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Effect of Sowing Dates and Phosphorous Levels on Growth, Development and Yield of Summer Mungbean

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Abstract

A field experiment was conducted at Research Farm, J.N.K.V.V., College of Agriculture, Tikamgarh (M. P.) during summer 2016. The experiment was laid out in split plot design with three replications. The main plot treatments consisted of three sowing dates viz., March 20, March 30 and April 9. The sub-plot treatments consisted of four phosphorous levels viz., 0 kg P_2O_5 ha^{-1}, 40 kg P_2O_5 ha^{-1}, 60 kg P_2O_5 ha^{-1} and 80 kg P_2O_5 ha^{-1}. Among different sowing dates, March 30 resulted significantly higher growth attributes at all growth stages and at harvest followed April 9 and March 20 sown crops. Similarly, yield attributes and seed yield (1305.7 kg ha^{-1}), were also significantly higher under March 30 followed by April 9 (1234 kg ha^{-1}) and March 20 (1203.5 kg ha^{-1}) sown crops. However, plant height (cm) and number of nodules (plant^{-1}) at 15 DAS and 1000-seed weight (g) at harvest did not differ significantly among different sowing dates. Among different phosphorous levels, 80 kg P_2O_5 ha^{-1} showed significantly greater growth and yield attributes at all stages and the lowest with 0 kg P_2O_5 ha^{-1}. However, all the phosphorous levels were failed to create significant difference in phenology. The interaction between sowing dates and phosphorous levels for seed yield and biological yield was found significant and observed higher on crop sown on 30 March with application of phosphorous @ 80 kg P_2O_5 ha^{-1}.

Key words: sowing dates, phosphorus, yield, mungbean

Introduction

Mungbean requires less nitrogen but phosphorus is considered important inputs to get high yields per unit area. Phosphorus has very positive effects on root growth, nodule formation and nitrogen fixation in legume crops. Phosphorus is a vital yield determining nutrient in legumes[4]. Application of phosphorus in optimum amount reported an increase in yield and yield attributing parameters of mungbean[3]. Sowing time is one of the most important non-monetary agronomic factors for realizing the yield potential of improved varieties as its helps in achieving complete harmony between vegetative and reproductive stages of the crop. Sowing of the crop at optimum time therefore, plays a key role in obtaining the high seed yields[6]. In view of above consideration the present investigation was planned and carried out.

Materials and Methods

The field experiment was conducted at Research Farm, J.N.K.V.V., College of Agriculture, Tikamgarh (M. P.) during *summer* 2016. The soil of the experimental field was clay loam in texture and it was medium in organic matter had good water holding capacity with pH range from 7.1 – 7.2. The experiment was laid out in Split Plot Design with three replications. The main plot treatments consisted of three sowing dates *viz*., March 20, March 30 and April 09. The sub-plot treatments consisted of four phosphorous levels *viz*., 0 kg P_2O_5 ha^{-1}, 40 kg P_2O_5 ha^{-1}, 60 kg P_2O_5 ha^{-1} and 80 kg P_2O_5 ha^{-1}. The '*Mungbean'* variety '*K - 851'* was used with the recommended seed rate of 25 kg ha^{-1}, all the required

parameters were recorded and analysed statistically.

Results and Discussion

Effect of different sowing dates and phosphorous levels on yield attributes and yield :

Data given in table 1 indicated that March 30 sown mungbean resulted higher seed yield (1305.7 kg ha^{-1}) as compared to delayed sowings in the month of April (1234.0 kg ha^{-1}) or too early sowing in March (1203.5 kg ha^{-1}). Consecutive 10 days delay in sowing from March 30 to April 9 and early from March 30 to March 20 caused a loss in seed yield by 5.08% and 7.67%., respectively. This result shows similarities with the finding of many others[2, 5, 7].

Among different phosphorous levels, 80 Kg P_2O_5 ha^{-1} was found to be most suitable for soils of Tikamgarh region of Madhya Pradesh. 80 kg P_2O_5 ha^{-1} produced significantly highest seed yield (1410.7 kg ha^{-1}) followed by 60 kg P_2O_5 ha^{-1} (1376.2 kg ha^{-1}), 40 kg P_2O_5 ha^{-1} (1234.4 kg ha^{-1}) and significantly lowest at 0 kg P_2O_5 ha^{-1} (969.6 kg ha^{-1}). However, seed yield (kg ha^{-1}) between 60 and 80 kg P_2O_5 ha^{-1} did not differ significantly. Phosphorous application @ 80 Kg P_2O_5 ha^{-1} exhibited 2.44%, 12.5% and 31.2% higher seed yield (kg ha^{-1}) over 60 Kg P_2O_5 ha^{-1}, 40 Kg P_2O_5 ha^{-1} and 0 Kg P_2O_5 ha^{-1}, respectively. These results are in conformity with the findings of past investigators[1, 6]. This could be due to adequate supply of phosphorous during early stage of growth is considered important in promoting vegetative growth and branching, thereby increasing the sink in terms of flowering and grain setting.

Table 1 Effect of different dates of sowing and phosphorous levels on seed yield of summer mungbean

Treatments	Seed yield (kg ha^{-1})				
	Phosphorous levels (kg P_2O_5 ha^{-1})				
	0	**40**	**60**	**80**	**Mean**
20 March 2016	845.3	1329.1	1316.6	1323.1	**1203.5**
30 March 2016	930.1	1100.5	1564.4	1627.8	**1305.7**
9 April 2016	1133.4	1273.7	1247.7	1281.1	**1234.0**
Mean	**969.6**	**1234.4**	**1376.2**	**1410.7**	
		S.Em±		**C.D.(P = 0.05)**	
Date		**11.1**		**45.0**	
P levels		**16.5**		**49.6**	
Date x P levels		**27.2**		**86.4**	

Effect of different sowing dates and phosphorous levels on economics:

Economics is the major criteria to evaluate the best treatment which is economically sound and that can be accepted by farming community. In the present study (table 2) the maximum gross returns (73777.4), net returns (52220.8) and B:C ratio (2.42) were realized with application of phosphorous at 80 kg P_2O_5 ha^{-1} among all sowing dates. This was mainly due to higher seed yields compared to other levels of phosphorus. Among sowing dates, March 30 sown crop exhibited maximum GMR (68568.5), NMR (46994.5) and benefit cost ratio (2.17).

Table 2 Effect of different dates of sowing and phosphorous levels on economics

Treatments	Net Monetary Return (Rs./ha)					Benefit Cost Ratio				
	Phosphorous levels (kg P_2O_5 ha^{-1})					Phosphorous levels (kg P_2O_5 ha^{-1})				
	0	**40**	**60**	**80**	**Mean**	**0**	**40**	**60**	**80**	**Mean**
20 March 2016	24513.0	43864.7	47247.3	47532.0	**40789.2**	1.16	2.04	2.16	2.17	**1.88**
30 March 2016	28881.9	37130.4	59420.8	62545.0	**46994.5**	1.37	1.73	2.72	2.86	**2.17**
9 April 2016	39861.9	43559.1	44759.8	46585.4	**43691.5**	1.99	2.13	2.14	2.23	**2.12**
Mean	**31085.6**	**41518.0**	**50475.9**	**52220.8**		**1.51**	**1.97**	**2.34**	**2.42**	

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