**Annals of Plant and Soil Research 20(4): 428-431 (2018)**

# Effect of varieties and dates of sowing on growth, yield and quality of black gram (*Vigna mungo* L.)

**KETAN PATIDAR AND T. SINGH**

Department of Agronomy, A.K.S. University, Satna -485 001 (M.P.)

Received; September, 2018; Revised accepted: November, 2018

## ABSTRACT

*A field experiment was conducted during rainy season of 2017 at the Instructional Farm, A.K.S. University, Satna (M.P.) to study the effect of varieties and dates of sowing on growth, yield and quality of black gram (Vigna mungo L). The treatments consisting of four varieties and three dates of sowing were evaluated in factorial randomized block design with three replications. The results revealed that the variety T-9 recorded significantly higher growth and yield-attributes, yield and nutritional quality of black gram. over other varieties.T-9 recorded maximum grain (8.38 g ha$^{-1}$) and straw (22.89 q ha$^{-1}$) which were higher by 0.86 q ha$^{-1}$ grain and 1.88 q ha$^{-1}$straw over PU-19. Seed protein contact (21.21%) as well as net income of Rs.33034 ha$^{-1}$ with a B:C ratio of 2.39.were highest in verities T-9. The 1$^{st}$ week of July sowing crop gave highest yield (9.54 q ha$^{-1}$) as well as net income (Rs.40593 ha$^{-1}$) with B:C ratio 2.71. The grain protein content was also highest (21.41%) in seeds of first week of July sowing crop. The lowest yield, net returns and protein content were recorded in crop sown in third week of July. T-9 grown in 1$^{st}$ week of July produced higher yield (10.28 q ha$^{-1}$) and net income of (Rs.45755 ha$^{-1}$) over other treatment combinations.*

**Key words:** Black gram, dates of sowing, varieties yield, quality

## INTRODUCTION

Blackgram (Vigna *mungo* L.) is one of the most popular and urid dal all over india .it is very nutritious and its cultivation is also easy. But the productivity of this pulse crop is low due to adoption of low yielding varieties as well as delay in sowing. Improved cultivar is an important tool which has geared productivity in many counties the improved varieties showed significant variations in plant height, branches per plant, pods per plant, and seeds per pod, test weight, seed yield, biological yield and harvest index. It produces significantly higher seed yield, higher number of pods and branches per plant. In general, short duration genotypes in comparison to normal duration genotypes showed efficient biological yield and yield attributes which results in higher overall harvest index and seed yield. It was noted that 25-35% higher yield and net returns were recorded compared to respective local checks and gave higher productivity and profitability under rained conditions. The various parameters such as stomata conductance, photosynthetic rate, transpiration rate, total chlorophyll and leaf nitrate reductase activity were found significantly higher in high yielding varieties of black gram. The value of stable and high yielding cultivars has been universally recognized as an important factor for boosting crop production (Sharma *et al.* 2018). Optimum time of sowing of black gram may vary from variety to variety and season to season due to variation in agro ecological conditions. Date of sowing determines time of flowering and it has great influence on dry matter accumulation seed set and seed yield. Time of sowing is the most important factor influencing the yield of black gram. Too much delay in the time of sowing results in reduction of crop yield. Thus, keeping the above facts in view, the present investigation was conducted to study the effect of varieties and date of sowing on productivity, quality and economics of black gram

## MATERIALS AND METHODS

The field experiment was carried out during rainy season of 2017 at the Instructional farm, A.K.S. University, Satna (M.P.). The soil of the experimental field was silty clay-loam having pH 7.5, electrical conductivity 0.26 dS m , organic carbon 4.8 g kg, available N,$P_2O_5$ and $K_2O$ 180, 12.5 and 200 kg ha, respectively. The total rainfall received during June to October 2017 was 760.8 mm. The treatments comprised four varieties (IPU-94-1,Sekhar -2,T-9 and PU-

19) and three dates of sowing (1st,2ndand 3rd week of July) thus twelve treatment combinations were laid out in a factorial randomized block design with three replication. These varieties were sown @15 kg seed $ha^{-1}$ in rows 30 cm apart on first, second and third week of July, 2017. An uniform dose of 20 kg N $ha^{-1}$ was supplied in all the treatments. Recommended dose of 60 kg $P_2O_5$ $ha^{-1}$ was applied as basal through diammonium phosphate. The crop was raised as per recommended package of practices. The crop eas harvest on October 14, 2017. The growth and yield attributes were recorded at harvest. The gram and straw yields were also recorded at maturity. The N contact in gram was determed by Kjeldahl method and the proton contain was computed using factor 6.25 multiplied by N content in grarn.

