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EFFECT OF POTASSIUM ON YIELD AND YIELD COMPONENTS OF BLACK GRAM

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The investigation into the effect of varying levels of potash application on the yield and quality characteristics of black gram (cv. Mash 88) were carried out on a sandy loam soil having 0.05% N, 8 and 130 ppm P_2O_5 and K_2O, respectively. A uniform dose of 25 and 75 kg Nand P_2O_5 ha-I was used in all the treatments. The varying levels of potash were 0, 25, 50, 75, 100 and 125 kg K_2O ha-I. The whole quantity of N, P and K in the form of urea, single super phosphate and potassium sulphate, respectively was side drilled just after seeding. The results revealed that application of 75 kg K_2O in addition to 25 and 75 kg Nand P_2O_5 ha-! showed a significant increase in yield and improved seed protein contents of mashbean.

INTRODUCTION

Black gram *(Viglla mungo* L.) also known as mashbean is an important grain legume of our country. Besides improving soil fertility through symbiotic N fixation, it is a cheap source of vegetable protein for direct human consumption and is known as poor man's meat. Having a wider adaptability, it is planted successfully both in irrigated as well as in barani areas twice a year Le. in spring and autumn. In spite of being widely adapted crop, its ha-I yield is very low in Pakistan. One of the major causes of low yield could be poor fertility status of the soils, therefore, fertility management is imperative to ensure better crop production on exhausted soils. Application of Nand P fertilizers was found to increase 1000-grain weight, grain yield and protein contents of various legumes particularly black gram (Rajendran *et al.,* 1974). This finding was further supported by the results reported by Subramanian and Radhakrishnan (1983) who claimed a significant increase in yield of black gram with the use of Nand P. Malik *et al.* (1986) also reported that Nand P combination was essential for having maximum yield of mashbean, however, K alone or in combination with Nand P did not show significant positive response. But the literature also witnessed that K application in addition to Nand P showed beneficial effects on mashbean (Raval and Yadav, 1986). Similarly, other researchers had also reported almost similar response to applied N, P and K by the crops like chickpea and mungbean (Ravankar *et al.,* 1973; Gowda and Gowda, 1978; Samiullah *et al.,* 1982; Shabbir, 1982).

Keeping in view these results, it was contemplated to work out the optimum level of potash to be applied with constant rate of Nand P for improving yield and quality of mashbean.

MATERIALS AND METHODS

The investigations were carried out during 1990 at the Postgraduate Agricultural Research Station (PARS), University of Agriculture, Faisalabad on a sandy loam soil having 0.05% N, 8 and 130 ppm available

Table 1. Effect or K application on the yield and yield components and protein content or black gram

Treatment (K_2O kg ha-I)	Number of pod bearing branches plant-1	Number of pods plant-I	Number of seeds pod-I	Seed weight plant-t (g)	Seed yield (q ha-I)	Seed protein contents (%)
0	4.20d	19.80 d	4.9 c	4.8 e	7.49 c	19.25 d
25	4.43 cd	24.00 c	5.3 c	5.4 d	8.12 be	23.80 c
SO	4.60c	29.75 a	5.9 b	6.7 ab	8.80 b	25.50 be
75	5.43 a	27.40 b	6.7 a	6.9 a	10.49 a	28.30 a
100	5.20 ab	29.62 a	6.2 b	6.0c	10.60 a	26.20 b
125	5.oob	29.20 a	6.1 b	6.3 be	10.00 a	26.00 b

Any two means not sharing a letter in comm differ significantly from each other at 5% level of probability.

P~s and K_2O, respectively. The quadruplicated eiperiment was laid out using randomized complete block design. The net plot size was 5 x 2.4 m. The experiment comprised 0,25, SO, 75, 100 and 125 kg ha-I K~ of levels. A uniform dose of 25 and 75 kg ha-I of Nand $P_2O.s$, respectively was used in all the treatments. A promising variety of black gram (Mash 88) was planted during the last week of July, 1990 in 60 cm apart rows using 20 kg seed ha-I. Whole quantity af'N, P and K in the form of urea, single super phosphate and potassium sulphate, respectively was side drilled just after sowing. All other cultural practices were kept normal and uniform for all the treatments. Observations were recorded on some important plant parameters like pod bearing branches planr't, number of pods planr 1, number of seeds pod-I, seed weight planr ', seed yield and seed protein contents. Nitrogen content of the seeds was estimated using Kjeldhal method. The seed protein estimation was made from N content of the seeds. The data collected were statistically analysed using analysis of variance technique and Least Significant Difference (LSD) test at 5% probability to compare the difference among the treatments means (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

It is evident (Table 1) that pod bearing branching behaviour was affected significantly by the application of K in addition to Nand P. Maximum number of pod bearing branches (5.43) planr'! was produced with 75 kg K_2O ha-1 application.

Number of pods planr'! was also significantly influenced by K application. All K levels produced significantly higher number of pods planr! than the control (where only Nand P were applied). The K levels of 50, 100 and 125 kg K_2O ha-I were statistically at par with each other but produced significantly higher number of pods planr! than rest of the treatments. Similar results were also reported by Shabbir (1982) in chickpea crop.

Number of seeds pod^{-1} was significantly higher in case of treatment where 75 kg ha^{-1} of K_2O was applied. Whereas 50, 100 and 125 kg K_2O ha-I of K application produced statistically similar results but were significantly higher than 25 kg K_2O ha-I or control treatments. Similar results have also been reported by Ghafoor (1985) in mungbean.

Improvements such as increased number of branching, , pod bearing or number of seeds pod-I could possibly be because of improved N and P utilization efficiency in the presence of K. Because these macro-elements have been found to show complimentary role for each other. Similar observation was also reported by Ayyoub (1985).

The results on seed weight plant^{-1} (Table 1) indicated a significantly positive effect of K. In general, K application produced significantly higher seed weight plant-I than the control. Where 50 or 75 kg K_2O ha^{-1} being statistically at par produced the maximum seed weight plant^{-1} than rest of the treatments. This can be attributed to higher number of pods plant^{-1} and number of seeds pod^{-1} in these treatments as reported earlier.

The seed yield increased progressively with increasing the rate of K_2O up to 100 kg ha-I. The higher levels of K_2O i.e. 75, 100 and 125 kg ha-I, however, did not differ significantly from one another. The maximum seed yield ~10.60 q ha-I) was recorded where 100 kg K_2O ha^{-1} was applied. The yield increase may be the result of cumulative effect of yield contributing components.

Potassium application increased the seed protein contents over control. The maximum seed. protein contents (28.3%) were noticed in case 75 kg K_2O ha^{-t} was applied. These results are in line with those of Ghafoor (1985) and Subrahamanyan (1987).

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