Pakistan Journal of Applied Sciences 3 (6): 428-431, 2003
ISSN 1607-8926

Phosphorus and Potassium Requirements of Mungbean (*Vigna radiata*)

F.C. Oad, A. Naqi Shah, G.H. Jamro and S.H. Ghaloo
Sindh Agricultural University, Tandojam, Pakistan

Abstract: A field experiment was conducted to assess the growth and yield performance of mungbean (***Vigna radiata***) varieties under various phosphorus and potash levels at Student's Experimental Farm, Sindh Agriculture University, Tandojam. Four mungbean varieties viz. AEM/25, AEM-6/20, NM-20/21 and AEM-10/2/87 were tested. Most of the agronomic traits of mungbean varieties were significantly influenced by phosphorus and potassium fertilizers except pod number, seed weight per plant and seed index were non-significant. However, 100-100 PK kg ha^{-1} showed an increase in the yield of the crop. Thus, it is recommended that the mungbean crop should be fertilized with phosphorus and potassium at the level of 100-100 PK kg ha^{-1} for achieving satisfactory seed yield.

Key words: Mungbean, fertilizer, phosphorus, potassium, growth, yield

Introduction

Mungbean is sub-tropical, short duration and drought resistant crop. It is an important pulse crop having high nutritional value and low cost protein food. It also restores the fertility of soil by fixing atmospheric nitrogen through root nodules. The farmers are taking low yield due to many constrains. Among those the fertilizer requirements mostly phosphorus and potassium have vital importance which are not properly supplied to the crop. Patel and Patel (1991) reported that grain yield was increased with increasing phosphorus rates from 0- 50 kg ha^{-1}. Thakuria and Saharia (1990) reported that yields of grams were increased from 518 to 720 kg ha^{-1} by applying 20 kg P_2O_5 ha^{-1}. Nirmal ***et al.*** (1991) noted that yield of mungbean increased with increasing phosphorus rates applied to the preceding crop. Rajkhowa ***et al.*** (1992) observed that seed yield of gram increased significantly when 20 kg P_2O_5 ha^{-1} was incorporated. Looking the previous research in the other countries, the field research was set to evaluate the effects of P and K levels on the yield and yield components of mungbean varieties.

Materials and Methods

The field experiment was conducted at Students Experimental Farm, Sindh Agriculture University, Tandojam, Pakistan. Four mungbean varieties (AEM-25/20, AEM-6/20, NM-20/21 and AEM-10/2/87 were tested under three phosphorus and potassium levels (50-50, 100-100 and 0-0 kg NP ha^{-1}). These fertilizers were applied at the time of sowing. Proper irrigation and cultural practices were carried out according to the experimental requirements of the crop.

Ten plants from each treatment were selected at random for recording observations and crop was harvested for final yield. The data collected was statistically analyzed by LSD test following Gomez and Gomez (1984).

Results and Discussion

The mean performance of mungbean varieties and their statistical analysis as affected by phosphorus and potassium levels is presented in Table 1. Data revealed that most of the agronomic traits have been significantly affected by fertilizer levels except number of pods, seed

Table 1: Agronomic traits of mungbean as affected by phosphorus and potassium fertilization

Plant height (cm)

	PK Fertilizer levels (kg ha^{-1})			
Varieties	0-0	50-50	100-100	Mean
AEM-25/20	43.16	42.02	44.77	43.31
AEM-6/20	43.77	36.75	48.25	42.32
NM-20/21	39.07	34.55	38.57	37.39
AEM-10/2/87	40.87	40.02	45.55	42.17
Mean	41.71a	38.38b	44.26a	
Statistics of fertilizer			Statistics of varieties	
S.E.= 3.77	Cdi=2.75	Cdii=3.73	Non-significant	

Number of fruiting branches per plant

	PK Fertilizer levels (kg ha^{-1})			
Varieties	0-0	50-50	100-100	Mean
AEM-25/20	9.42	9.97	12.06	10.66
AEM-6/20	7.37	11.50	10.09	9.92
NM-20/21	9.05	7.37	10.92	9.26
AEM-10/2/87	8.25	11.45	11.12	10.27
Mean	8.63b	10.07a	11.38a	
Statistics of fertilizer			Statistics of varieties	
S.E.=2.714	Cdi=1.981		Non-significant	

Number of pods per plant

	PK Fertilizer levels (kg ha^{-1})			
Varieties	0-0	50-50	100-100	Mean
AEM-25/20	18.60	20.55	23.22	20.79
AEM-6/20	15.97	24.77	27.07	22.58
NM-20/21	23.92	17.37	27.30	22.86
AEM-10/2/87	16.22	21.77	22.40	19.96
Mean	18.67	21.11	24.98	

Statistics of varieties and Fertilizer

Non-significant

Table 1: Continue

Pod length (cm)

