of the nitrogen was applied at transplanting and the remainder 3 weeks after transplanting. Phosphorus and potassium were applied at the time of transplanting as concentrated superphosphate and muriate of potash respectively. A plot size of 10 ft. $\times$ 10 ft. and a spacing of 24 inches between rows and 16 inches in the rows were used. The variety was N $\times$ 5 cross and the treatments were replicated four times.

The yield results are presented in Table 1.

TABLE 1.—Mean Yield of Cabbage in tons/acre

Level			N		P		K		L.S.D.
0	..	..	4.38	..	3.19	..	5.55	..	—
1	..	..	7.23	..	7.36	..	5.98	..	1.41
2	..	..	6.68	..	7.75	..	6.77	..	—

Nitrogen and phosphorus gave significant responses at the 1 per cent level. Potassium did not show any significant response.

Trial (ii)

Maha 1963/64

This was an amended 3×3 nitrogen and phosphorus trial in four replicates. Potassium was given as muriate of potash at the rate of 60 lb. K_2O /acre to all the treatments at the time of planting. The other details including the variety were the same as in trial (i).

Following were the levels of fertilizers :

Level			N lb./acre		P_2O_5 lb./acre
1	..	..	50	..	80
2	..	..	70	..	100
3	..	..	90	..	120

The yield results are shown in Table 2.

TABLE 2.—Mean Yield of Cabbage in tons/acre

Level			N		P		L.S.D.
1	..	..	4.85	..	5.25	..	—
2	..	..	5.00	..	5.21	..	1.15
3	..	..	6.69	..	5.60	..	—

In this trial only nitrogen showed a significant response at the 5 per cent level.

(b) Bean

Trial (i)

Maha 1963 (October)

A 3 × 3 nitrogen and phosphorus factorial trial in six replicates was carried out with the following fertilizer levels :

Level			N lb./acre		P ₄ O ₆ lb./acre
0	..	..	0	..	0
1	..	..	25	..	50
2	..	..	50	..	100

Nitrogen in the form of ammonium sulphate, phosphorus as concentrated superphosphate and potassium as muriate of potash were used. Potassium was applied at the rate of 25 lb. K₂O/acre to all treatments. All fertilizers were applied at planting. The plot size was 10 ft × 10 ft. and the spacing, 1 ft. between the rows and 9 inches in the rows. The variety used was 'Tenderlong'.

The yield results are shown in Table 3.

TABLE 3.—Mean Yield of Bean in cwt./acre

Level			N		P		L.S.D.
0	..	..	17.32	..	11.41	..	—
1	..	..	16.15	..	18.02	..	4.84
2	..	..	17.44	..	21.48	..	—

Phosphorus showed a significant response at 1 per cent level.

Trial (ii)

Maha 1963 (December)

This trial was exactly the same as that done previously [trial (i)], with the same number of replicates, levels etc. The yield results from this trial are presented in Table 4.

TABLE 4.—Mean Yields of Bean in cwt./acre

<i>Level</i>		<i>N</i>	<i>P</i>	<i>L.S.D.</i>
0	..	19.33	17.68	—
1	..	23.18	21.59	5.25
2	..	23.89	26.14	—

In this trial too, only phosphorus showed a significant response at 5 per cent level.

DISCUSSION

The two experiments conducted with cabbage show the response of this vegetable to nitrogen and phosphorus fertilizers. Trial (i) shows a response of 2.85 tons per acre to the application of the first 50 lb. N/acre and trial (ii) shows a further response of 1.84 tons/acre to an additional dressing of 40 lb. N/acre. The maximum economic response to phosphorus appears to be reached in the region of 80-100 lb P_2O_5 /acre. There does not seem to be much economic response to potassium.

In the case of bean, phosphorus seems to be the nutrient that needs consideration in these soils. The response in yield to the application of phosphorous up to 100 lb. P_2O_5 /acre is economical though the difference in yields between the 50 lb. P_2O_5 /acre and 100 lb. P_2O_5 acre fails to reach significance. Nitrogen did not give any significant response. This is quite understandable in view of the nitrogen fixing capacity of the plant. However, a small dressing of nitrogen at the start is beneficial for quicker initial growth and slightly higher yields.

SUMMARY

Fertilizer experiments conducted on the dry patana soils at Rahangala with cabbage and bean are reported. Cabbage responds well to nitrogen and phosphorus fertilizers on these soils while bean shows response only to phosphorus fertilizers.

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