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**Richa Raghuvanshi**
Department of Soil Science and Agricultural Chemistry, Banda University of Agriculture and Technology, Banda, Uttar Pradesh, India

**Shailendra Kumar Yadav**
Department of Agricultural Extension and Communication, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, India

**Jagannath Pathak**
Department of Soil Science and Agricultural Chemistry, Banda University of Agriculture and Technology, Banda, Uttar Pradesh, India

**RP Singh**
Department of Agricultural Chemistry and Soil Science, Udai Pratap Autonomous College, Varanasi, Uttar Pradesh, India

**Akhilanand Dubey**
Department of Soil Science, R.N. Tagore Agriculture College, Deoghar, Birsa Agriculture University, Ranchi, Jharkhand, India

**Neelam Kushwaha**
Department of Genetics and Plant Breeding, Acharya Narendra Dev university of Agriculture and Technology, Kumarganj, Ayodhya, Uttar Pradesh, India

**Shivam Singh**
Department of Soil Science and Agricultural University, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, India

**Corresponding Author:**
**Shivam Singh**
Department of Soil Science and Agricultural University, Sardar Vallabhbhai Patel University of Agriculture and Technology, Meerut, Uttar Pradesh, India

# Evaluation of yield and its attributing traits for chickpea under varying sowing dates in the Mawai village of Banda

**Richa Raghuvanshi, Shailendra Kumar Yadav, Jagannath Pathak, RP Singh, Akhilanand Dubey, Neelam Kushwaha and Shivam Singh**

**Abstract**
A field survey in the local variety of chickpea was carried out at farmer's farm of Mawai village of Banda district to evaluate the yield and its attributing character under different sowing date. The seeds were sown on dated November 02, December 03, December 16 and January 06, 2020. Late seed sowing results in poor yield and its attributes compared to optimum however there had been a very close relation between optimum sowing and early sowing. Yield attributing character such as days to flowering, days to maturity and number of grain per pod shows non-significant relationship but number of grain per plant seed index and shows significant relationship. Higher yield 2.05 tons/ha with seed index 241.89gm and number of grain per plant 25.61 had been reported when seeds are sown on December 03 and lowest characters had been found for the seeds when sown on January 06, 2020 however, number of grain per pods had been found to vary non-linearly towards the date of sowing.

**Keywords:** Gram, Banda, Bundelkhand

## Introduction
Chickpea (*Cicer arietinum* L.) is an annual legume also known as Gram, Bengal gram etc. It is very essential for the human consumption because its seeds are the rich source of 17-31% protein, 52-78% of biological activity which is equivalent to 4 times more as compared to rice of equal caloric value (Allam, 2002; Bhattacharya, 1999) [3, 4]. Of the world, Indian sub-continent had been investigated to produce two-third of chickpea annually thus, have larger adoption for producing the legumes (Akbar *et al*., 2011) [1]. The production and productivity of chickpea records highest in India followed by after Australia which ranks second (FAO 2018) [2]. Bundelkhand region of India is very well known for the production of legumes and oilseeds due to nutrient rich soil and the suit climatic condition.
It is mainly grown in Rabi season but due to evaluation of high yielding varieties of cereals and other food crops for Bundelkhand region on one hand and increasing population reduces the cultivable area every year on other hand results decline in the cultivation for chickpea. Therefore, chickpea production now the days reduced to an extent and can be increased using high yielding time adjustable varieties using improved technology (Fallah, 2008; Iliadis C., 2001) [12, 13]. Various agronomic practices had been found to increase the production but are found to be very luxuriant and non time adjustable. Farmers practices results that only optimum sowing provides more time for growth and development as compared to early and late sown varieties which hinders the crop yields. In early sowing the plant population is attacked by anthracnose while in late sown the yield is affected by shortening of seeds (Kabir *et al*., 2009) [7]. Net monetary return from optimum sowing due to market stocking is low also. Thus, an attempt had been made with an objective to evaluate the yield and its attributing traits under different sowing date in local variety of chickpea.

## Materials and Methods
The survey was made at farmers farms of village Mawai of district Banda which is located at 25032'09.82''N and 80021'06.19''E having elevation 390 ft.

The different days of sowing (4 days) under this survey were considered as treatments and each farmer were considered as replication (3 farmers from each sowing date). Since the data were taken from the field hence randomized block design was the suit experimental design which is being analyzed for the varaience using excel sheet. The area conceived an average rainfall 902mm (Arial view of Experimental site is shown in figure 1). The recommended dose of fertilizer NPK @ 12.5:25:2.5 kg/ha was applied uniformly in all treatments. Urea, Single Super Phosphate and MOP were acting as major source of nitrogen, phosphorous and potassium respectively. Along with this Gypsum, Boric acid and Zinc Sulphate were also applied @ 110, 12 and & 7 kg/ha. Additionally, 25 kg/ha of compost had been added to maintain the physico-chemical status of soil. The full dose of fertilizers had been applied at time of land preparation except gypsum which is applied at time of land preparation in half dose and half dose at time pod formation stage. 2 irrigations had been given i.e., one at pre-flowering stage and one at pod development stage because of low winter rainfall. Proper intercultural operation *VIZ* – thinning, gap filling, weeding and drainage with plant protection measures had been taken if found at right time.

