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Research Paper

Effect of sowing time, row spacing and seed rate on production potential of clusterbean

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ABSTRACT

The field experiment was conducted under rainfed condition during *Kharif* season of 2007 at Department of Agronomy, Marathwada Agricultural University, Parbhani to study the effect of sowing time, row spacing and seed rate on production potential of clusterbean. The experimental field was laid out in split plot design with three replications after thorough preparatory cultivation prior to sowing. Six treatment combinations of three sowing dates and two row spacing were allotted to main plot and three treatments of seed rate were allotted to sub plot randomly. On the basis of results obtained from present investigation clusterbean sown during 28th MW at 45 cm row spacing with 15 kg/ha seed rate improved growth, yield attributes *viz.*, grain, straw and biological yield and increased productivity under agroclimatic conditions of Marathwada region.

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Key words : Sowing time, Row spacing, Seed rate , Yield, Clusterbean

INTRODUCTION

Clusterbean [*Cyamopsis tetragonoloba* (L.) Taub] or Guar is a drought tolerant legume of family leguminaseae. Other than India, Pakistan and USA are major guar cultivating countries and Australia and Africa are with smaller averages. The maximum contribution of states in respect of area is shared by Rajasthan (18.18 lakh hectare) followed by Gujarat (2.27 lakh/ha) and Haryana (1.27 lakh/ha) (Kothari *et al*., 2005). Cluster bean [*Cyamopsis tetragonoloba* (L.) Taub.], moth bean (*Vigna aconitifolia* (Jacq.) Morechal), horse gram (*Macrotyloma uniflorum*), cow pea [*Vigna unguiculata* (L.) Wal.] are typical legumes grown in tropical and subtropical area extensively. But production levels of these legumes are very low because of low and erratic distribution of rainfall coupled with extreme temperatures and low fertility status of soils. Main strategies for achieving sustainable production of these legumes are use of improved short duration varieties, integrated nutrient management, pest and disease control and suitable agronomic practices. Among these arid legumes clusterbean have immense importance due to its high industrial value.

Appropriate sowing time helps to more efficient use of water, sunshine hours and higher photosynthetic rates. Optimum row spacing is one of the major management variable under dryland conditions. In water deficits regions large canopy growth may be disadvantageous as it may exhaust the available soil moisture more rapidly from root zone (Garg *et al*., 2005). In Maharashtra, the area under clusterbean is quite low but increasing year after year due to drought hardy nature and better performance under moisture stress situation compared traditional legume crops. Therefore, it is of paramount importance to identify and develop agronomical practices that influences the performance of guar. Appropriate crop management increases production potential, ensures stable yields and increases water use efficiency.

In the changing agricultural scenario, cultivation of clusterbean crop has assumed greater important due to tremendous potential it offers in multiple use particularly in gum production and industrial use. The increasing demand for clusterbean products is much felt in

diversification of present cropping with diversified agroclimate of India is a boon for cultivation.

Considering the above points in view, experiment entitled effect of sowing time, row spacing and seed rate on production potential of clusterbean was conducted at Department of Agronomy, Marathwada Agricultural University, Parbhani in *Kharif* season 2007.

MATERIALS AND METHODS

The field experiment was conducted under rainfed condition during *Kharif* season of 2007 at Department of Agronomy, Marathwada Agricultural University, Parbhani. The experimental field was laid out in split plot design with three replications after thorough preparatory cultivation prior to sowing. Six treatment combinations of three sowing dates(D_1-26th MW, D_2-28th MW, D_3-30th MW) and two row spacing (R_1-30 cm , R_2-45 cm) were allotted to main plot and three treatments of seed rate (S_1-10 kg/ha, S_2-15 kg/ha, S_3-20 kg/ha) were allotted to sub plot randomly. Sowing of clusterbean cv. HG 867 was done as per the different treatments. Seeds were

Table 1: Yield attributes of clusterbean as influenced by different treatments

Treatments	Total no. of pods/ plant	No. of filled pods	Grains/ pod	Number of grains/ plant	Weight of pods per plant (g)	Weight of grains per plant (g)	100 seed weight (g)
Sowing time (MW)							
D_1 26th MW	66.66	56.27	5.88	327.3	19.64	3.80	2.75
D_2 28th MW	84.86	69.66	6.84	471.0	25.26	4.51	2.90
D_3 30th MW	56.65	44.38	4.99	218.83	15.63	3.57	2.63
S.E. $\pm$	2.05	1.23	0.12	11.86	0.82	0.10	0.04
C.D. (P=0.05)	6.47	3.88	0.40	37.33	2.59	0.33	0.14
Row spacing(cm)							
R_1 30	66.88	52.66	5.42	288.80	18.25	3.72	2.67
R_2 45	71.90	60.88	6.38	389.20	22.10	4.20	2.85
S.E. $\pm$	1.68	1.00	0.10	9.69	0.67	0.08	0.03
CD at 5%	5.28	3.17	0.33	30.48	2.11	0.27	0.11
Seed rate (kg/ha)							
S_1 10	63.77	52.50	5.84	310.00	18.08	3.68	2.75
S_2 15	75.13	63.44	6.81	432.20	23.27	4.31	2.96
S_3 20	69.26	54.38	5.07	274.80	19.18	3.89	2.58
S.E. $\pm$	1.77	1.36	0.13	13.64	0.69	0.15	0.06
C.D. (P=0.05)	5.16	3.97	0.38	39.76	2.02	0.45	0.18
Interaction D x R							
S.E. $\pm$	2.91	1.74	0.18	16.78	1.16	0.15	0.06
C.D. (P=0.05)	NS	NS	NS	NS	NS	Ns	NS
D x S							
S.E. $\pm$	3.06	2.36	0.22	23.63	1.20	0.26	0.11
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS
R x S							
S.E. $\pm$	2.50	1.92	0.18	19.29	0.98	0.21	0.09
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS
D x R x S							
S.E. $\pm$	4.33	3.33	0.32	33.42	1.69	0.37	0.15
C.D. (P=0.05)	NS	NS	NS	NS	NS	NS	NS
G.M.	69.39	56.177	5.90	339.06	20.18	3.96	2.76

