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# Effect of sowing time and weed management on performance of pigeonpea

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**ABSTRACT**

Field studies were conducted at Research Farm of CCS Haryana Agricultural University, Hisar, during *Kharif* 2006 and 2007 to find out the effect of sowing time (10th May, 25th May, 10th June and 25th June) and weed control measures consisted weedy, weed free, pendimethalin 1.0 kg/ha as pre-emergence (PE) *fb* HW at 60 DAS, trifluralin 1.0 kg/ha as pre-plant incorporation (PPI) *fb* HW at 60 DAS and HW at 30 and 60 DAS), in pigeonpea (*Cajanus cajan* L.). Results revealed that density and biomass of weeds increased with the corresponding advancement in crop growth and delay in sowing time from 10th May to 25th June. Pendimethalin 1.0 kg/ha as PE and trifluralin 1.0 kg/ha as PPI each followed by (*fb*) one hand weeding (HW) at 60 days after sowing (DAS) provided better weed control than HW up to 60 DAS but at 90 DAS, these three treatments were statistically at par. Trifluralin *fb* HW had an edge over pendimethalin *fb* HW up to 60 DAS. In general, yield and yield parameters of pigeonpea were superior when crop was sown on 10th and 25th May compared to delay in sowing (10th and 25th June) during both the years. Performance of crop was similar when sown on 10th and 25th May. Among weed control treatments, trifluralin 1.0 kg/ha (PPI) *fb* 1 HW at 60 DAS, being at par with 2 HW, had an edge over pendimethalin 1.0 kg/ha (PE) *fb* 1 HW at 60 DAS in respect of yield attributes and ultimately yield of pigeonpea.

**Key words:** Chemical control, Pigeonpea, Sowing time, Weed management, Yield

Pigeonpea (*Cajanus cajan* L. Millsp) is the most widely cultivated pulse crop of rainy season in India. It is generally sown in the month of May and June with pre-monsoon rains. The crop is grown in wider row spacing and takes 5 to 6 month duration to mature. It faces stiff competition from most aggressive weed like carpet weed (Kundra and Brar 1990). Other prominent weeds infesting this crop are *Digera arvensis*, *Digitaria sanguinalis* and *Cyperus rotundus* (Reddy *et al.* 1990). Sowing time of crop may influence the severity of weed infestation besides overall crop performance. Due to problem of labour scarcity and its increasing cost, chemical control of weeds either alone or integrated with manual weeding may prove more cost effective. In past, encouraging results have been obtained with herbicides like butachlor, oxyfluorfen, bentagran, thiobencarb, oxadiazon, pendimethalin and fluchloralin, (Kundra and Brar 1990, Mishra *et al.* 1990, Nagaraju and Kumar 2009, Singh *et al.* 2010). In the present study, efforts have been made to find out the effect of sowing time and different weed control measures on the performance of pigeonpea.

## MATERIALS AND METHODS

To study the effect of sowing time and different weed control treatments on the performance of pigeonpea (*Cajanus cajan* L.), a field experiment was conducted during *Kharif* seasons of 2006 and 2007 at Research Farm of Department of Agronomy, CCS Haryana Agricultural University, Hisar. The soil of the experimental field was sandy loam in texture, low in available N (182.7 kg/ha), medium in available $P_2O_5$ (14.3 kg/ha) and high in $K_2O$ (416.7 kg/ha) with slightly alkaline in reaction (pH 8.2). The experiment consisting four date of sowing (10th May, 25th May, 10th June and 25th June) in the main plots and five weed control treatments (weedy, weed free, pendimethalin 1.0 kg/ha as PE *fb* 1 HW at 60 days after seeding (DAS), trifluralin 1.0 kg/ha as PPI *fb* 1 hand weeding (HW) at 60 DAS and 2 HW at 30 and 60 DAS in the sub-plots was laid out in split plot design with three replications. Pigeonpea variety "*Manak*" was sown with a row to row spacing of 45 cm using a seed rate of 15 kg/ha (as per recommended package of practices for the state). The variety "*Manak*", also known as '*H77-216*', is of medium statured which mature in 120-130 days and it can fit into late sown conditions (even up to 1st fortnight of July). The plot size was 10.0 x 3.6 m accommodating 8 rows per plot. Herbicides were applied by a knapsack sprayer fitted with a flat fan nozzle with a volume rate of 500 liter/ha. The crop was raised with all other recommended package of practices for the state. Density and biomass of the total weeds were recorded at 30, 60 and 90 DAS dur-

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ing both the years. Yield and yield attributes were also recorded at harvest. Original data were analyzed by the method of analysis of variance (ANOVA) as described by Panse and Sukhatme (1985).

