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Response of Summer Blackgram (*Vigna mungo*) Varieties to Phosphorus Levels under Lateritic Soils of Konkan

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Abstract:

A field experiment was conducted at Agronomy Farm, College of Agriculture, Dapoli, Maharashtra during summer season of 2011. The experiment was laid out in split-plot design with three replications. The main plot and sub-plot treatment comprised of four varieties and four levels of phosphorus. Results showed that yield attributes viz. plant height, dry matter accumulation/ plant, pods/ plant, grains/ pod and test weight were recorded the highest with variety 'TAU-1'. Further, among the different varieties of blackgram studied,'TAU-1' has produced maximum and significantly higher grain (1040 kg/ ha) and stover (1510 kg/ ha) yield over rest of the varieties, while the minimum and maximum harvest index was obtained with variety 'T-9' and 'TAU-1', respectively. The variety 'TAU-1' recorded significantly more total protein yield as compared to rest of the varieties. Similarly nitrogen and phosphorus removal by grain and stover were highest with variety 'TAU-1'. The application of phosphorus responded favorably up to 50 kg/ ha for yield attributes, grain and straw yield, total protein yield and removal of nitrogen and phosphorus. Similarly nitrogen content (44.97 kg/ ha) in grain and stover was more in the variety 'TAU-1'. The variety 'TAU-1' with application of 50 kg P_2O_5/ ha recorded maximum grain and stover yield with most remunerative combination of treatment having B: C ratio 1.47.

Key words:

Blackgram, Economics, Nutrient removal, Phosphorus levels, Varieties.

1. Introduction

Blackgram (*Vigna mungo* L. Hepper) is one of the most important components in the preparation of many south Indian dishes. In Konkan region, blackgram is grown mostly in *kharif* season as an mixed or intercrop which have very low productivity due to high incidence of diseases and pests. However, by introduction of suitable varieties it cultivation is being pushed in summer season to adjust between the time left after harvesting of *rabi* and sowing of *kharif* crops, where infestation of diseases and pests is relatively lower and also the vacant land is efficiently utilized without affecting the seasonal crops. Varieties and levels of phosphorus are the most important factors affecting the yield of blackgram. The crop being a leguminous, requires large quantity of phosphorus for proper growth and yield, but in almost all soils phosphate deficiency becomes a limiting factor for its maximum production. As information of phosphorus fertilization to blackgram varieties in summer season under irrigated condition of Konkan region is scanty, the present investigation is carried out to study the performance of different blackgram varieties to levels of phosphorus.

2. Methodology

The field experiment was conducted during summer season of 2011 at Agronomy farm, College of Agriculture, Dapoli, Ratanagiri (17.4° N latitude and 73.1° E longitude at 250 m above mean sea-level). The soil of experiment plot was sandy clay loam in texture, medium in available nitrogen (317.60 kg/ ha) and phosphorus (15.36 kg/ ha), high in available potassium (290.64 kg/ ha), high in organic carbon (1.25 gm kg^{-1}) and slightly acidic in reaction *p*H (5.9). The experiment was laid out in split-plot design assigning four varieties (TAU-1, T-9, BDU-1 and TPU-4) in main-plot and four levels of phosphorus (0, 25, 50 and 75 kg P_2O_5/ ha) in sub-plot make 16-treatment combination were replicated thrice. The two seeds were dibbled per hill with inter row spacing 30 cm and inter hill spacing was 15 cm. The seed rate used was 15 kg/ ha. Thinning of seedlings was carried out at 10 DAS, keeping single healthy plant per hill. Full dose of nitrogen (25 kg/ ha) and phosphorus as per treatment were applied by placement method as basal dose at the time of sowing. Necessary plant protection measures were followed. The weekly mean maximum and minimum temperature during the experiment ranged from 30.0 to 36.4°C and 10.0 to 22.9°C, respectively. The biometric observation was recorded periodically while yield and yield attributes were recorded at harvest of the crop. Economics and nutrient removal (N and P) were worked out.

