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Response of Mungbean Varieties to Different Sowing Dates

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Abstract: In order to investigate the effect of sowing dates on yield and yield components of mungbean varieties a two years field experiment was conducted during 2005 and 2006 in Iran. The experimental design was split plot on the basis of randomized complete block design with four replications. Main plots consisted of three sowing dates (May 30, June 14, 29) and sub plots were also allocated to six varieties (Partow, vc1973, vc1178, vc4152, NM92 and Pusa1973). Results of combined analysis showed that seed yield was significantly affected by sowing dates. The maximum seed yield (102.9 g m^{-2}) was obtained in June 29 sowing date because the number of pods per plant and 1000-seeds weight were also increased. Varieties also responded significantly towards yield and yield components. The maximum seed yield (114.9 g m^{-2}) was produced by vc4152 variety. Interaction effects of sowing dates and varieties were found significant, vc4152 variety sowing on June 29 gave the highest seed yield (134.7 g m^{-2}).

Key words: Mungbean, sowing dates, varieties, seed yield, yield components

INTRODUCTION

Mungbean (*Vigna radiata* L.) is a leguminous pulse crop for it's use as a vegetable protein source, animal fodder and green manure. It contains isoflavonoids having estrogen and antioxidant activities that used in prevention of much diseases such as cancer, it also exhibits antimicrobial and insecticidal activities (Sheteawi and Tawfik, 2007) and plays an important role in improving soil fertility through biological nitrogen fixation (Asghar Malik *et al*., 2006). This crop is an important short growth duration (70-90 days) grain legume and high nutritive value. It is popular because it's nutritional quality where meal is often to babies and convalescents, owing to their high digestibility and protein content (22-24%) (Hozayn *et al*., 2007). Sowing time is one of the major input affecting the growth and yield of field crops. It affects the duration of vegetative, reproductive and maturity periods (Soomro and Rahman Khan, 2003). Among the various agronomic practices, planting time is the most important factor influencing the yield of mungbean (Asghar Malik *et al*., 2006). Optimum planting time of mungbean may vary from one variety to another and also from one region to another due to variation of agro-ecological conditions (Sarkar *et al*., 2004). Patel *et al*. (1992) reported that the grain yield of two varieties of mungbean was considerably more at the first date of sowing as compared to second date of sowing. Sangakkara (1998) reported from Sri Lanka that late sowing of mungbean produced the lowest yields of low quality seeds. Gebologlu *et al*. (1997) sown mungbean cultivars on 1 or 15 May or 1 or 15 June and reported that 1000-seeds weight and yield were highest with May 15 or June 15 sowing. Mungbean cultivars varied significantly in yield and yield components (Rahman *et al*., 2002).

The present study was carried out to find out optimum sowing time for various mungbean genotypes for obtaining their yield potential.

MATERIALS AND METHODS

The experiment was conducted at the experimental farm of the Islamic Azad University of Shahre-rey, in Tehran, Iran, during 2005 and 2006. The research field is located in an arid climate where the summer is hot and dry and the winter is cool and dry. The altitude of the research field is 1000 m. The field is located at 35°-35'N and 51°-28'E. The mean annual precipitation and temperature are 201.7 mm and 20.4°C, respectively. The experiment was laid out in a split plot on the basis of complete block design with four replications that placed sowing dates in the main plots and varieties in sub plots. Three sowing dates viz., May 30, June 14 and June 29 and six varieties viz., Partow, vc1973, vc1178, vc4152, NM92 and Pusa 1973 were used. The soil of experimental field was clay loam with pH 7.6, and contains organic matter 1.4%, total nitrogen 0.08%, available phosphorus 18 ppm, exchangeable potassium 230 ppm and EC of 2.5 mmohs cm^{-1}. Size of each plot was 12.5 m^2 (5×2.5 m) with a spacing of 50 cm between rows and 10 cm between plants. Experimental plots was uniformly fertilized with 60-60-20 kg ha^{-1} NPK in the form of urea, triple

superphosphate and muriate of potash at the time of final land preparation. Crop management practices such as weeding, thinning and plant protection measures were done as per requirement. At physiological maturity ten plants/plot were selected randomly, sun dried and then pods were separated from the plants, counted and threshed for seed. Seeds were cleaned before being weighed for grain yield/plant. Collected data were analyzed statistically using MSTAT-C program and the means were compared by Duncan's Multiple Range Test at 5% probability level (Steel and Torrie, 1980).

RESULTS AND DISCUSSION

Effect of sowing date: Number of pods per plant was significantly affected by sowing dates. Later sowing date (June 29) produced highest number of pods per plant (13.84) and earlier sowing date (May 30) produced lowest number of pods per plant (11.34) (Table 1). These results are similar to the finding of Gebologlu *et al.* (1997) who reported higher number of pods per plant in late sowing as compared to early sowing. Sowing date had also significant effect on number of seeds per pod. The maximum number of seeds per pod (6.98) was observed in June 14 sowing, against minimum (6.73) in June 29 sowing (Table 1). Sarkar *et al.* (2004) also reported that number of seeds per pod affected by sowing date. Effect of sowing dates on 1000-seeds weight was significant. June 29 sowing, gave highest 1000-seeds weight (54.74 g) while June 14 sowing, gave lowest 1000-seeds weight (50.45 g) (Table 1). This results are supported by Heatherly (1988) who reported that average seed weight from irrigated late planting of soybean was greater than irrigated early planting. The data showed that sowing dates had significant effect on seed yield (Table 1). Crops sowing on June 29 produced maximum seed yield (102.9 g m^{-2}) attributed by the higher number of pods per plant and 1000-seeds weight, while crops sowing on May 30 produced minimum seed yield (79.57 g m^{-2}). Similar results have been reported by Asghar Malik *et al.* (2006) who found that seed yield was affected by sowing time and late sowing (3rd week of July) produced more seed yield as compared to early sowing.