## RESULTS AND DISCUSSION

### Effect on weeds

Density and biomass of weeds increased significantly with corresponding delay in each date of sowing (Table 1). The infestation of weeds was lowest when crop was sown on 10th May and was maximum when sown on 25th June during both the years. Early sown crop due to better growth and canopy cover suppressed weeds more effectively than late sown crop. Weed density during both the years was more at 30 DAS and it reduced with the advancement of crop stage at each sowing date, however, dry weight accumulation by weeds increased with corresponding increase in growth stage of crop from 30 to 90 DAS. Weed infestation as referred in terms of total weed density and biomass was maximum under untreated check and it was significantly reduced due to all weed control treatments (Table 1). Pendimethalin 1.0 kg/ha and trifluralin 1.0 kg/ha (60 DAS) were better than HW up to 60 DAS. However, these treatments were statistically at par at 90 DAS in terms of influencing density and biomass of weeds. During both the years, trifluralin 1.0 kg/ha *fb* HW clearly had an edge over pendimethalin 1.0 kg/ha *fb* HW up to 60 DAS up to 60 DAS. Trifluralin 1.0 kg/ha *fb* HW reduced the biomass of weeds to the extent of 83 and 94% at 30 and 90 DAS, respectively. Chauhan *et al*. (1995) have also reported satisfactory control of weeds in pigeonpea due to trifluralin 1.0 kg/ha (PPI) and pendimethalin 1.0 kg/ha (PE) each *fb* 1 HW at 60 DAS.

### Effect on crop

Yield and yield attributes of pigeonpea being at par at first two date of sowing (10th May and 25th May) were superior to delayed two date of sowing (10th June and 25th June) during both the years (Table 2). It indicated that optimum sowing time for sowing of pigeonpea would be 10 - 25th May. Early sowing provided better vigor to crop and it also encountered less weed competition consequently resulting into higher productivity. Yield and yield attributes were lowest under weedy check and highest under weed free check (Table 2). Pendimethalin 1.0 kg/ha and trifluralin 1.0 kg/ha each *fb* HW at 60 DAS and HW (30 and 60 DAS) being at par were statistically similar to weed free check in terms of plant height and test weight during both the years. However, pendimethalin 1.0 kg/ha *fb* HW had lower plant height during 2007 and test weight during 2006 compared to weed free check. Trifluralin 1.0 kg/ha being at par with HW had an edge over pendimethalin 1.0 kg/ha in respect of yield attributes and ultimately yield of pigeonpea. These results were in conformity with earlier reports

**Table 1. Effect of treatments on the population and dry weight of weeds in pigeonpea**

| Treatment | Time of application | Weed density (no./m$^2$) | | | | | | Biomass of weeds (g/m$^2$) | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 30 DAS | | 60 DAS | | 90 DAS | | 30 DAS | | 60 DAS | | 90 DAS | |
| | | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 |
| *Date of sowing* | | | | | | | | | | | | | |
| 10 May | - | 30.5 | 38.0 | 26.1 | 31.8 | 25.0 | 28.7 | 30.1 | 38.7 | 26.9 | 72.3 | 71.1 | 83.9 |
| 25 May | - | 32.4 | 41.5 | 29.1 | 33.7 | 25.9 | 29.4 | 32.6 | 43.4 | 61.4 | 71.9 | 81.3 | 93.6 |
| 10 June | - | 40.7 | 48.1 | 32.6 | 37.0 | 27.3 | 31.3 | 43.0 | 49.7 | 77.3 | 85.7 | 90.2 | 106.3 |
| 25 June | - | 52.9 | 59.9 | 35.1 | 38.9 | 28.7 | 32.2 | 59.0 | 60.0 | 81.2 | 95.5 | 100.3 | 112.2 |
| LSD (P= 0.05) | | 1.9 | 1.4 | 1.8 | 1.5 | 1.8 | 1.6 | 4.2 | 2.4 | 4.9 | 3.1 | 3.7 | 1.3 |
| *Weed control* | | | | | | | | | | | | | |
| Pendimethalin 1 kg/ha + 1 HW | PE *fb* 60 DAS | 17.3 | 19.9 | 24.3 | 27.9 | 8.1 | 8.8 | 17.0 | 22.7 | 67.8 | 93.2 | 20.3 | 25.2 |
| Trifluralin 1 kg/ha + 1 HW | PPI *fb* 60 DAS | 13.4 | 14.7 | 21.5 | 24.5 | 7.7 | 9.2 | 13.0 | 17.3 | 44.2 | 77.3 | 19.8 | 23.8 |
| Two HW | PPI *fb* 30 and 60 DAS | 82.4 | 99.7 | 7.6 | 7.7 | 7.5 | 8.8 | 90.2 | 100.1 | 104.8 | 34.9 | 19.8 | 25.0 |
| Weedy | - | 82.6 | 100.0 | 100.3 | 116.6 | 110.2 | 125.2 | 85.8 | 99.5 | 91.8 | 201.4 | 368.8 | 420.9 |
| Weed free | - | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| LSD (P= 0.05) | | 2.8 | 0.9 | 1.4 | 0.7 | 2.0 | 1.4 | 3.4 | 2.0 | 4.7 | 3.5 | 4.5 | 3.9 |

