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Effect of Sowing Dates on the Growth and Yield of Blackgram Varieties

M. Biswas, A.A. Begum, ¹Ali Afzal, F. U. Mia and ²A. Hamid
Regional Agricultural Research Station, Jamalpur-2000, Bangladesh
¹Pulses Research Station, BARI, Gazipur-1701, Bangladesh
²Department of Agronomy, BSMARU, Salna, Gazipur, Bangladesh

Abstract: An experiment was conducted to determine optimum sowing time for different varieties of blackgram in Jamalpur region (AEZ-9) of Bangladesh. Pooled analysis exhibited a significant variation among the varieties in respect of seed yield. Barimash-3 produced the highest seed yield (977 kg/ha) which was statistically similar to that of Binamash-1 (960 kg/ha). Barimash-2 produced the lowest seed yield (866 kg/ha). Sowing dates exerted significant effect on seed yield. First sowing (31st August) produced significantly highest seed yield (1168 kg/ha) while the lowest seed yield (541 kg/ha) was found in the latest (28 September) sowing. Interaction also produced significant effect on seed yield. The highest seed yield (1225 kg/ha) was recorded from Barimash-3 with August sowing while the lowest (404 kg/ha) was found in Barimash-2 with Sep. 28 sowing. All varieties produced maximum seed yield with August sowing. Barimash-3 and Binamash-1 performed better than others with delayed sowing up to Sep. 14 during both years.

Key words: Sowing date, growth, yield, blackgram

Introduction

A huge amount of foreign currency is expended every year to meet the national shortfall, as available of pulses in Bangladesh is about 12 g/head/day against the balanced nutritional requirement of 45 g/head/day (Anonymous, 1998). So there is no alternative to increase pulse production through adaption of modern technologies. Blackgram (*Vigna mungo* L.) one of the major pulse crop, stands fourth both in acreage and production in Bangladesh. Generally legumes are rich in sulphur containing amino acids (methionine and cysteine). However, blackgram, especially contains a higher percentage of methionine compared to other food legumes (Tsou and Hsu, 1978). Seeds of blackgram are used for human consumption as pulse soup. Green plants, matured plant parts and husk of blackgram are also used as animal feed. Blackgram is a short duration crop and matured within 70-80 days and it can easily fit well into an intensive cropping pattern thereby increasing total productivity. As a leguminous crop, blackgram fixes up atmospheric nitrogen for its growth and development and also improve soil fertility and productivity. Crop growth and yield depend on its growth characters like leaf area index, dry matter production and partitioning etc. These growth characters are greatly influenced by environmental factors (i.e. temperature, photoperiod etc.), variety and cultural practices (i.e. seeding date and rate, spacing etc.). Time of sowing determines time of flowering and it has great influence on dry matter accumulation, seed set and seed yield (Sofield *et al.*, 1977). There are three varieties of blackgram developed by BARI which may be sown in both Kharif-I (February-March) and Kharif-II (August-September) seasons while BINA has developed one variety which is photosensitive and may be grown only in Kharif-II season. But the magnitude of sowing time in the respective season is still to be known for different varieties in Jamalpur region. Therefore, the experiment was undertaken to know whether long range of sowing time in Kharif-II could have any effect on the growth and seed yield of blackgram varieties under the agroclimatic conditions of Jamalpur in Bangladesh.

Materials and Methods

The experiment was conducted at the Regional Agricultural Research Station Jamalpur, Bangladesh during Karif-II (August-September) seasons, 1999 and 2000 to determine the optimum sowing time for different varieties of blackgram in Jamalpur region. Four blackgram varieties viz. Barimash-1, Barimash-2, Barimash-3 and Binamash-1 and five sowing dates viz. August 31, September 07, September 14, September 21 and September 28 were included as treatments in the experiment. A split plot design was used assigning varieties in the main plot and sowing dates in

the sub-plot. There were three replications having unit plot size 4 × 3 m². Seeds were sown @ 30 kg/ha in 30cm apart line and plant to plant distance, 3-5 cm was maintained after thinning. Fertilizers were applied @ 20-40-20 kg/ha of NPK, respectively, as basal during final land preparation. Seeds were sown in raised bed. Seeds sown in line made by iron made *tine* were not covered by soil because of much moistened soil with rainwater. Thus the crop sown in rainy days was established successfully. Insecticide "Diazinon" was sprayed to control insect pests for all crops while the fungicide "Tilt" @ 0.2% was sprayed to control powdery mildew specially in the later sowing. Weeding was done once at 20-30 days after sowing. Data on yield components were recorded from 10 randomly selected plants from each plot of each sowing. Seed yield was calculated from an area of 3 × 3m². Collected data were analyzed statistically and means were separated using Duncan's Multiple Range Test (DMRT).

