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## Effect of sowing time and mulching on the performance of pigeon pea (*Cajanus cajan* L.)

**Nisha and Balwinder Singh Dhillon**

**Abstract**

The experiment entitled “Effect of sowing time and mulching on the performance of pigeon pea (*Cajanus cajan* L.)” was conducted during Kharif season 2018 at Experimental Farm of Guru Kashi University, Talwandi Sabo, Bathinda (Punjab). The trial was laid out in split plot design with 3 different date of sowing (May 10<sup>th</sup>, May 25<sup>th</sup>, June 10<sup>th</sup>) in main plots and three mulching levels (control, 5 and 10 t/ha) in sub plots. The results showed that the crop sown on May 10 gave significantly higher plant height, number of branches, dry matter accumulation, number of pods/plant, seed yield, stover yield, biological yield and harvest index over other sowing dates. The results showed that crop sown on May 10 gave significantly higher yield (28%, 62.3%) over May 25, June 10. The application of straw mulching @ 10 t/ha was found to be beneficial and can be practiced for yield of pigeon pea crop. Mulching @ 5 t/ha and 10t/ha recorded 8.27 and 18.09%, respectively higher seed yield than control (no mulch). The crop sown on May 10 under 10 t/ha of mulch application gave significantly higher plant height, number of branches/plant, number of pods/plant, grain yield, stover yield, biological yield and harvest index than the other treatment combinations.

**Keywords:** Grain yield, growth, mulching, pigeon pea and sowing time

**Introduction**

Pigeon pea (*Cajanus cajan* L.) is the second most important pulse crop of India after chickpea. Seed of pigeon pea contains 18 to 26% protein and rich in essential amino acids like lysine, tyrosine, cysteine and iron, iodine. Pigeon pea flour is an excellent component in the snack industry and has been recommended as an ingredient to increase the nutritional value of pasta without affecting its sensory properties. Millet mixed with pigeon pea is very nutritious and provide a cheaper alternative to wheat imports in Nigeria (Eneche 1990). In India pigeon pea was grown on 4.43 lakh ha area with the production of 4.25 million tonnes. In Punjab pigeon pea was grown on an area of 2.6 thousand ha and the total production was 2.63 thousand tonnes with average yield 10.13 q/ha (Anonymous 2019).

Pigeon pea also suffers more when sowing is delayed (Padhi 1995) <sup>[1]</sup>. Early sown crop may accumulate excessive dry matter resulting in reduced pod development, while late sown crop may have less biomass and reduced yields (Kumar *et al* 2008) <sup>[7]</sup>. Sowing of crop during the first fortnight of the June, delay the maturity of the crop (Ram *et al* 2011) <sup>[10]</sup> causing delayed harvesting of pigeon pea and consequently delayed sowing of succeeding wheat crop and ultimately low productivity (Tomar *et al* 2014). Singh and Dixit (1992) <sup>[14]</sup> reported delay in sowing results in shortening of growing period and reduces the yield. The beneficial effects of straw mulch application is increasing soil moisture, decrease in soil temperature, soil conservation, control weeds and improved soil fertility has been represented by (Dushouyu *et al* 1995) <sup>[1]</sup>. Moreover, mulches increase infiltration and storage of water in the rhizosphere, improve structure and macroporosity of soil along with reducing runoff and evaporation losses (Acharya and Kapur, 1993) <sup>[2]</sup>. Therefore, this research work was aimed to determine the effect of pigeon pea to different dates of sowing and mulching levels on yield components. Choosing an optimum date of sowing and mulching level could also be a compromise between maximizing yield potential and minimizing disease levels. Keeping in view, the present investigation was undertaken to study the effect of different sowing dates and mulching levels on the performance of pigeon pea.

**Materials and Methods**

The field experiment study entitled, “Effect of sowing time and mulching on the performance of pigeon pea (*Cajanus cajan* L.)” was conducted at research farm of Guru Kashi University, Talwandi Sabo (Bathinda) during kharif season 2018-19. The farm is located at 29.9875°N latitude and 75.0903°E longitude with an altitude of 252 meters above the mean sea level as

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per are extreme. The mean maximum and mean minimum temperature ranged 39.7°C and 21.8°C, respectively recorded during May, 2018 to December, 2019. The field experiment was conducted at experimental area of agriculture research farm of Guru Kashi University, Talwandi Sabo (Bathinda) during Kharif 2018-19. The maximum temperature of about 39.7 °C is achieved during month of May and June during the year, while freezing temperature accompanied by frost occurrence may be recorded in the months of December and January in this region. The monsoon generally starts in the first week of July.). The trial was laid out in split plot design with three sowing dates *viz.*, May 10<sup>th</sup>, May 25<sup>th</sup> and June 10<sup>th</sup> in main plot and three mulching levels *viz.*, control, 5 and 10 t/ha in sub plot.

The collected data were statistically analyzed by using Fisher's ANOVA technique and Critical difference (CD) test at 5% probability level was used to compare differences among treatment.

## Results and Discussion

### Growth parameters of pigeon pea

The maximum plant height (170 cm) was recorded with the crop sown on May 10<sup>th</sup> which was significantly higher than other sowing dates (Table 1). Application of mulch resulted in increased plant height. The maximum plant height (161 cm) was recorded with 10t/ha of mulch application which was significantly higher as compared to other mulching levels. Similar results were also reported by Kumar *et al* (2008) [7].