Table 1: Mean comparison of yield and yield components of mungbean as affected by sowing date and variety in 2 years (2005 and 2006)

Treatments	Pods plant^{-1}	Seeds pod^{-1}	1000-seeds weight (g)	Seed yield (g m^{-2})
Sowing dates				
30-May	11.34c	6.76b	51.99b	79.57c
14-Jun	12.23b	6.98a	50.45c	86.26b
29-Jun	13.84a	6.73b	54.74a	102.9a
Variety				
Partow	13.75a	7.00b	48.34d	92.62b
vc1973	11.38c	6.58c	62.83a	94.18b
vc1178	11.55c	6.40d	54.70c	80.86d
vc4152	13.95a	7.18a	56.90b	114.90a
NM92	12.26b	7.22a	48.51d	87.50c
Pusa1973	11.92b	6.56c	43.06e	67.35e

Means with the same letter in each column and treatment are not significantly different at probability level of 5% using DMRT

Effect of variety: Different varieties had significant effect on number of pods per plant. The maximum number of pods per plant (13.95) were observed in vc4152 variety, while the minimum (11.38) were recorded in vc1973 variety (Table 1). It might be due to genetic make up of cultivars. Similar results were reported by Khan and Malik (2001) and Ayub *et al.* (1999). It was observed that number of seeds per pod differed significantly among the varieties. The highest number of seeds per pod (7.22) were recorded in NM92 which was statistically at par with vc4152 (7.18).

The lowest number of seeds per pod (6.40) were recorded in case of vc1178 variety (Table 1). These results are in line with those of Sarkar *et al.* (2004) and Khan and Malik (2001) who observed that mungbean cultivars differed in number of seeds per pod. Data revealed that 1000-seeds weight was significantly affected by the varieties. The maximum 1000-seeds weight (62.83 g) was observed in vc1973 while the minimum 1000-seed weight (43.06 g) was observed in Pusa1973 variety (Table 1). Samanta *et al.* (1999) also concluded that mungbean cultivars had significant effect on 1000-seeds weight. Significant variation in seed yield was observed among 6 varieties of mungbean. vc4152 produced the maximum seed yield (114.9 g m^{-2}) while pusa1973 produced the minimum seed yield (67.35) (Table 1). The higher seed yield in vc4152 variety was attributed to more number of pods per plant and number of seeds per pod. Similar results were reported by Sarkar *et al.* (2004), Khan and Malik (2001) and Samanta *et al.* (1999).

Interaction effects of sowing date and variety: Interaction effects between sowing dates and varieties were found significant in seed yield and its components. The vc4152 variety sowing on June 29 gave the highest seed yield (134.7 g m^{-2}) mainly be due to increased number of pods per plant while the Pusa1973 variety sowing on May 30 gave the lowest seed yield (60.33 g m^{-2}) might be due to decreased number of pods per plant and 1000-seeds weight (Table 2). Number of pods per plant was the highest (15.75) on June 29 sowing of Partow variety and statistically similar result was found on June 29 sowing of vc4152 variety while the lowest number of pods per plant (10.61) was found on May 30 sowing of Pusa1973 and May 30 sowing of vc1973 variety. The highest number of seeds per pod (7.42) was observed on June 14 sowing of vc4152 and June 14 sowing of Partow variety. The lowest number of seeds per pod (6.18) was observed on June 29

Table 2: Interaction effects of sowing date and variety on yield and yield components of mungbean in 2 years (2005 and 2006)

Treatments combination	Pods plant^{-1}	Seeds pod^{-1}	1000-seeds weight (g)	Seed yield (g m^{-2})
May 30×Partow	12.34de	7.11b	48.58f	84.89g
May 30×vc1973	10.63h	6.46fg	63.76a	87.49fg
May 30×vc1178	11.43fg	6.38gh	52.74d	76.84h
May 30×vc4152	12.19e	6.82cd	56.00c	93.12e
May 30×NM92	10.85gh	7.06bc	48.75f	74.73h
May 30×Pusa1973	10.61h	6.75de	42.09i	60.33j
June 14×Partow	13.16c	7.38a	44.61gh	86.71fg
June 14×vc1973	11.23gh	6.70def	60.30b	90.64ef
June 14×vc1178	11.29g	6.65defg	52.26de	78.09h
June 14×vc4152	14.02b	7.42a	56.10c	116.80b
June 14×NM92	11.49fg	7.31ab	46.10g	77.52h
June 14×Pusa1973	12.20e	6.42fgh	43.32hi	67.83i
June 29×Partow	15.75a	6.51efg	51.82de	106.30cd
June 29×vc1973	12.30e	6.59defg	64.43a	104.40d
June 29×vc1178	11.95ef	6.18h	59.11b	87.65fg
June 29×vc4152	15.63a	7.31ab	58.60b	134.70a
June 29×NM92	14.45b	7.28ab	50.69e	110.20c
June 29×Pusa1973	12.94cd	6.52efg	43.78hi	73.88h

Means with the same letter in each column are not significantly different at probability level of 5% using DMRT

sowing of vc1178 variety. The vc1973 variety sowing on June 29 gave the highest 1000-seeds weight (64.43 g) while the Pusa1973 variety sowing on May 30 gave the lowest 1000-seeds weight (42.09 g) (Table 2).

From the present study it may be concluded that June 29 sowing should be adapted for obtaining high yield in mungbean. Among varieties, vc4152 appears to be well adapted to the agro-ecological conditions of the Shahrerey region in Iran.

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