Results and Discussion

The seed yield in the second year was higher than the first year. The possible cause might be that the land selected in the second year was better in respect of productivity and drainage facility. Drainage facility of the experimental site was poor during first year which possibly affected adversely the yield and yield components. Moreover, temperature was somewhat higher in the second year specially for later sowing. This could also help for higher seed yield.

Effects of variety: The results revealed that 100-seed weight and number of pods/plant varied significantly among the varieties in both years (Table 1). Number of seeds/pod in 1999 while plant height and seed yield in 2000 did not vary significantly. However, the longest plant (44.4cm) was found in Binamash-1 which was statistically similar to that of Barimash-3 (41.4cm) and the shortest plant (37.2cm) was found in Barimash-2 which was statistically similar to that of Barimash-1 (37.8cm) in 1999. Barimash-2 had the highest number (6.63) of seeds /pod in 2000 which was significantly different from all other varieties. The highest 100-seed weight was also recorded from Barimash-3 during both years while the lowest (3.99g) was recorded from Barimash-1 in 1999 and Binamash-1 (3.94g) in 2000. The highest number of pods/plant was obtained from Binamash-1 in both years. Barimash-2 produced statistically similar number of pods/plant to that of Binamash-1 in 1999. The lowest number of pods/plant was recorded from Barimash-1 during both years. However, significantly highest seed yield (846 kg/ha) was obtained from Barimash-3 in 1999 which was statistically similar to that of Binamash-1. The lowest seed yield (706 kg/ha) was obtained from Barimash-1 which was statistically similar to that of Barimash-2.

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Table 1: Yield and yield attributes of blackgram as influenced by varieties and sowing dates during Kharif-II 1999 and 2000

Treatments	Plant ht. (cm)		Number of seeds /pod		100-seed wt. (g)	
	1999	2000	1999	2000	1999	2000
Variety(s) :						
Barimash-1	37.8 b	33.6	5.57	6.28 b	3.99 b	4.58 b
Barimash-2	37.2 b	31.3	5.74	6.63 a	4.03 b	4.38 c
Barimash-3	41.4 ab	33.7	5.76	6.31 b	4.57 a	4.76 a
Binamash-1	44.4 a	37.7	6.15	6.23 b	4.00 b	3.94 d
F	**	NS	NS	*	**	**
CV(%)	10.7	17.2	7.7	4.3	3.80	1.9
Sowing date(s):						
Aug. 31	45.5 a	42.1 a	5.92 a	6.23	4.26 b	4.31 b
Sep. 07	44.0 a	35.2 b	6.00 a	6.15	4.48 a	4.35 b
Sep. 14	42.4 a	33.8 bc	5.93 a	6.50	4.23 b	4.57 a
Sep. 21	36.0 b	31.1 cd	5.83 a	6.52	4.47 a	4.49 a
Sep. 28	33.1 b	28.3 d	5.36 b	6.40	3.31 c	4.36 b
F	**	**	*	NS	**	**
CV(%)	10.6	9.2	8.9	12.8	3.4	2.3

Note (for all Tables): Figures in a column having same or no letter(s) do not differ significantly.

NS- Not significant ** indicates significant at 1% level of significance

* indicates significant at 5% level of significance

Table 1: Continued.

