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Response of Mungbean Genotypes to Different Dates of Sowing in Kharif Season under Rainfed Conditions

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Abstract: An experiment was conducted to study the effect of different sowing dates on grain yield and yield attributing components on mungbean genotypes sown during kharif under rainfed conditions. It was observed that delay in sowing caused a substaintial decrease in all the growth and development parameters recorded. Genotypes responded significantly towards the grain yield. Maximum grain yield of 1668 kg ha^{-1} was produced by advanced breeding line (NCM-209) when sown early in the season (5th July). It was concluded that first week of July was found to be ideal tome of sowing for mungbean and NCM-209 performs better than other genotypes.

Key words: *Vigna radiata*, dates of sowing, genotypes, grain yield, agronomic characters

Introduction

Sowing time is one of the major non-monetary input affecting the growth and yield of field crops. It affects the duration of vegetative, reproductive and maturity periods. Dhanjal *et al.* (2000) reported that early sown mungbean (on 15 March) had a higher seed than crops sown on the other dates (31st March or 16th April). Ram and Dixit (2000) reported from their field trails in Faizabad (India) that early sown mungbean (30 March) produced better results in terms of growth, yield and its contributing characters. Sangakkara (1998) reperted from Sri Lanka that late sowing of mungbean produced the lowest yields of low quality seeds. Chaudhry *et al.* (1994) found in a field experiment sown during kharif using urdbean cultivars in Uttar Pardesh (India) that delay in sowing decreased seed yield. Similar findings were reported by Bhingarde and Dumbre (1994). Bhoit and Nimbalkar (1997) tested different kharif season crops including greengram, that were sown on 18-25th June (early), 25th June-01st July (normal or 2nd-8th July (late). Grain yield and monetary returns were highest with the earliest sowing date and lowest with latest sowing date for all the crops. Gobologlu *et al.* (1997) sown mungbean cultivars on 1 or 15 May or 1 or 15 June and reported that plant height was greatest with sowing on June 15 and lowest with May 15 sowing, pods/plant were highest with May 1 or June 15 sowing, seeds/ pod were higher with June than May sowing, while 1000-seeds weight and yield were highest with May 15 or June 15 sowing. However, information about response of newly developed mungbean cultivars to different sowing dates is lacking under Pakistan conditions. Therefore, present work was carried out to find out optimum sowing time for various mungbean genotypes for obtaining their yield potential.

Materials and Methods

A field experiment was conducted at experimental farm of the National Agricultural Research Centre Islamabad, during summer 2001. Experiment was laid out in a split plot design replicated thrice with dates of sowing in main plots and genotypes in sub plots. The plot size was 4.0x1.20 m (4.80 m^2). Five genotypes including advanced breeding lines (NCM-209, M-1, M-6, NM-2 and NM-92) were used in the study and sowing was done as per sowing date treatments (5, 15, 25th July and 5th August) designated as SD_1, SD_2, SD_3 and SD_4, respectively. At physiological maturity, four plants/plot were sampled, sun dried for one week. Than pods were separated from the plants, counted and threshed for seeds. Seeds were cleaned before being weighed for grain yield/plant. Metrological data regarding rainfall, temperatures and relative humidity were collected from Meteorological Observatory of Water Resources Research Institute, NARC, Islamabad.

For statistical analysis data were analyzed using analysis of variance and means were compared using (LSD) at the 5% probability (Steel and Torrid, 1980).

Result and Discussion

Sowing dates had a great influences on growth including plant height. Maximum plant height 79 cm was recorded when the crop was sown on 5th July, followed by 15th July sown crop (62 cm) and further decrease was noted in later sowing dates (Table 1). Plants could attain only 31 cm height when sown on 5th August. Plant height varied

Table 1: Effect of different sowing dates on plant height, pods per plant pod length (cm), seeds per pod and grain yield kg per hactare of mungbean genotypes

	Plant height (cm)	Pods/plant	Pod length (cm)	Seeds/pod
Sowing dates:				
5th July	79a	18.3a	9.2a	12.4a
15th July	62b	15.4ab	8.5a	13.0a
25th July	48c	11.1b	8.0ab	11.7a
5th August	31d	5.0c	5.1b	10.3b
LSD (0.05)	9.35	4.32	1.02	0.72
Genotypes:				
NCM-209	55b	16.2a	7.4c	11.9ab
M-1	55b	11.7b	9.0a	11.8ab
M-6	60a	12.4b	7.8bc	12.3a
NM-2	53bc	11.4b	8.1bc	11.7b
NM-92	51c	10.7b	8.3ab	11.7b
LSD (0.05)	3.51	2.09	0.80	0.51
SD x Gen.	7.01	4.18	1.60	1.01

Table 2: Weekly rainfall (mm) recorded at NARC during crop growing period

Month	1st week	2nd week	3rd week	4th week	Total
July	53.2	170.9	286.5	80.4	591.0
August	23.1	69.4	48.4	--	140.9
September	2.0	25.2	2.1	--	29.3
October	4.4	18.5	--	--	22.9
Grand total					784.1

Source: Water Resource Research Institute, NARC, Islamabad year 2001.