PE: Pre-emergence, PPI: Pre-plant incorporation, HW = hand weeding

**Table 2. Yield and yield attributes of pigeonpea as influenced by date of sowing and weed control treatments**

| Treatment | Time of application | Plant height (cm) | | Pods/plant (no.) | | Seeds/plant (no.) | | Test weight (g) | | Grain yield (t/ha) | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 | 2006 | 2007 |
| *Date of sowing* | | | | | | | | | | | |
| 10 May | - | 180.2 | 181.0 | 189.3 | 180.8 | 3.97 | 3.94 | 101.7 | 100.7 | 1.62 | 1.70 |
| 25 May | - | 179.8 | 179.7 | 187.4 | 179.1 | 3.94 | 3.94 | 101.0 | 100.2 | 1.60 | 1.68 |
| 10 June | - | 177.1 | 175.6 | 181.2 | 163.5 | 3.88 | 3.95 | 97.7 | 98.2 | 1.51 | 1.29 |
| 25June | - | 173.6 | 169.9 | 163.9 | 143.5 | 3.85 | 3.77 | 96.4 | 94.1 | 1.27 | 1.01 |
| LSD (P= 0.05) | | 2.2 | 2.3 | 3.6 | 4.0 | 0.05 | 0.04 | 0.9 | 2.1 | 0.08 | 0.08 |
| *Weed control* | | | | | | | | | | | |
| Pendimethalin 1.0 kg/ha + 1 HW | PE *fb* 60 DAS | 181.2 | 179.4 | 190.0 | 177.0 | 4.10 | 4.06 | 100.1 | 99.5 | 1.57 | 1.49 |
| Trifluralin 1.0 kg/ha+ 1 HW | PPI *fb* 60 DAS | 181.2 | 179.6 | 193.0 | 179.7 | 4.11 | 4.11 | 100.7 | 100.3 | 1.63 | 1.59 |
| Two HW | PPI *fb*30 and 60 | 182.0 | 180.9 | 205.0 | 184.2 | 4.12 | 4.11 | 101.6 | 100.8 | 1.69 | 1.63 |
| Weedy | - | 161.2 | 161.2 | 112.3 | 103.2 | 3.07 | 3.04 | 91.5 | 89.0 | 0.89 | 0.67 |
| Weed free | - | 182.9 | 181.6 | 205.2 | 189.5 | 4.15 | 4.16 | 102.2 | 101.7 | 1.71 | 1.71 |
| LSD (P= 0.05) | | 2.7 | 2.0 | 3.0 | 4.0 | 0.03 | 0.04 | 1.4 | 2.3 | 0.11 | 0.09 |

PE= Pre-emergence, PPI= Pre-plant incorporation, HW = hand weeding

(Chauhan *et al*. 1995). Weeds allowed to grow throughout the crop season resulted in 47.8 and 60.8% reduction in grain yield of pigeonpea during 2006 and 2007, respectively (Table 2). Padmaja *et al*. (2013) also reported that uncontrolled weeds led to 79% loss in the seed yield of pigeonpea.

Based on the two year data, it was concluded that sowing time between 10 to 25$^{th}$ May and integrated use of trifluralin 1.0 kg/ha as pre-plant incorporation followed by one hand weeding at 60 days after sowing would be appropriate to achieve higher yield of pigeonpea with significantly lower density and dry weight of weeds.

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