Treatment	Number of pods/plant		Seed yield (kg/ha)		
	1999	2000	1999	2000	Pooled
Variety(s):					
Barimash-1	10.1 b	14.2 b	706 b	1028	867 b
Barimash-2	11.9 ab	16.3 b	724 b	1007	866 b
Barimash-3	11.5 b	15.8 b	846 a	1109	977 a
Binamash-1	13.6 a	19.6 a	774 ab	1145	959 ab
F	*	**	**	NS	*
CV(%)	17.2	9.9	8.9	14.4	11.7
Sowing date(s):					
Aug. 31	17.0 a	21.4 a	1007 a	1330 a	1168 a
Sep. 07	13.5 b	18.9 b	877 b	1247 ab	1062 b
Sep. 14	12.0 b	17.9 b	817 bc	1151 b	984 c
Sep. 21	9.4 c	13.1 c	771 c	890 c	830 d
Sep. 28	7.0 c	11.0 c	342 d	742 d	541 e
F	*	**	**	**	**
CV(%)	8.9	11.0	7.3	10.9	7.2

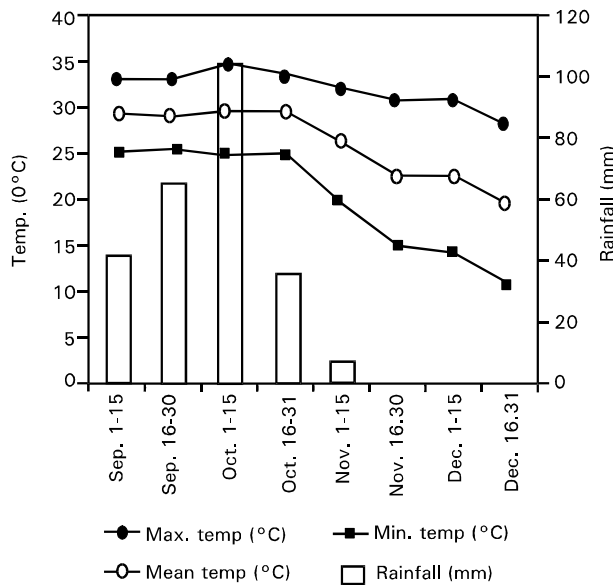


Fig. 1: Meteorology of the period from Sep. to Dec. 1999 at the Regional Agril. Res. Station, Jamalpur, Bangladesh

Pooled analysis showed that Barimash-3 produced the highest seed yield (977 kg/ha) and it was statistically similar to that of

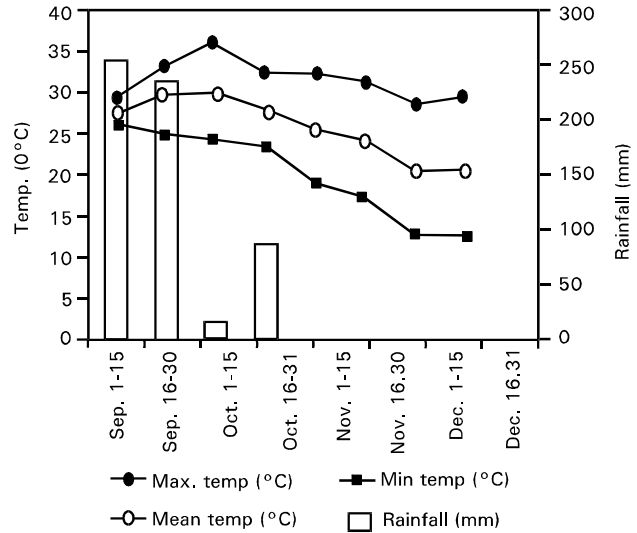


Fig. 2: Meteorology of the period from Sep. to Dec. 2000 at the Regional Agril. Res. Station, Jamalpur, Bangladesh

Binamash-1 (959 kg/ha). The other two varieties produced significantly lower seed yield than that of Barimash-3 but statistically similar to that of Binamash-1. Higher values for number of pods/plant and 100-seeds weight mainly might be attributed to higher seed yield in Barimash-3.