**Fig 1:** Shows aerial view of Experimental Plot taken from GPS-google earth pro software

**Data Collection and Statistical Analysis**

For collecting data on yield and its attributes 5 plants were selected randomly and mean of data is tabulated in result section of this paper. The data had been taken for Days to Flowering, Days to Maturity, Number of grain per plant, Number of grain per pod, Seed Index (gram) and Yield (tons/hectare).The data were analyzed for analyses of varience (ANOVA) using data tool in excel sheets. Along with ANOVA, CV had also been calculated from the same excel sheet.

**Results and Discussion**

**Table 1:** Description of the treatments

| S.No. | Treatment No. | Treatment Description |
|---|---|---|
| 1. | $T_1$ | 02 November |
| 2. | $T_2$ | 03 December |
| 3. | $T_3$ | 16 December |
| 4. | $T_4$ | 06 January |

**Table 2:** Description of days to maturity and flowering

| Date of sowing | Days to Flowering | Days to maturity |
|---|---|---|
| 02 November | 67.52 | 109.17 |
| 03 December | 60.46 | 100.3 |
| 16 December | 58.52 | 90.66 |
| 06 January | 55.23 | 84.21 |
| RBD (0.05) | Non-Significant | Non-Significant |
| CV | 3.12 | 8.09 |

The above statistics shows that different date of sowing have non-significant changes in flowering and maturity however they positive correlated to each other. Optimum sowing on 2 November takes maximum days to flowering and maturity (67.52 days and 109.17 days respectively) while, late sowing on 6 January shows minimum days of flowering and maturity (55.23 days and 84.21 days respectively). It may be due to thermal variation.

**Fig 2:** Shows flowering stage of gram

**Table 3:** Description of yield attributing character

| Date of sowing | Number of grain per plant | Number of grain per pod |
|---|---|---|
| 02 November | 19.78 | 0.88 |
| 03 December | 20.61 | 0.96 |
| 16 December | 15.25 | 0.81 |
| 06 January | 10.32 | 1.01 |
| RBD (0.05) | 0.95 | Non-Significant |
| CV | 2.42 | 8.08 |

Number of grain per pod were significantly affected while number of grain per pod varies non-significantly by several date of sowing. Delayed sowing decreases the number of grains per plant more significantly compared to early sowing nevertheless number of seeds per plant had been found to non-significantly and the variation was also found to be non

linear. The higher temperature during grain filling stage might be the possible reason for lower number of grains per plant and thus the increase in seed per grain of chickpea is delayed. Highest number of grain per pod (1.01) had been found for the plants at late sown and highest number grain per plant (20.61) was recorded in optimum sowing however there is a very little difference for the number of grain per plant and number of grain per pod.

**Table 4:** Description of yield

| Date of sowing | Seed Index (gram) | Yield (tons/hectare) |
|---|---|---|
| 02 November | 210.84 | 1.93 |
| 03 December | 241.89 | 2.05 |
| 16 December | 192.51 | 1.84 |
| 06 January | 148.21 | 1.61 |
| RBD (0.05) | 6.25 | 0.01 |
| CV | 2.48 | 2.34 |

Experimental analysis revealed that variation on sowing date has strong positive impact on the yield and seed index. The highest seed index of 241.89 gm and yield 2.05 t/ha had been reported in $T_2$ while lowest yield 1.61 with seed index 148.21 gm had been reported in $T_4$. The lower grain yield accurs mainly due to less grain filling which is the result of high temperature.

Maximum yield was recorded when crop was sown on 2 November as compared to other sowing dates which might be due to favorable climatic condition and provides the suitable vegetative and reproductive growth (Rehman HU *et al.*, 2015) [9]. Due to immature developmental stages the other yield attributes had also sown a decrease bench mark (Sharma and Sharma, 2002) [10]. The other factors for lower yield might be due to low temperature, frost. The result had been supported by Ray *et al.*, 2017 [11].

The yield and quality of chickpea had been found to be very low in traditional agronomic practices and thus, the increasing demand of chickpea makes more responsible for pulse breeder to evaluate the high yielding varieties and grower should be more responsible.

## Conclusion

The early and late sown varieties both have been reported to be effected by the yield and its attributes of chickpea. Maximum result had been found on sowing the chickpea on 3 December while minimum had been appeared on sowing 6 January. But the difference between the yield and its attributes on sowing the crop on 2 November had been reported to very close to maximum yielder. Hence, the farmer in this region can lay their seed in the given period of time. Further trails are conducted under the Banda University of Agriculture and Technology so as to release the scientific way for the cultivation of chickpea as compared to conventional farmer practices.

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