## RESULTS AND DISCUSSION

### Growth and yield attributes

Amongst the four varieties, T-9 resulted in significantly taller plants (35.5 cm), highest pods/plant(47.8), pod length, (4.06 cm) grains/pod, (6.7) test weight(46.44 g) and grain weight/plant(33.9g). The best performance of T-9 over IPU-94-1, Sekhar-2 and PU-19 varieties may be ascribed to its genetic attainment for translocation of more photosynthetic towards the reproductive organs Moreover, the improvement in yield-attributes due to T-9 variety may be ascribed to the increased photosynthesis and improved vegetative growth as a result of increased nutrients uptake from the soil for root and shoot development. These results on black gram are in close agreement with those of Kumar *et al.* (2009) and Bhowaland and Bhownik (2014).The yield-attributes were found almost significantly higher when the crop was sown early on 1st week of July. The maximum pods (50.91/plant), seeds/pod (6.93) and test weight( 49.5 g ) pod length (4.2 cm) and (41.9 g )seed weight/plant. All these yield attributes were decreased significantly with the delay in sowing upto 3rd week of July The rapid increase in yield-attributes was due to more vigorous growth in early planting, resulting in more photosynthetic from leaves to the reproductive parts (Razzaque *et al.* 2005, Reddt *et al.* 2014).

Table 1: Effect of varieties and dates of sowing on growth and yield attributes of blackgram

| Treatments | Plant height (cm) | Pods/ plant | Seeds/ pod | 1000-seed weight (g) | Length of pod (cm) | Seed yield/ plant (g) |
|---|---|---|---|---|---|---|
| Varieties | | | | | | |
| IPU-94-1 | 34.9 | 46.5 | 6.45 | 44.4 | 4.10 | 31.68 |
| Sekhar-2 | 34.6 | 45.5 | 6.35 | 43.1 | 3.96 | 30.44 |
| T-9 | 35.5 | 47.8 | 6.73 | 46.4 | 4.06 | 33.99 |
| PU-19 | 34.3 | 44.2 | 6.16 | 41.7 | 3.93 | 29.66 |
| SEm± | 0.32 | 0.27 | 0.12 | 0.20 | 0.03 | 0.36 |
| CD (P = 0.05) | 0.96 | 0.81 | 0.37 | 0.60 | 0.09 | 1.06 |
| Dates of Sowing | | | | | | |
| 1st week of July | 36.8 | 50.9 | 6.93 | 49.5 | 4.29 | 41.93 |
| 2nd week of July | 34.8 | 40.8 | 6.53 | 44.5 | 3.99 | 29.91 |
| 3rd week of July | 32.0 | 40.3 | 5.80 | 37.9 | 3.69 | 22.49 |
| SEm± | 0.28 | 0.24 | 0.11 | 0.17 | 0.02 | 0.31 |
| CD (P = 0.05) | NS | 0.70 | NS | 0.51 | 0.08 | 0.92 |

### Yield

Data (Table 1) revealed that varietiy T-9 resulted in significantly higher seed yield (8.38 q ha) which was due to increased yield-attributes of this variety. However, the second best variety was IPU-94-1 yielding 8.04 q $ha^{-1}$. Sekhar-2 and PU-19 recorded equally lower seed yield (7.52 to 7.74 q/ha) which was in accordance with the yield-attributes of these varieties. The varietal differences in yielding potential have been reported by Patra *et al.* (2000) and Dodwadiya and Sharma (2012).The black gram yield was significantly affected by different dates of sowing. Considering the date of sowing, 1st week of July sowing gave the highest seed yield (9.54 q $ha^{-1}$). It was found that the seed yield was gradually decreased in the later 2nd and 3rd week

of July sowing dates. This might be due to decrease in the yield-attributing characters as a result of decreased translocation of photosynthetic from the vegetative parts towards the reproductive organs. These findings corroborate with those of Singh *et al.* (2004).The variety T-9 grown earlier on 1st week of July further increased all these parameters synergistically. Thus, the tremendous enhancement in the vegetative growth and thereby yield-attributing characters of black gram variety T-9 sown on 1st week of July might be due to attainment of full inherent potential and availability of longer vegetative growth period increased the growth of young leaves which helped in the synthesis of carbohydrates, proteins etc. for building up new tissues and eventually increase in the yield-attributes and grain yield.The increases in straw yield due to some varieties and earlier sowing date was also observed which may be due to more vegetative growth and late translocation of photosynthetic from vegetative parts towards the reproductive organs (seed). The harvest index was also found to be significantly higher in all varieties except T-9 as well as under earlier sowing. The changed HI under these treatments was because of the proportionately higher grain production per hectare over its straw (Reddy *et al.* 2014).

Table 2: Effect of varieties and dates of sowing on yield quality and economics of blackgram

| Treatments | Seed yield (q $ha^{-1}$) | Stover yield (q $ha^{-1}$) | Harvest index (%) | Seed protein (%) | Net income (Rs $ha^{-1}$) | B:C ratio |
|---|---|---|---|---|---|---|
| Varieties | | | | | | |
| IPU-94-1 | 8.04 | 21.59 | 27.1 | 20.4 | 30715 | 2.29 |
| Sekhar-2 | 7.74 | 21.17 | 27.0 | 20.2 | 28680 | 2.21 |
| T-9 | 8.38 | 22.89 | 26.8 | 21.2 | 33034 | 2.30 |
| PU-19 | 7.52 | 21.01 | 28.1 | 19.5 | 26994 | 2.14 |
| SEm± | 0.09 | 0.82 | 0.83 | 0.18 | - | - |
| CD (P = 0.05) | 0.28 | 2.42 | 2.43 | 0.53 | - | - |
| Dates of Sowing | | | | | | |
| 1st week of July | 9.54 | 23.08 | 29.2 | 21.4 | 40593 | 2.71 |
| 2nd week of July | 7.53 | 20.20 | 27.4 | 20.1 | 27273 | 2.15 |
| 3rd week of July | 6.69 | 19.91 | 25.2 | 19.3 | 21702 | 1.92 |
| SEm± | 0.08 | 0.71 | 0.71 | 0.15 | - | - |
| CD (P = 0.05) | 0.24 | NS | NS | NS | - | - |

