Pak. J. Agri. Sci.
25(2) 95, 1988

SEED YIELD AND QUALITY OF MUNGBEAN (*Vigna radiata* L.) AS INFLUENCED BY NPK APPLICATION

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Investigations into the effect of NPK application on the seed yield and protein contents of mungbean were carried out on a sandy loam soil having on an average 0.057% N, 4.71 ppm available P_2O_5 and 111.8 ppm K_2O. The treatments comprised 0-0-0, 25-0-0, 0-50-0, 0-0-50, 0-50-50, 25-50-0, 25-0-50 and 25 50-50 kg NPK ha^{-1} The results rev-ealed that mungbean exhibited a positive response to NPK in terms of increased nodulation, leaf area, number of pods per plant and number of grains per pod. The treatment 25-50-0 kg NPK ha^{-1} resulted in increased seed yield and produced seeds with high protein contents.

INTRODUCTION

Pulses play a vital role in human diet, animal feed and in the maintenance of soil fertility. Mungbean (*Vigna radiata* L.) is more popular owing to its nutritive value, high protein level in the seed (28.5%) being palatable and non-flatulent. The importance of high plant protein in the predominately starchy diet of developing countries cannot be over emphasized. Being drought tolerant and short duration crop, it has a wide adaptability under varying conditions in irrigated and non irrigated areas and enjoys a privileged position amongst the pulses. Moreover, it can be planted twice a year (spring and autumn), hence fits well in the crop rotation programme.

Despite these facts pulses in Pakistan have usually been associated with poor soils, poor people and rainfed agriculture, Malik *et al* , (1985). Mungbean is cultivated on an area of about 91,000 hectares with annual production of 41, 800 tonnes in Pakistan (Anonymous, 1984). But per hectare yield of mungbean in Pakistan is very low. The possible reasons for low yield are old varieties having low potential and insufficient and non-judicious use of fertilizers.

Bains (1967) showed that application of N, P and K had beneficial effects

on mungbean yield. Khan (1970) and Ravankar *et al.*, (1973) stated that phosphorus was more beneficial for having increased yield of mungbean than nitrogen. Rajendran *et al.*, (1974) observed that in mungbean seed protein and phosphorus contents increased with increasing level of applied nitrogen and phosphorus, whereas Samiullah *et al.*, (1982) reported that application of 20 kg N and 60 kg P per hectare separately and in combination was the optimum for most of the yield characteristics of summer mung.

Keeping in view these developments, the present investigations were carried out to determine the effect of NPK with varying combinations on the yield and quality of mungbean CV. No. 6601 under Faisalabad conditions.

MATERIALS AND METHODS

The experiment was conducted on a sandy loam soil having N (0.057%), P (4.7 ppm) and K (111.8 ppm) as determined from the soil samples taken from the field before planting at the Agronomic Research Area, University of Agriculture, Faisalabad, during the year 1984. The experiment was quadruplicated using Randomized Complete Block Design with a net plot size of 2.4 m x 5 m. The studies comprised the following treatments, 0-0-0, 25-0-0, 0-50-0, 0-0-50, 0 50-50, 25-50-0, 25-0-50 and 25-50 50 kg NPK ha.$^{-1}$

The crop was planted in the first week of August with hand drill by using 20 kg ha^{-1} seed rate. The entire quantity of fertilizers in the form of S. S. P, urea and potassium sulphate was side drilled just after seeding. Plant to plant distance was maintained at 10 cm by thinning. Other cultural practices remained uniform for all the treatments.

Following observations were recorded during the course of these studies; leaf area per plant, nodules count per plant, plant population per unit area, number of pods per plant, number of grains per pod, grain yield per hectare and protein contents in grain.

For recording leaf area, nodules, count, number of pods plant^{-1} and numder of grains pods,$^{-1}$ 5 plants were randomly selected from each plot, while plant population and grain yield were recorded on net plot basis and then calculated on hectare basis. Nitrogen percentage in grains was determined through Gunning and Hibbard's method using Tecator apparatus and multiplied with a constant factor (6 25) for calculating protein contents (Jackson, 1960).

The data were then analysed by using analysis of variance technique and Duncan's New Multiple Range Test at 5% was employed to compare the difference among the treatment means (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

The data pertaining to various growth characteristics are presented in Table 1. It is evident that planting density per unit area did not vary significantly. It was because of maintaining a uniform seeding rate. Nitrogen alone or in combinations with other fertilizers tended to increase leaf area, though many of the treatments did not differ significantly from control in behaviour. The data regarding nodulation behaviour indicated that nitrogen alone or in combination with other fertilizers influenced nodulation greatly and most of the treatments produced significantly higher number of nodules over the control. These results are quite in line with the findings of Ravankar *et al.* (1973) who maintained that starter nitrogen alongwith phosphorus helped the leguminous plants for establishing their root system and in the nodulation initiation.

The data regarding various yield parameters and grain quality (protein contents) are given in Table 2. It is evident that nitrogen in combination with P or K turned up with increased pod number per plant and differed significantly from control. Where application of 25-50-0 kg NPK ha^{-1} seemed to be appropriate for having higher number of pods per plant. This was because of increased number of pod bearing branches on the plants growing under the adequate levels of available essential macro-elements in soil. As regards number of grains pod^{-1} the data show that most of the treatments though exhibiting maching results, differed significantly from control and produced well filled pods. The Table 2 further reflets that fertilizer application tended to influence the yield performance and the application of 25-50-0 kg NPK ha^{-1} produced significantly higher yield over control which seemed to be the optimum dose for exploiting maximum economic returns under the prevailing conditions.

Similarly, application of 25-50-0 kg NPK ha^{-1} also seemed appropriate for producing grains with higher protein contents. These results support the findings of Samiullah *et al.* (1982) to a great extent who maintained that 20-60-0 kg NPK ha^{-1} appeared to be the suitable dose for obtaining increased grain yield with higher grain protein level.

Table 1. *Growth performance of mugbean as influenced by N, P and K application.*

Treatments (NPK Rates) $kgha^{-1}$	Plant population per plot	Leaf area per plant (cm^2)	Nodules count per plant
0- 0 - 0	217	640.50 d	4 d
25- 0 - 0	197	935.00 abcd	9 abc
0-50- 0	219	833.13 bcd	8 abc
0-0- 50	197	685.63 cd	6 cd
0-50-50	200	740.50 cd	7 bcd
25-50- 0	213	1145.38 ab	10 ab
25-0- 50	206	1015.25 abc	10 ab
25-50-50	235	1257.13 a	11 a

Entries not sharing a letter differ significantly at the 5 % level of significance (DMRT).

Table 2. *Yield parameters and grain quality of mungbean as influenced by the NPK application.*

Treatments (NPK Rates) (Kg ha^{-1})	Number of pods per plant	Number of grains per pod	Grain yield per hectare (kg)	Protein contents in grain (%)
0- 0 - 0	29 e	5 c	891 c	25.74 d
25- 0 - 0	35 bcd	8 ab	1083 bcd	30.53 bcd
0-50- 0	33 cde	8 ab	1041 bcd	30.04 bcd
0- 0-50	30 de	6 bc	883 de	26.87 cd
0-50-50	32 de	7 abc	1008 abc	28.47 cd
25-50- 0	40 ab	9 a	1166 ab	34.50 ab
25- 0-50	37 bc	9 a	1224 bc	32.18 abc
25-50 50	43 a	9 a	1281 a	37.06 a

Entries not sharing a letter differ significantly at 5% level of singificance (DMRT).

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