Effects of sowing date: Sowing date exerted significant influence on all the characters studied during both years except number of seeds/pod in the second year (Table 1). The results indicated that plant height reduced significantly beyond Sep. 14 sowing in 1999 while plant height reduced significantly beyond Aug. 31 sowing in 2000. The shortest plant was recorded from Sep. 28 during both years. Number of seeds/pod was found lowest in Sep. 28 sowing in 1999 which was significantly different from all other sowings. The highest number of seeds/pod was recorded from Sep. 07 sowing which was statistically similar to those of all others except Sep. 28 in 1999. There was no consistency in respect of 100-seed weight in both years. Earlier sowings produced higher number of pods/plant and it reduced gradually with delayed sowing. However, the crop sown in Aug. 31 produced significantly highest seed yield and it decreased progressively due to delayed sowing. Earlier sowings had higher number of pods/plant mainly which in turn possibly attributed to produce higher seed yield. Pooled

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Table 2: Yield and yield attributes of blackgram as influenced by the interaction of varieties and sowing dates during Kharif-II 1999 and 2000

Variety x Sowing date	Plant ht. (cm)		100-seed wt. (g)		Seeds/pod (no.)	
	1999	2000	1999	2000	1999	2000
V ₁ D ₁	40.0 b-f	36.3 bcd	4.03 fgh	4.53 cde	5.80 ab	6.3
D ₂	40.6 b-f	33.9 b-e	4.77 bc	4.37 ef	5.80 ab	5.2
D ₃	38.9 b-f	34.2 b-e	4.03 fgh	4.38 def	5.07 bc	7.1
D ₄	35.8 def	32.5 b-e	4.00 gh	4.87 ab	5.70 ab	6.3
D ₅	34.0 ef	31.3 cde	3.10 k	4.75 bc	5.50 ab	6.5
V ₂ D ₁	38.2 c-f	38.0 bc	3.53 ij	4.12 gh	6.33 ab	6.7
D ₂	38.4 b-f	31.8 cde	4.87 bc	4.39 def	5.87 ab	7.2
D ₃	42.9 b-e	31.5 cde	4.10 e-h	4.70 bc	6.07 ab	6.7
D ₄	33.9 ef	28.9 de	4.37 def	4.38 def	6.27 ab	6.2
D ₅	32.4 ef	26.2 e	3.27 jk	4.32 efg	4.17 c	6.4
V ₃ D ₁	42.4 b-f	38.5 bc	5.20 a	4.65 bc	5.60 ab	5.8
D ₂	47.6 bc	34.9 bcd	4.10 e-h	4.65 bc	5.87 ab	5.9
D ₃	42.1 b-e	34.3 b-e	4.67 cd	5.02 a	6.33 ab	6.5
D ₄	39.0 b-f	31.2 cde	5.07 ab	4.85 ab	5.27abc	6.7
D ₅	35.8 def	29.6 de	3.83 hi	4.62 bcd	5.73 ab	6.6
V ₄ D ₁	61.3 a	55.6 a	4.27 efg	3.95 hi	5.93 ab	6.1
D ₂	49.3 b	40.1 b	4.20 efg	3.98 hi	6.47 a	6.3
D ₃	45.8 bcd	34.9 bcd	4.07 fgh	4.18 fgh	6.27 ab	5.7
D ₄	35.3 def	31.8 cde	4.43 de	3.85 i	6.07 ab	6.9
D ₅	30.4 f	26.2 e	3.03 k	3.75 i	6.03 ab	6.1
F	**	**	**	**	**	NS
CV(%)	10.6	9.2	3.4	2.3	8.9	12.8

Note: V₁= Barimash-1, V₂= Barimash-2, V₃= Barimash-3 and V₄= Binamash-1
D₁ = Aug. 31, D₂ = Sep. 07, D₃ = Sep. 14, D₄ = Sep. 21, D₅ = Sep. 28

Table 2: Continued.