**Economics**

Amongst the varieties, T-9 gave maximum net income of Rs.33034 $ha^{-1}$ with a B:C ratio of 2.39. The second best variety was IPU-94-1 and then Sekhar-2. PU-19 which gave the lowest monetary gain of Rs.26994 $ha^{-1}$ with B:C ratio of 2.14. Similar results were reported by Singh *et al.* (2004). Similarly 1st week of July sowing gave the maximum monetary gain of Rs.40593 $ha^{-1}$ with B:C ratio of 2.71, whereas the late sowing 2nd and 3rd week of July gave net returns of Rs.27273 and Rs.21702 $ha^{-1}$, respectively. Such variation in monetary gain under different varieties and their sowing dates was exactly in accordance with the grain and straw yield and the consequently gross income obtained per hectare after the sale of the produce from these treatments.

**Quality**

The protein content in grain of the varieties was found to differ significantly. Accordingly the variety T-9 contained significantly higher protein content (21.21%) over other varieties. The varietal differences in grain protein may be owing to genetic variability among the varieties which eventually differed in the protein synthesis as a result of N-metabolism. These results corroborate the findings of Bhowmik *et al.* (2008) and Reddy *et al.* (2014). The protein content in black gram seed did not deviate upto significant extent due to different dates of sowing. However, 1st week of July sowing resulted in slightly higher protein content (21.41%), followed by 2nd week of July sowing (20.16%). It was further decreased upto 19.33% under 3rd week of July sowing. The optimum (earlier) sowing date with longer span

of vegetative growth provided essential nutritional requirement responsible for biochemical activities leading towards respiratory enzyme catalyse which is involved in the conversion of food material into soluble simple sugar. The increase in protein content of black gram upto 21.41% under earlier sowing date may be ascribed to more synthesis of protein through amino acids as a result of N-metabolism (Singh *et al.* 2004).

It may be concluded from the results that the croo sown in first week of July produced significantly higher yield. Likewise protein content was also higher in grain of black gram under first week of July sowinf. Amongst varieties, T-9 was found to be most suitable for agro-climatic conditions of Satna (M.P.) and exhibited higher yields than other varieties.

## REFERENCES


Bhowaland, S.K. and Bhowmik, S.K. (2014). Performance of summer mungbean as affected by variety and date of harvest. *Trends in Biosciences*, **7** (13): 1534-2014.

Bhowmick, M.K., Sadhukhan, R. and Saha, P.K. (2008). Response of new mungbean genotypes to sowing time during spring summer in West Bangal. *Journal of Crop and Weed*, **4**(1): 1-3.

Dodwadiya, K.S. and Sharma, A.R**. (**2012). Effect of tillage and method of sowing on performance of greengram (*Vigna radiata*) varieties during summer and rainy seasons. *Indian Journal of Agricultural Sciences*, **82** (5): 462-5.

Kumar, Rakesh, Nandan, R., Kumar Vinod, Prasad. S. and Singh. D. (2009). Response of summer mungbean (*Vigna radiata*) cultivars to sowing time and seed rate. *Indian Journal of Agricultural Science*, **79** (4):309-312.

Patra, A.K., Nayak, B.C. and Mishra, M.M. (2000). Performance of greengram (*Phaseolus radiatus*) varieties under different dates of sowing during winter season. *Indian Journal of Agronomy*, **45** (1):143-147.

Razzaque, M.A., Rafiquzzaman, S., Kabir, A.H.M.F. and Ali, M.A. (2005). Effect of sowing time on the yield of mungbean under rainfed condition. *Journal of Agriculture Rural Development* (Gazipur), **3** (1/2): 103-106.

Reddy, G.R., Dattatri, K., Sudhakar, N., Himabindu, T., Osman, M. and Sharma, K.L. (2014). Assessment of Improved Varieties under Different Climate Vulnerabilities. *Indian Journal of Dryland Agricultural Research and Development*, **29** (1): 11-22.

Singh, T.K., Ram Pyare, Dwivedi, D.P., Singh, S.K. and Verma, S.N. (2004). Response of varieties and dates of sowing on growth and yield of chickpea. *Plant Archives*, **4**(2): 471-474.

Sharma, S., Gupta, D., Singh, L. and Lal, M. (2018) Productivity, quality and profitability of barley (*Hordeum vulgare*) as affected by genotypes and dates of sowing. *Annals of Plant and Soil Research* **20** (3): 263-267.