3. Results and Discussion

3.1 Effect of varieties

Four varieties of blackgram (TAU-1, T-9, BAU-1 and TPU-4) were tried on lateritic soil of Konkan during summer season 2011 and the result revealed that the variety 'TAU-1'

significantly influence the yield attributes *viz.* pods/ plant, grains/ pod, 1000-grain weight and thereby yield (Table 1). The variety 'TAU-1' recorded significantly higher grain yield (1040 kg/ ha) and stover yield (1514 kg/ ha) as compared to rest of the varieties under study. The varieties 'T-9', 'BDU-1', 'TPU-4' were at par with each other and recorded lower grain and stover yield as compared to 'TAU-1'. The variety 'TAU-1' (40.72) was observed to be highest which was closely followed by 'BDU-1' (40.66) in respect of harvest index. The total protein yield of 'TAU-1' was significantly highest (275.90 kg/ ha) as compared with other varieties. 'TAU-1' recorded significantly highest grain yield over rest of the varieties which could be attributed due to higher values of yield components namely pods/ plant, grains/ pod, 1000-grain weight. The present results are in accordance with Rao and Konda (1988) and Yadahalli and Palled (2004). The significantly higher nitrogen and phosphorus removal (44.97 kg/ ha and 7.1 kg/ ha respectively) were obtained by 'TAU-1' compared to rest of the varieties. The present results are in accordance with Yadahalli and Palled (2004), Singh and Singh (2010).

3.2 Effect of phosphorus levels

Increasing levels of phosphorus application up to 50 kg/ ha resulted in improved yield attributing characters (Table 1). However, 50 and 75 kg P_2O_5/ ha did not differ significantly with respect to yield attributes and yield. Application of 50 kg P_2O_5/ ha significantly improved the yield attributing characters and yield over the control (no phosphorus) and the percentage increase in pods/ plant, grains/ pod, 1000-grain weight, grain yield and straw yield were 44.4, 12.3, 10.9, 33.3 and 15.0% under 50 kg P_2O_5/ ha compared to the control. This could be attributed to favourable effect of phosphorus on pods/ plant and 1000-grian weight at these levels. The findings are in agreement with those of Kumar *et al.* (2003) and Yadahalli and Palled (2004). Removal of both total N and P were significantly increased by P application up to 50 kg P_2O_5/ ha. The enhanced removal may be owing to cumulative effect of increased dry-matter accumulation and partly due to increase in its concentration. This is in conformity with results obtained by Reddy *et al*. (2000). The interaction effect between varieties and phosphorus levels for yield attributes, yield and nutrient removal was found to be non-significant.

Perusal of data (Table 2) clearly indicated that treatment combination of variety 'TAU-1' and 50 kg P_2O_5/ ha exhibited maximum grain (1130 kg/ ha) and stover (1380 kg/ ha) yield and also showed higher net return (Rs 19862/ ha) and benefit: cost ratio (1.47) as compared to rest of the treatment combinations. While treatment combination of 'BDU-1' and no phosphorus gave the lowest yield of grain (825 kg/ ha) and stover (1256 kg/ ha) and poorer in net return (Rs 4454/ ha) and benefit: cost ratio (1.12).

4. Conclusion

Thus, it can be concluded that for obtaining higher yields and net returns, blackgram variety 'TAU-1' be grown during summer season with the application of 50 kg P_2O_5/ ha under Konkan conditions.

5. References

i. Kumar, Satish,; Singh, R.C.; and Kadian, V.S., Response of mungbean genotypes to phosphorus application. Indian Journal of Pulses Research, 2003, Vol. 16(1), pp. 65-66.

ii. Rao, T.; and Konda, C.R., New and improved high yielding varieties in some pulses crops. Training Programme on Pulse Production Technology from September 28-30, 1988. Eds. M. M. Hosmani and B.M. Chittapur, Department of Agronomy, UAS, Dharwad.

iii. Reddy, B.; Prabhakar; and Reddy, S. Narayana, Effect of farmyard manure, phosphate solubilizing bacteria and phosphorus on yield and economics of black gram (Phaseolus mungo). Indian Journal Agricultural Sciences, 2000, Vol. 70(1), pp. 694-696.

iv. Singh, V; and Singh, G., Effect of sowing method and seed rates on growth and yield of summer mung bean genotype. Journal of Food Legume, 2010, Vol. 23(4), pp. 253-255.

v. Yadhalli G.S.; and Palled, Y.B., Response of black gram genotypes to Dates of Sowing and phosphorus levels in Northern Transitional Tract of Karnataka. Karnataka Journal of Agriculture Science, 2004, Vol. 17(2), pp. 215-219.