sown at 45 cm and 30 cm row spacing using 10, 15 and 20 kg/ha seed rate for each sowing time. Recommended dose of fertilizer at the rate of 20 kg N and 40 kg P_2O_5 per hectare was applied through urea and single super phosphate. Entire dose of fertilizer was applied uniformally as a basal dose at each sowing time. Other cultural practices and plant protection measures were given according to the recommended package of practices. At maturity, the observations on ancillary characters were recorded on five randomly selected plants in each plot. The total yield/ha were recorded on net plot basis.

RESULTS AND DISCUSSION

The results obtained from the present investigation have been discussed in the following sub heads :

Effect of sowing time:

Maximum number of pods per plant, number of filled pods, number of grains per plant and maximum weight of pods per plant were recorded at sowing time 28th MW which was significantly superior over 26th MW and 30th MW. Also sowing time 26th MW was observed significantly superior over 30th MW.

The number of grains per pod and maximum grain weight per plant were significantly higher with the 28th MW as compared to rest of sowing dates. The 26th and 30th MW were at par with each other.

The mean 100 seed weight of clusterbean was 2.76 g. Maximum test weight of clusterbean was recorded at 28th MW sowing time which gave significantly higher 100 seed weight than 30th MW, however, it was at par with 26th MW. The 26th MW sowing and 30th MW sowing were at par with each other.

Among different sowing dates, the highest grain yield, straw yield and biological yield was recorded, when crop was sown during 28th MW, which was significantly superior over 26th MW and 30th MW sowing. Similar variations in yield due to different sowing time were reported by Taneja *et al*. (1995) and Kalyani *et al*. (2007).

Effect of row spacing:

The differences between 45 cm and 30 cm row spacing were not significant in respect of number of pods per plant. Also similar reduction in number of pods was observed by Montalvo (1959).

The mean number of grains/plant, weight of pods per plant, weight of grain per plant, test weight, grain yield, straw yield and biological yield per hectare of clusterbean was significantly maximum due to sowing at 45 row spacing as compared to sowing at 30 cm spacing. Similar difference in number of pod and weight, difference in yields of clusterbean was found by Yadav *et al*. (1990) and Garg *et al*. (2005).

Table 2: Mean grain, straw and biological yield and harvest index as influenced by different treatments of clusterbean

Treatments	Grain yield (kg/ha)	Straw yield (q/ha)	Biological yield (kg/ha)	Harvest index
Sowing time (MW)				
D_1 26th MW	685.17	16.82	2283.1	30.08
D_2 28th MW	797.28	18.83	2636.7	30.36
D_3 30th MW	480.03	12.82	1738.9	27.71
S.E. ±	23.78	0.479	66.99	0.835
C.D. (P=0.05)	74.83	1.507	210.7	NS
Row spacing (cm)				
R_1 30	595.80	14.93	2068.2	28.50
R_2 45	712.53	17.39	2371.0	30.27
S.E. ±	19.42	0.391	54.70	6.820
C.D. (P=0.05)	61.10	1.230	172.09	NS
Seed rate (kg/ha)				
S_1 10	573.92	14.36	2010.9	28.41
S_2 15	776.01	19.15	2567.0	30.34
S_3 20	612.5	14.96	2080.8	29.40
S.E. ±	23.55	0.439	65.15	1.311
C.D. (P=0.05)	68.63	1.280	189.8	NS
Interaction D x R				
S.E. ±	33.64	0.677	94.74	1.181
C.D. (P=0.05)	NS	NS	NS	NS
D x S				
S.E. ±	40.79	0.761	112.8	2.271
C.D. (P=0.05)	NS	2.218	NS	NS
R x S				
S.E. ±	33.30	0.621	92.14	1.855
C.D. (P=0.05)	NS	NS	NS	NS
D x R x S				
S.E. ±	57.68	1.07	159.60	3.21
C.D. (P=0.05)	NS	NS	NS	NS
General mean	654.16	16.15	2219.60	29.38

NS=Non-significant

Effect of seed rate:

Maximum total number of pods (75.13) was recorded with 15 kg/ha seed rate which was significantly superior to 10 kg/ha as well as 20 kg/ha seed rate. Similarly, 20 kg/ha seed rate also produced significantly more total number of pods than 10 kg/ha seed rate.

Seed rate of 15 kg/ha showed significantly more

grains per pod over 10 kg/ha and 20 kg/ha seed rate. Seed rate of 10 kg/ha showed significantly more mean number of grains per pod over 20 kg/ha. The findings are in accordance with those of Yadav *et al*. (2001).

Maximum number of filled pods, weight of pods, weight of grain per plant, number of grains, 100 seed weight, grain yield, straw yield and biological yield per ha were recorded with 15 kg/ha seed rate, which was significantly superior to 10 kg/ha and 20 kg/ha seed rate. However, seed rate 10 kg/ha and 20 kg/ha were at par with each other. Similar results were observed by Singh *et al*. (1978) and Yadav (2001).

Conclusion:

On the basis of results obtained from present investigation clusterbean sown during 28th MW at 45 cm row spacing with 15 kg/ha seed rate improved growth, yield attributes *viz.,* grain, straw and biological yield and increased productivity under agroclimatic conditions of Marathwada region.

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