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Effect of Phosphatic and Nitrogenous Fertilizers on Yield of Field Bean (*Vicia faba var. minor L.*)

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ABSTRACT

A significant increase in the yield of straw, pods and seeds of field bean was obtained with the application of 150 kg/fed. as calcium superphosphate. The application of 25 and 50 kg/fed. as ammonium sulphate increased the yield equally. The combined application of 150 kg. calcium superphosphate plus 50 kg. ammonium sulphate per fed. improved the field bean seed yield significantly.

INTRODUCTION

Many investigators found varied response of field beans to the application of phosphatic and nitrogenous fertilizers applied alone or in combination. Ballatore (1956), El-Sherif (1964), Hanna and Lowes (1967) and Taha *et al.* (1967) found a positive significant relationship between the phosphatic fertilizer and seed yield of horse bean plants. Moes (1964), Salem (1969) and Mohammed (1971) found no relationship between phosphatic fertilizers and seed yield of field bean plants. Similarly Mansour (1971) on Egyptian lupin and Ahmed (1973) on field bean found no increase in seed yield for the application of nitrogen.

Nitrogen alone gave a negative relationship to peanut seed yield and it became positive when combined with phosphorus. The interaction between nitrogen and phosphorus was significant (Humber, 1956). Loutfi *et al.* (1966) obtained 32 per cent increase in seed yield for the addition of 100 kg of calcium superphosphate per fedden* alone. This yield was further increased to 48.7 and 60.1 percent for the additional application of 50 and 100 kg/fed. of calcium nitrate respectively. The present work was contemplated to study the effect of phosphotic and nitrogenous fertilizers on field bean yield under the conditions of Minoufia governorate, Iraq.

MATERIALS AND METHODS

The experiment was conducted during 1972 and 1973 on light clay soil having a pH of 7.5 and 8.0 respectively. The total soluble nitrogen and available phosphoric acid were 0.025 and 0.80 per cent respectively during 1972 and 0.022 and 0.76 per cent respectively during 1973. The land where the present experiment was carried out during 1972 was preceded with maize and wheat in 1970 and cotton in 1971. The field where the experiment was conducted during 1973 was preceded with maize and berseem in 1971 and maize and barley in 1972.

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* 1 Fedden = 0.42 ha.

The most widespread field bean varieties in Delta region viz., Giza 1 and Giza 2 were taken for the study. Each experiment had nine treatments with combinations of three levels of calcium superphosphate and three levels of ammonium sulphate. The calcium superphosphate and ammonium sulphate analysed 16.0 per cent P_2O_5 and 20.5 per cent N respectively. The calcium superphosphate was applied at 0, 75 and 150 kg/fed. and ammonium sulphate applied at 0, 25 and 50 kg/fed. The experiment was laid out in a randomized block design and replicated four times. After sowing the seeds, calcium superphosphate was applied and plots irrigated while ammonium sulphate was applied 25 days after sowing, i. e., after thinning and prior to second irrigation. The plot size was 21 m^2 with six ridges of 60 cm. in width and 6 m in length.

The yield of pod, straw and seeds of the four inner ridges of every treatment in both seasons were determined at harvest and converted to kg fed. The number of pods per m^2 was also calculated. The shelling percentage, number of seeds per pod and weight of hundred seeds were also recorded.

RESULTS AND DISCUSSION

Effect of calcium superphosphate: Table shows the effect of calcium superphosphate on yield and yield components. Significant progressive increase on yield of straw, pods, seeds and number of pods per m^2 were obtained for the increasing levels of fertilizer. The application of 150 kg/fed. of calcium superphosphate was significantly superior to other levels in respect of the above characters. These results are in accordance with the reports of Ballatore (1956), El-Sherif (1964), Hanna and Lowes (1967) and Taha *et al.* (1967). In respect of shelling percentage, number of seeds per pod and weight of hundred seeds, there was no significant difference which corroborated the work of Salem (1969) and Mohammed (1971).

Effect of ammonium sulphate: Ammonium sulphate did not exert a significant effect on yield and yield components. However a consistant increase in yield and yield components was obtained in Giza 1 variety during 1972 and 1973 years for the application of 50 kg of ammonium sulphate/fed. On the contrary in Giza 2, the 25 kg of ammonium sulphate increased fed/. the yield.

It could be hypothesized that the amount of nitrogen synthesized by nodule bacteria is not sufficient to provide the plants with their requirements and the adequate amounts of ammonium sulphate under the environmental conditions of this study for Giza 1 and Giza 2 to be added was 50 and 25 kg of ammonium sulphate/ fed respectively. These results agree with Salem (1962) on lentil, Badawi (1965) on soybean, Loutfi *et al.* (1966) on peanut and Mansour (1971) on fenugreek but disagree with Mansour (1971) on Egyptian lupin and Ahmed (1973) on field bean.

Interaction between calcium superphosphate and ammonium sulphate: The interaction effect of the two fertilizers on the yield of straw, pods and seeds as well as number of pods per sq. m.

was not significant and therefore, the data were not included except for seed yield which showed that the addition of phosphorus in combination with nitrogen increased the seed yield than addition of either of them alone. The combined application of 150 kg/fed. of calcium superphosphate plus 50 kg/fed. of ammonium sulphate gave the highest seed yield in both the varieties in all seasons. This work is in conformity with the results of Loutfi *et al.* (1966) but in variance with Wahhab and Muhammed (1958) and Mansour (1971).

TABLE: Effect of Calcium superphosphate on the yield of field bean and its components.

Calcium superphosphate Kg/Fed.	Straw Kg/Fed.	Pods Kg/Fed.	Seeds Kg/Fed.	Shelling percent	No. of Pods/m²	No. of seeds/pod.	weight of 100 seeds g
0	1476.6	1810.0	1283.7	71.7	188.6	3.2	77.1
75	1815.7	2200.0	1511.7	69.3	223.6	3.2	67.1
150	2436.7	2581.7	1788.1	71.3	268.5	3.2	78.0
L. S. D. (0.01)	407.8	314.4	245.0	N. S.	37 2	N. S.	N. S.
0	2118.3	1925.3	1501.3	78.7	172.0	2.9	70.0
75	2608.3	2412.7	1752.5	75.0	208.7	3.0	71.7
150	3158.3	2818.3	1995.4	71.0	250.3	2.9	74.2
L. S. D. (0.01)	302.1	641.4	316.8	N. S.	44.6	N. S.	N. S.
0	1150.0	1756.6	1351.7	77.9	180.1	3.1	82.5
75	1541.7	2133.3	1651.7	77.3	221.9	3.1	81.5
150	1815.0	2411.6	1935.0	78.9	262.3	3.0	82.2
L. S. D. (0.01)	457.8	316.8	396.0	N. S.	41.6	N. S.	N. S.
0	2179.7	1921.0	1451.7	73.8	189.7	3.14	82.5
75	2580.0	2433.7	1880.0	77.3	222.0	3.14	83.8
150	3197.9	2929.3	2246.3	76.9	256.3	3.13	83.4
L. S. D. (0.01)	427.6	474.5	304.3	N. S.	49.2	N. S.	N. S.

N. S.: Not Significant.

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