Table 1: Yield Attributes, Yield and Nutrient Removal by Blackgram as Influenced by Varieties and Phosphorus Levels

Treatment	Grain yield (kg/ha)	Stover yield (kg/ ha)	Pods/ plant	Grains/ pod	1000- grain weight (g)	Harvest index (%)	Total protein yield (kg/ ha)	Total removal (kg/ ha)	
								Nitrogen	Phosphorus
Varieties									
TAU-1	1040	1514	20.12	6.44	43.77	40.72	275.90	44.97	7.1
T-9	892	1393	19.06	6.05	40.85	39.03	227.36	36.67	5.21
BDU-1	926	1351	19.27	5.95	40.58	40.66	229.30	36.77	5..93
TPU-4	907	1361	19.95	5.87	39.56	39.99	228.39	36.54	5.33
S.Em. ±	24	40	0.37	0.11	0.45	-	7.94	1.27	0.63
C.D. at 5%	69	17	1.09	0.34	1.30	-	23.70	3.71	1.84
Phosphorus levels (kg P_2O_5/ ha)									
Control (No P_2O_5)	792	1299	15.78	5.68	39.16	37.85	201.60	32.56	4.73
25	856	1353	15.58	5.98	40.34	38.75	207.60	33.23	5.31
50	1056	1494	22.78	6.38	43.41	41.41	286.98	45.92	6.64
75	1063	1473	21.27	6.28	41.87	41.91	267.48	45.96	6.33
S.Em. ±	24	44	0.60	0.11	0.61	-	10.69	1.75	0.38
C.D. at 5%	70	128	1.75	0.33	1.77	-	32.01	5.12	1.11
Interaction effect									
S.Em. ±	0.46	0.46	1.20	0.22	1.21	-	21.92	3.51	0.76
C.D. at 5%	N.S.	N.S.	N.S.	N.S.	N.S.	-	N.S.	N.S.	N.S.

N.S.: Not significant

Table 2: Grain and Stover Yield and Economics of Blackgram as Influenced by Combination of Varieties and Phosphorus Levels

Treatment combination	Grain yield (kg/ha)	Stover yield (kg/ha)	Cost of cultivation (Rs/ ha)	Gross returns (Rs/ ha)	Net returns (Rs/ ha)	B : C ratio
TAU-1 + No P_2O_5	720	1420	30637	36420	5783	1.18
TAU-1 + 25 kg P_2O_5/ha	910	1320	38304	46320	8026	1.20
TAU-1 + 50 kg P_2O_5/ha	1130	1380	41458	61320	19862	1.47
TAU-1 + 75 kg P_2O_5/ha	1030	1550	41318	56550	15232	1.36
T-9 + No P_2O_5	750	1120	35946	36120	17447	1.00
T-9 + 25 kg P_2O_5/ha	1010	1180	39114	51180	12066	1.30
T-9 + 50 kg P_2O_5/ha	1123	1420	40642	56420	15778	1.38
T-9 + 75 kg P_2O_5/ha	1009	1520	40479	51520	11041	1.27
BDU-1 + No P_2O_5	825	1256	36802	41256	4454	1.12
BDU-1 + 25 kg P_2O_5/ha	900	1386	38315	46386	8071	1.21
BDU-1 + 50 kg P_2O_5/ha	920	1500	38988	46500	7511	1.19
BDU-1 + 75 kg P_2O_5/ha	1110	1700	41343	56700	15357	1.37
TPU-4 + No P_2O_5	830	1500	36842	41500	4657	1.12
TPU-4 + 25 kg P_2O_5/ha	950	1180	38281	46180	7899	1.20
TPU-4 + 50 kg P_2O_5/ha	1000	1400	39805	51400	11595	1.29
TPU-4 + 75 kg P_2O_5/ha	1100	1300	41276	56300	15024	1.36