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# Effect of Weed Interference on Weeds and Productivity of Blackgram (*Phaseolus mungo*)

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## ABSTRACT

Field studies were carried out to determine the critical period of crop-weed competition in blackgram (*Phaseolus mungo*). *Trianthema portulacastrum, Digera arvensis, Echinochloa crusgalli, Parthenium hysterophorus, Phyllanthus niruri* and *Cynodon dactylon* were the most predominating weeds. Grain yield loss increased with the increase in the duration of competition and maximum loss (67%) occurred due to full season competition. Significantly higher grain yield (12.42 q/ha) and yield attributing characters were obtained in plots remaining weed free upto harvest. The critical period of weed competition was between 30 to 45 DAS during which the crop should be kept free of weeds to prevent the potential loss in blackgram grain yield.

**Key words :** Critical period, weed competition, herbicide efficacy



## INTRODUCTION

Identification of critical period of weed competition is an important factor in crop production. Weeds are a major problem for successful cultivation in rainy season blackgram as their initial growth is relatively slow. Early emerging weeds are more competitive. The critical period of weed-crop competition is between early growth stage during which weeds can grow without affecting crop yield and the point after which weed growth does not affect the yield (Zimdahl, 1980). Establishing the critical period of competition is essential to develop effective and economical weed control measures (Sharma *et al.,* 1977).

Seed yield reduction upto 46.8% has been reported by Singh *et al.* (2002) due to uncontrolled weeds in blackgram. Information on the critical period of crop-weed competition was essential to optimize herbicide use or integration of alternative weed control measures such as stage of mechanical weeding. Blackgram cv. PU 19 was sown in rows 30 cm apart on 2 and 5 August 2003 and 2004, respectively. Plot size was 5 x 3.6 m using 20 kg seed/ha of blackgram. Therefore, an experiment was conducted to determine the critical period of crop weed competition in blackgram.

## MATERIALS AND METHODS

To find out the critical period of competition between weeds and blackgram crop, field experiments were conducted during **kharif** seasons of 2003 and 2004 at S. V. B. Patel University of Agriculture & Technology, Modipuram, Meerut. The soil of the experimental field was sandy loam having a pH of 7.2, organic carbon 0.42%, available N 208 kg/ha, available $P_2O_5$ 13.5 kg/ha and available K 159.7 kg/ha.

Ten treatments comprised weed free for initial 15, 30, 45, 60 days and weedy thereafter and weedy for the first 15, 30, 45, 60 days and weed free thereafter, in a randomized block design with three replications. Blackgram cv. PU 19 was sown in rows 30 cm apart on 2 and 5 August 2003 and 2004, respectively. Plot size was 5 x 3.6 m using 20 kg seed/ha of blackgram was inoculated with *Rhizobium* culture. Repeated hand weeding were done in weed free plots to keep the plots weed free for the whole season. Other recommended cultural practices were followed as per requirement of the crop. The data on dry matter accumulation by different weeds were recorded by using quadrate of 1.0 $m^2$ of each separately from three different places and sun-dried for three days and dried in a hot air oven at $70^0$C to a constant weight, at the time of weed removal as per treatment and also at the time of crop harvest. Observations on growth characters and yield attributing of blackgram crop were recorded at the time of harvesting.

## RESULTS AND DISCUSSION

### Effect on Weeds

The dominant weed flora of experimental field

was dominated by *Trianthema portulacastrum, Digera arvensis, Echinochloa crusgalli, Parthenium hysterophorus, Phyllanthus niruri* and *Cynodon dactylon*. Other weeds were also present throughout the season. Total weed density and dry weight were 204/$m^2$ and 220.2 g. Dry matter accumulation by weed decreased with an increase in weed free period (Table 1). The lowest population of weeds was noticed in the plots which were free from weeds for initial 60 DAS followed by the plots which remained weed infested for 45 DAS.

### Effect on Growth and Yield of Crop

Height of blackgram crop was severely hampered by the presence of weeds (Table 2). Maximum plant height (59.7 cm) was observed in weed free plots upto harvest and minimum (44.2 cm) in weedy plots upto harvest.