Variety x sowing date	Number of pods /plant		Seed yield (kg/ha)		
	1999	2000	1999	2000	Pooled
V ₁ D ₁	18.9ab	17.7cde	1007ab	1231 ab	1119 abc
D ₂	11.7cde	18.5cd	766efg	1200 ab	983 c-f
D ₃	7.2ef	14.7efg	724fg	975 cd	850 efg
D ₄	6.3ef	10.7hi	714g	948 cd	831 fg
D ₅	6.5ef	9.4i	319hi	785 d	552 hi
V ₂ D ₁	20.5 a	22.9 a	1021a	1406 a	1214 ab
D ₂	13.1 bcd	19.5 bcd	825 def	1191 ab	1008 cde
D ₃	14.7 bc	17.4 de	762 efg	1043 bc	902 d-f
D ₄	7.6 def	11.9 ghi	752 efg	848 cd	800 g
D ₅	3.5 f	9.9 i	262 l	546 e	404 l
V ₃ D ₁	14.1 bc	22.8 ab	1046 a	1403 a	1225 a
D ₂	14.4 bc	16.7 def	1007 ab	1216 ab	1111 abc
D ₃	11.9 cde	17.1 def	906 bcd	1207 ab	1057 bcd
D ₄	9.8 cde	11.3 hi	855 cde	877 cd	866 efg
D ₅	7.2 ef	10.9 hi	413 h	842 cd	627 h
V ₄ D ₁	14.4 bc	21.9 ab	952 abc	1280 a	1116 abc
D ₂	14.7 bc	21.1 abc	909 bcd	1382 a	1146 abc
D ₃	14.1 bc	22.5 ab	877 cd	1379 a	1128 abc
D ₄	13.9 bc	18.4 cd	761 efg	888 cd	825 fg
D ₅	10.9 cde	14.0 ef	373 h	795 d	581 h
F	**	*	*	*	**
CV(%)	19.6	11.1	7.3	10.9	7.2

Note: V₁= Barimash-1 V₂= Barimash-2, V₃= Barimash-3 and V₄= Binamash-1
D₁ = Aug. 31, D₂ = Sep. 07, D₃ = Sep. 14, D₄ = Sep. 21, D₅ = Sep. 28

analysis also exhibited that Aug. 31 sowing produced significantly highest seed yield (1168 kg/ha). The lowest seed yield (541 kg/ha) was obtained from Sep.28 sowing. Seed yield decreased progressively with delayed sowing might be due to the prevailing low temperature (Fig. 1 & 2) at flowering and pod filling stages. Most favourable temperature for blackgram ranges from 25-35°C (Ahmed, 1984). The results are in close conformity with those of Moula *et al.* (2000).

Interaction effects: Interaction effect of variety and sowing date was significant for all the characters studied except number of

seeds/pod in 2000 (Table 2). The highest seed yield (1046 kg/ha) was obtained from Barimash-3 in 1999 while Barimash-2 produced the highest seed yield (1406 kg/ha) in 2000 with Aug. 31 sowing. However, all varieties produced statistically similar seed yield with Aug. 31 sowing. During both years Barimash-3 and Binamash-1 showed better performance in delayed sowing. However, pooled analysis also showed that Barimash-3 produced the highest seed yield (1225 kg/ha) which was statistically similar to those of Barimash-1, Barimash-2 and Binamash-1 with Aug. 31 sowing. The second sowing of both Barimash-3 and Binamash-1 and third sowing of Binamash-1 also gave statistically similar seed yield to that of the combination Barimash-3 x Aug. 31 sowing. From the above results (pooled) it may be suggested that all varieties of blackgram should be sown in last week of August to produce maximum seed yield. The results also suggested that the varieties, Barimash-3 could be sown one week later while Binamash-1 could be sown up to mid of September without significant reduction in seed yield than others in comparison with August 31 sowing in Jamalpur region.

References

Ahmed, N., 1984. Bangladesh Dal Chasher Pathopangi (In Bengali). Bangladesh Progressive Enterprise Press Ltd. 1st Edn., pp: 55.
Anonymous, 1998. Blackgram Cultivation in Bangladesh. Pub. No. 19. Published by Lentil, Blackgram, Mungbean development Pilot Project, Bangladesh Agril. Res. Inst., Joydebpur, Gazipur 1701. pp: 9.
Moula M.G., S. Begum and M.A. Quayyum, 2000. Influence of sowing time on the yield of blackgram. Bangla. J. Agril. Sci., 27: 159-162.
Sofield K., L.T. Evans, M.G. Cook and I. F. Wardlaw, 1977. Factors influencing the rate and duration of grain filling in wheat. Australian J. Pl. Physiol., 4: 785-797.
Tsou, S.C.S and M.S.Hsu, 1978. The potential role of mungbean as a diet component in Asia. Pro. First Int. Mungbean Symp. February, 1978. AVRDC, Taiwan ROC. pp: 40-45.