	PK Fertilizer levels (kg ha^{-1})			
Varieties	0-0	50-50	100-100	Mean
AEM-25/20	6.23	6.10	6.66	6.33
AEM-6/20	6.03	6.54	6.70	6.43
NM-20/21	6.45	5.60	6.28	6.11
AEM-10/2/87	6.22	6.17	6.60	6.33
Mean	6.23b	6.10b	6.56a	
Statistics of fertilizer			Statistics of varieties	
S.E.= 0.440	Cdi=0.231		Non-significant	

Seed weight per plant (g)

	PK Fertilizer levels (kg ha^{-1})			
Varieties	0-0	50-50	100-100	Mean
AEM-25/20	4.34	5.12	5.60	5.02
AEM-6/20	3.16	4.03	4.86	4.01
NM-20/21	3.86	2.92	4.83	3.87
AEM-10/2/87	2.42	3.53	3.58	3.17
Mean	3.44	3.90	4.71	
Statistics of varieties and Fertilizer				
Non-significant				

Seed index (100 seeds weight in grams)

	PK Fertilizer levels (kg ha^{-1})			
Varieties	0-0	50-50	100-100	Mean
AEM-25/20	3.29	3.23	3.44	3.32
AEM-6/20	2.94	3.15	3.33	3.14
NM-20/21	3.37	3.42	3.05	3.28
AEM-10/2/87	3.26	3.47	3.38	3.37
Mean	3.21	3.31	3.30	
Statistics of varieties and Fertilizer				
Non-significant				

Yield per hectare (kg)

	PK Fertilizer levels (kg ha^{-1})			
Varieties	0-0	50-50	100-100	Mean
AEM-25/20	297.22	316.93	334.30	316.15
AEM-6/20	297.73	327.55	335.64	320.30
NM-20/21	299.30	325.30	335.53	320.04
AEM-10/2/87	303.23	322.26	333.71	319.73
Mean	299.37c	323.01b	334.79a	
Statistics of fertilizer			Statistics of varieties	
S.E.=4.6922	Cdi=3.442	Cdii=4.640	Non-significant	

weight per plant and seed index, whereas, varietal differences were non-significant. Further, data demonstrated that variety AEM-6/20 performed better results followed by AEM-25/20 under both the fertilizer levels as compared to control (untreated) in most of the crop parameters. However, data obviously indicated that P and K level of 50-50 kg ha^{-1} increased the seed yield over control and higher fertilizer level 100-100 PK kg ha^{-1} respectively. Most of the results are in accordance with the findings of Singh ***et al.*** (1991), Sarkar and Mukharjee (1991), Nirma ***et al.*** (1991), Rajkhowa ***et al.*** (1992), Jakhro ***et al.*** (1993) and Asif (1973), all researchers reported that the application of 50-82 kg P_2O_5 ha^{-1} increased the root length, stem, dry weight of leaves, seed index and number of pods per plant of mungbean. It can be concluded that phosphorus and potassium fertilizers should be applied at 50-50 kg ha^{-1} for satisfactory and economical seed yield of mungbean.

References

Asif, M.I.A., 1973. Effect of different levels of phosphorus on the growth and nodulation of mung. Agron. J., 75: 94-95.

Gomez, K.A. and A.A. Gomez, 1984. Statistical procedures for agricultural research (2nd Edn.). John Willey and Sons, New York.

Jakhro, A.A., U.A. Buriro, G.H. Jamro and M.B. Kumbhar, 1993. Effect of phosphorus fertilization on nodulation, growth and yield of mungbean. Sci. Int. (Lahore), 5: 189-190.

Nirmal S., N.M. Rafique, D. Kher, G.M. Khan and N. Singh, 1991. Effect of nitrogen and phosphorus on productivity of mustard-mungbean rotation. Haryana J. Agron., 7: 19-24.

Patel, F.M. and L.R. Patel, 1991. Response of green gram varieties to phosphorus and rhizobium inoculation. Indian J. Agron., 36: 2, 195-197.

Rajkhowa, D.J., K.Thakuria and S.R. Baroova, 1992. Response of summer green gram (***Phaseolus radiatus***) varieties to source and level of phosphorus. Indian J. Agron., 37: 589-590.

Sarkar, A. and A.K. Mukharjee, 1991. Effect of phosphorus on yield and nodulation of green gram (***Phaseolus radiatus***), black gram ***(P. mung***) and rice bean (***Vigna umbellate***). Field Crop Abst. 046-05144.

Singh, A.K., R.K. Chaudhry and R.P.R Sharma, 1991. Effect of inoculation and fertilizer levels on yield, nutrient uptake and economics of summer pulses. J. Potassium Res., 9: 176-178.

Thakuria, K. and P. Saharia, 1991. Response of green gram genotypes of plant density and phosphorus levels in summer. Indian J. Agron., 35: 431-432.