EFFECT OF DATE OF SOWING AND SEED RATE ON THE GROWTH AND YIELD OF KHArif MASH (VIGNA MUNGO L)

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ABSTRACT
A field study was carried out to evaluate the effect of date of sowing (30th June, 15th July, 30th July and 15th August) with different levels of seed rate (20 kg ha\(^{-1}\), 25 kg ha\(^{-1}\), 30 kg ha\(^{-1}\) and 35 kg ha\(^{-1}\)) on the growth and yield of Kharif mash. Maximum grain yield was recorded when sowing was done on 30th of June. It was due to higher number of pods per plant, number of grain per pod, maximum test weight and harvest index. However sowing done on 30th of June was statistically at par with crop sown on 15th of July and further by delay in sowing by 15 days reduced grain yield by 23.7%. Different levels of seed rates significantly effects the grain yield. Maximum grain yield was produced by 20 kg ha\(^{-1}\) seed rate which was statistically at par with 25 kg ha\(^{-1}\) seed rate and reduced progressively with successive increase in seed rates.

Key words: Date of sowing, Kharif mash, Seed rate.

INTRODUCTION
Black gram (Vigna mungo L.) also known as Kharif mash, belongs to family leguminoseae is one of the important pulse crops grown in many Asian countries including India, where the diet is mostly cereal based. In India, Kharif mash was grown on an area of 2.99 million hectares with total production of 0.81 million tones and yield of 422 kg ha\(^{-1}\) during 2009-2010 (Annonymous, 2011a). In Punjab, Kharif mash was grown on an area of 2.8 thousand hectares with total production of 0.81 million tones and yield of 422 kg ha\(^{-1}\) during 2009-2010 (Annonymous, 2011b). As a leguminous crop, black gram fixes up atmospheric nitrogen and also improves soil fertility and productivity. At present the productivity of rice-wheat based intensive cropping system has been declining in Punjab and several agro-ecological problems like imbalance in plant nutrients availability, declining water table and frequent outbreaks of pest and disease epidemics are growing rapidly and it is essential to include pulse crops in existing monoculture (rice-wheat) rotation. Sowing time is one of the major non-monetary inputs affecting the growth and yield of crops. At the same time optimum seed rate plays an important role in contributing to the high yield because in case of thick plant population, most plants remain sterile, easily attacked by diseases as compared to normal plant population. The date of sowing determine time of flowering and it has great influence on dry matter accumulation, seed set and seed yield (Sofield et al.1977) In Punjab during Kharif season, the major constraints are high humidity associated with luxurious vegetative growth of crop, insect-pest, diseases and less fruit setting etc. In order to save the crop from adverse effects of excess moisture, late sowing of Kharif mash may be beneficial. The present study was conducted to determine a suitable date of sowing and seed rate for higher Kharif mash production under the agro-climatic conditions of the Punjab.

MATERIALS AND METHODS
The field experiment was conducted at students’ research farm Khalsa College, Amritsar, during Kharif season 2009-2010. The soil of the experimental area was sandy loam in the texture and medium in organic carbon, available N and K. The treatment consisted of four date of sowing (30th June, 15th July, 30th July and 15th August) as main
plot and four different levels of seed rates (20 kg ha\(^{-1}\), 25 kg ha\(^{-1}\), 30 kg ha\(^{-1}\) and 35 kg ha\(^{-1}\)) as sub plots which were laid out in split plot design. The experiment was replicated four times maintaining a net plot size of 3m x 3m. The crop was sown by kera method using desi plough. Mash-338 an improved variety of Kharif Mash was selected for sowing. Data were recorded on pods per plant, grains per pod, thousand grain weights, biological yield, seed yield and harvest index were recorded by following the standard procedures. The data was analyzed with CPCS 1 software developed by Punjab Agricultural University, Ludhiana. Differences among the treatments means were compared using least significant difference (LSD) at 5% probability level (Steel and Torrie, 1984).