**Table 1:** Effect of different sowing dates and mulching levels on growth attributing characters of pigeon pea.

Treatment	Plant height (cm)	Number of branches/plant	Dry matter accumulation (g)
<b>Sowing dates</b>			
May 10	170.0	13.4	78.7
May 25	156.0	12.1	73.3
June 10	146.0	10.6	71.2
C.D (0.05%)	0.5	0.8	1.0
<b>Mulching levels (t/ha)</b>			
0	154.0	11.1	72.7
5	157.0	12.0	74.3
10	161.0	13.0	76.1
C.D (0.05%)	0.3	0.3	0.6

Similarly, sowing dates showed significant effect on other growth parameters of plant (Table 1). The maximum number of branches/plant (13.4) was recorded with May 10<sup>th</sup> sown crop as compare to other sowing dates. The maximum number of branches/plant (13) was recorded with 10 t/ha of mulch application which was significantly higher than the other mulching levels. Similar, results were also recorded by Ram *et al* (2011) [10] and Gajera and Ahlawat (2002) [4].

The maximum dry matter accumulation (78.7 g) was recorded with crop sown on May 10<sup>th</sup> (Table 1) than the other sowing dates. The maximum dry matter accumulation (76.2 g) was recorded with the mulch application of 10 t/ha which was significantly higher than the other mulching levels. Similar, results were recorded by Ram *et al* (2011) [10] and Kumar and Rana (2007) [6].

### Yield attributes of pigeon pea

The sowing dates showed significant effect on various yield attributes of pigeon pea (Table 2). The increase in number of pods/plant (138.6) was recorded when the crop was sown on May 10<sup>th</sup> which was significantly higher than the other sowing dates. However, pod length (5.54 cm), number of

seeds/pod (3.42) and test weight (25.5 g) was non-significant. Similarly, the mulch application significantly increased the yield attributing parameters and mulch application of 10 t/ha resulted in significantly higher number of pods/plant (137), pod length (5.74 cm), number of seeds/pod (3.66) and test weight (25.6 g) as compare to the other mulching levels. However, the interaction effect between sowing dates and mulching levels were non-significant. Similar, results were also reported by the Malik and Yadav (2014) [13] and Rani and Reddy (2010) [11].

**Table 2:** Effect of different sowing dates and mulching levels on yield attributing characters on pigeon pea

Treatment	Number of pods/plant	Pod length (cm)	Number of seeds/pod	Test weight (g)
<b>Sowing dates</b>				
May 10	138.6	5.54	3.42	25.5
May 25	124	5.43	3.44	25.4
June 10	115	5.44	3.30	25.3
LSD (0.05%)	13	NS	NS	NS
<b>Mulching levels (t/ha)</b>				
0	116	5.21	3.22	25.2
5	126	5.47	3.42	25.4
10	137	5.74	3.66	25.6
LSD (0.05%)	3.2	0.1	0.12	0.11

### Productivity of pigeon pea

The sowing date increased the grain yield of pigeon pea and maximum seed yield (3010 kg/ha) was obtained when crop was sown on May 10<sup>th</sup> which was 28 and 62.3% higher than the May 25<sup>th</sup> and June 10<sup>th</sup> sown crop (Table 3). In case of mulching, significantly higher seed yield (2611 kg/ha) was recorded at 10t/ha of mulch application as compared to other mulching levels. The percent increase in seed yield with 5 t/ha and 10 t/ha of mulch application was 8.27 and 18.09% over control. The interaction effect between sowing dates and mulching levels was significant and maximum grain yield (3240 kg/ha) was obtained when crop was sown on May 10<sup>th</sup> in combination with 10 t/ha of mulch application as compared to other treatment combinations.

**Table 3:** Effect of different sowing time and mulching levels on productivity of pigeon pea

Treatment	Seed yield (kg/ha)	Stover yield (kg/ha)	Biological yield (kg/ha)	Harvest index (%)
<b>Sowing dates</b>				
May 10	3010	2120	5119	58.8
May 25	2352	1819	4171	56.3
June 10	1854	1694	3548	52.3
LSD (0.05)	17	120	126	1.2
<b>Mulching levels (t/ha)</b>				
0	2211	1763	3975	55.3
5	2394	1861	4254	56
10	2611	2009	4609	56.3
LSD (0.05)	23	48	64	1.2

Similar, trend was observed in stover yield, biological yield and harvest index (Table 3). The stover yield (2010 kg/ha), biological yield (5119 kg/ha) and harvest index (58.8%) was significantly increased when crop was sown on May 10<sup>th</sup>. Application of mulch resulted in higher stover, biological yield and harvest index. The maximum stover yield (2009 kg/ha), biological yield (4609 kg/ha) and harvest index (56.3%) was recorded with 10 t/ha of mulch application. There was significant interaction between sowing dates and mulching levels on stover yield, biological yield and harvest index. The

maximum stover yield (2361 kg/ha), biological yield (5567 kg/ha) and harvest index (58.1%) was obtained when crop was sown on May 10<sup>th</sup> in combination with 10 t/ha of mulch application as compared to other treatment combinations. Similar, results was reported by Padhi 1995<sup>[8]</sup>, Rao *et al* 2004, Kumar *et al* 2008<sup>[7]</sup>, Vadi *et al* (2006)<sup>[15]</sup>, Mathukia *et al* (2012), Patil *et al* (2009)<sup>[9]</sup>, Islam *et al* (2008)<sup>[5]</sup>.

In conclusion, earlier sowing of pigeon pea on May 10 significantly increased the growth and yield attributes of pigeon pea and gave 28% and 62% higher grain yield over May 25<sup>th</sup> and June 10<sup>th</sup> sown crop. The mulch application significantly increased the grow yield attributes resulting percent increase in grain yield to the extent of 8.27% and 18.09% over 5 t/ha and control, respectively. It is concluded sowing of pigeon crop on May 10 in combination with 10 t/ha of mulch application gave maximum grain yield of pigeon pea. These findings can be useful for improving the production of pigeon pea in south-west Punjab.

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