Table 3: Monthly average minimum and maximum temperature (°C) and relative humidity (%) recorded at NARC during crop growing period

	Temperature		
Month	Min.	Max.	Relative humidity (%)
July	23.7	33.2	8.1
August	23.7	34.0	6.5
September	18.8	33.6	7.9
October	13.9	31.4	8.0

Source: Water Resource Research Institute, NARC, Islamabad year 2001.

among genotypes. Maximum plant height recorded in advanced breeding line M-6 was 60 cm and minimum 51 cm by NM-92. Results are further supported by the findings of Gebologlu *et al.* (1997), Ram and Dixit (2000) who reported significant effect of different sowing dated on plant height of mungbean sown on different dates.

Pods per plant are an imported yield component contributes significantly towards grain yield. Results (Table 1) revealed that maximum number of pods per plant (18.3) was observed from 5th July sown crop, followed by 15th July that produced (15.4) pods per plant and lowest (5) pods per plant was recorded in SD_4 sown crop. Genotypes *et al.* (1997) have also supported the present results and reported that pods plant were significantly affected under different sowing periods.

Data suggests that besides number of pods/plant, pod growth was also significantly affected by time of sowing; pod length decreased when sowing was delayed (Table 1). Earlier sowing (5th July) produced maximum (9.2 cm) pod length, followed by 15th July sown crop having pod length of (8.5 cm). Least pod length of (5.1 cm) was observed in last sowing data (5th August). Differences in pod growth were also observed among genotypes; pod

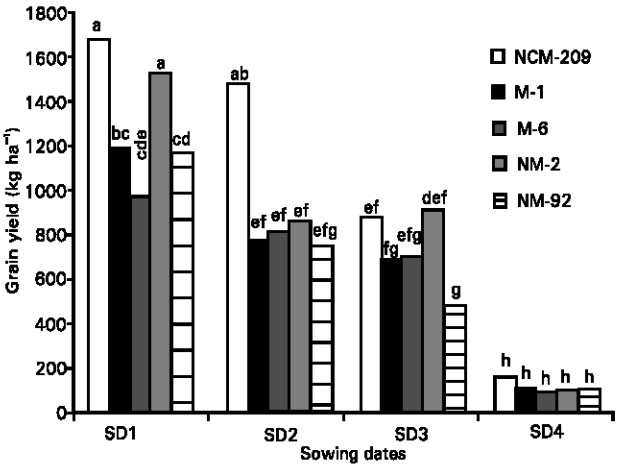

Fig. 1: Effect of sowing dates on grain yield of mungbean genotypes sown under rainfed condition during kharif season

length of 9.0 cm was recorded in M-1, followed by NM-92 (8.3 cm). The results have further been supported by findings of Dhanjal *et al.* (2000).

Results showed that sowing date x genotype interaction for number of seeds per pod was significant. Generally number of seeds per pod showed little decrease in SD_1, SD_2 and SD_3 but considerable reduction was noted in SD_4. Among genotypes NM-92 was relatively more sensitive, showing a gradual decrease in number of seeds per pod from SD_1 to SD_4. It should be noted that NM-92 is a standard cultivar of mungbean, being widely grown in the country. Therefore, it's sowing latter than the optimum

time of sowing presumably may cause a substantial reduction in national production of mungbean. The results of Gebologlu *et al.* (1997) are also in agreement with the present findings who recorded higher seeds/pod in early sown mungbean.

Highly significant differences were recorded in genotype x sowing date interaction in grain yield. Maximum grain yield (1668 kg ha^{-1}) was produced in NCM-209, followed by (1512 kg ha^{-1}) in NM-2, when crop was sown on 5th July (Fig. 1). Minimum grain yield (58 kg ha^{-1}) was recorded in M-6 in last sowing date (5th August). Among sowing dates, crop was sown on 5th July produced highest grain yield (1298 kg ha^{-1}). Gobologlu *et al.* (1997) and Borah (1997) also received higher seed yields of mungbean in early sown cultivars.

Data indicate that average yield reduction was about 38 kg day^{-1} when the crop was delayed from 5th July (SD_1) to 15th July (SD_2). Similarly yield reduction of 30 kg day^{-1} and 22 kg day^{-1} in 25th July (SD_3) sown crop as compared to (SD_1) and (SD_2), respectively. Early sowing (SD_1) produced 41 and 86% higher grain yield as compared to (SD_2) and (SD_3), respectively. These findings are in conformity with the results of Sharma *et al.* (1989) that delay in sowing decreased ultimate grain yield in mungbean by affecting yield components. Results showed that 1st week of July was optimum time of sowing (Table 2) and advanced breeding line NCM-209 may perform better than genotypes for obtaining maximum grain yield of mungbean (Fig. 1). The findings reported by Dhanjal *et al.* (2000) also reported reduction in seed yield with delayed sowing.

Meteorological data suggests that early sown crop (till mid July) was well benefited from monsoon rains. The crop attained vigorous vegetative growth prior to onset of flowering that was later used in pod formation and grain filling (Table 2). However, crop in SD_4 suffered from dry spells due to decline in monsoon rain and low relative humidity; growth was adversely affected and plants remained stunted. In addition, relatively high diurnal fluctuation in temperatures associated with low night temperature may have hampered grain formation (Table 3). Based on the observation, it is concluded that prevailing common practice of mungbean sowing in mid July or even later may cause a substantial reduction in grain yield.

Therefore, it is recommended that earlier sowing (Ist. week of July) should be adapted for obtaining high yield in mungbean. Among genotypes NCM-209 appears to be well adapted to the agro-ecological conditions of the Potowar and performs better than M-1, M-6, NM-2 and NM-92.

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