**RESULTS AND DISCUSSION**

Yield data presented in Table 1 revealed that the maximum seed yield was obtained when crop was sown on 30\(^{th}\) June which was statistically at par with the crop sown on 15\(^{th}\) July. Sowing on 30\(^{th}\) August recorded the lowest grain yield followed by 30\(^{th}\) July. It was observed that by every 15 days delay in sowing after 30\(^{th}\) June the grain yield declined by 21.6% and 33.1%, mainly due to reduction in number of pods per plant, grains per pod and seed weight. Sharma (1969) and Nema et al (1989) also reported that seed yield progressively delayed with delay in sowing which might be due to the prevailing low temperature at flowering stage and pod filling stages. These results were also in close conformity with those of Moula et al (2000). Higher seed yield obtained from crop sown on 30\(^{th}\) June which was due to higher number of pods per plant, number of seeds per pod and test weight. Similarly, Sekhon and Singh (2005) reported that crop sown on 25\(^{th}\) March recorded the highest grain yield due to more number of branches per plant, number of pods per plant and number of seeds per pod as compared to late sown crop (20\(^{th}\) April), (Table1).

Crop sown on different dates of sowing recorded a non-significant variation for days taken to emergence and took about 5 days to emerge. Delay in sowing resulted in early flowering and early maturity. However, variation for days taken to maturity was non-significant under different dates of sowing, whereas crop sown on 15\(^{th}\) August was earliest to initiate flowering which took about 35 days and varied significantly when compared with other
dates of sowing. Damodaran et al. (1989) also reported reduction in days to flowering with delayed sowing. Plants of 30th June sowing were significantly taller, recorded higher number of branches per plant, number of pods per plant and grain yield as compared to plants of 30th July and 15th August sowing. However plants of 15th July sowing were statistically at par with plants of 30th June sowing in plant height, number of branches per plant, number of pods per plant and grain yield. Mendhe et al. (2002) recorded significant effect on plant height, number of branches per plant, number of pods per plant and grain yield in crop sown on 30th October as compared to crop sown on 15th and 30th November in blackgram. The harvest index and test weight was found to be non-significant for different dates of sowings. Kumar et al. (2009) also reported that different date of sowing could not influence the significant difference on harvest index. (Table 1).

Maximum seed yield was obtained with 20 kg ha\(^{-1}\) seed rate which was statistically at par with 25 kg ha\(^{-1}\) seed rate. Ahmed et al. (2004) also recorded the highest grain yield of 1004.36 kg ha\(^{-1}\) with 25 kg ha\(^{-1}\) seed rate in mungbean due to the optimum plant population in the existing environment. A significant decrease in seed yield was recorded when seed rate increased from 30 kg ha\(^{-1}\) to 35 kg ha\(^{-1}\) seed rate due to reduction in dry matter accumulation per plant, number of branches per plant, number of pods per plant and grain yield. This might be due to the inter plant competition for moisture, nutrient, light and space availability by virtue of which performance of single plant was diminished. Similarly, Begum et al. (2009) also recorded reduction in number of branches per plant, number of pods per plant and grain yield in mungbean with increasing seed rate from 40 kg ha\(^{-1}\) to 60 kg ha\(^{-1}\). The effect of seed rates was found to be non-significant for days taken to flower initiation and days taken to maturity.

Increase in seed rate resulted in significant reduction of number of pods per plant whereas decrease in no. of seeds per pod was non-significant (Table 1). Mackenzie (1985) also reported that decrease in number of pods per plant in mungbean with increase in plant density. The plant height increase with successive increase in seed rate and it was found that seed rate 30 kg ha\(^{-1}\) and 35 kg ha\(^{-1}\) produced significantly taller plants than seed rate of 20 kg ha\(^{-1}\) and 25 kg ha\(^{-1}\). This may be due to the fact that the lateral growth of plant is less than vertical growth due to lesser space between plants and more competition. Sekhon and Singh (2005) and Kumar et al. (2009) also reported increase in plant height with increased in seed rate. The number of branches per plant and dry matter accumulation declined with increase in seed rate. This may be attributed to severe competition and higher respiratory rate due to the competition of available oxygen and moisture. (Table 1).

The different levels of seed rates did not show any significant effect on days taken to emergence. Kaleem (2000) also reported a non-significant effect of seed rate on days taken to emergence. The effect of seed rates was found to be non-significant on test weight and harvest index. Begum et al. (2009) also recorded non-significant decrease in test weight with increase in seed rate. Interaction between the date of sowing and seed rate was found to be non-significant.

REFERENCES