Table 1. Weed density and dry weight of weeds as affected by crop-weed competition at various crop growth stages (Pooled data of two years)

| Treatment | | Weed density (No./$m^2$) | | | | | Dry matter (g/$m^2$) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 15 DAS | 30 DAS | 45 DAS | 60 DAS | At harvest | 15 DAS | 30 DAS | 45 DAS | 60 DAS | At harvest |
| **Weed free upto** | | | | | | | | | | | |
| Weed free for the first | 15 DAS | 0 | 130 | 125 | 141 | 137 | 0 | 40.2 | 87.3 | 129.7 | 170.1 |
| Weed free for the first | 30 DAS | 0 | 0 | 108 | 115 | 102 | 0 | 0 | 38.2 | 75.5 | 115.2 |
| Weed free for the first | 45 DAS | 0 | 0 | 0 | 75 | 87 | 0 | 0 | 0 | 26.5 | 48.9 |
| Weed free for the first | 60 DAS | 0 | 0 | 0 | 0 | 65 | 0 | 0 | 0 | 0 | 20.6 |
| Weed free up to harvest | | - | - | - | - | - | 0 | 0 | 0 | 0 | 0 |
| **Weedy upto** | | | | | | | | | | | |
| Weedy for the first | 15 DAS | 132 | 0 | 0 | 0 | 0 | 38.5 | 0 | 0 | 0 | 0 |
| Weedy for the first | 30 DAS | 131 | 185 | 185 | 0 | 0 | 35.7 | 75.8 | 0 | 0 | 0 |
| Weedy for the first | 45 DAS | 136 | 160 | 160 | 0 | 0 | 37.2 | 76.1 | 162.3 | 0 | 0 |
| Weedy for the first | 60 DAS | 140 | 168 | 168 | 168 | 0 | 39.5 | 77.6 | 165.1 | 180.2 | 0 |
| Weedy upto harvest | | 142 | 178 | 178 | 195 | 204 | 41.3 | 89.7 | 182.1 | 211.5 | 220.2 |
| LSD (P=0.05) | | 11.2 | 10.5 | 10.5 | 14.2 | 16.8 | NS | 8.6 | 10.2 | 17.4 | 18.5 |

NS–Not Significant.
DAS–Days after sowing.

Table 2. Effect of crop-weed competition on yield and yield attributes of black gram (Pooled data of two years)

| Treatment | | Plant height (cm) | Branches/ plant | No. of pods/ plant | No. of seeds/ pod | Yield (q/ha) | | | Loss of yield (%) |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | 2003 | 2004 | Mean | |
| **Weed free upto** | | | | | | | | | |
| Weed free for the first | 15 DAS | 48.2 | 3.7 | 35 | 7.1 | 8.32 | 8.43 | 8.37 | 32.56 |
| Weed free for the first | 30 DAS | 52.4 | 4.2 | 39 | 8.2 | 10.22 | 10.71 | 10.46 | 15.74 |
| Weed free for the first | 45 DAS | 54.6 | 4.5 | 40 | 8.3 | 10.65 | 10.81 | 10.48 | 15.61 |
| Weed free for the first | 60 DAS | 56.8 | 4.9 | 43 | 10.1 | 11.98 | 11.54 | 11.76 | 5.31 |
| Weed free up to harvest | | 59.7 | 5.3 | 45 | 10.6 | 12.65 | 12.19 | 12.42 | - |
| **Weedy upto** | | | | | | | | | |
| Weedy for the first | 15 DAS | 55.3 | 4.6 | 42 | 7.8 | 9.32 | 9.14 | 9.23 | 25.68 |
| Weedy for the first | 30 DAS | 53.1 | 4.2 | 38 | 7.4 | 7.3 | 7.56 | 7.43 | 40.17 |
| Weedy for the first | 45 DAS | 51.7 | 3.7 | 35 | 7.2 | 5.99 | 5.44 | 5.71 | 54.02 |
| Weedy for the first | 60 DAS | 48.3 | 3.3 | 33 | 7.0 | 4.66 | 4.32 | 4.49 | 63.84 |
| Weedy upto harvest | | 44.2 | 3.0 | 31 | 6.2 | 3.99 | 4.2 | 4.09 | 67.02 |
| LSD (P=0.05) | | 4.2 | 0.5 | 4.4 | 2.3 | 2.51 | 2.44 | - | - |

DAS–Days after sowing.

Similarly, yield attributes viz., branches/plant, number of pods/plant and number of seeds/pod were also significantly influenced due to different weed free and weedy periods. Maximum values regarding all above attributes were recorded in plots kept weed free till harvest (Table 2) due to least crop weed competition for nutrients, moisture, space and sunlight. The minimum values; however, were recorded in plots kept weedy up to harvest. This was because of emergence of large number of weeds under these plots after 15 DAS, while weed free period 30 DAS and longer resulted in yield statistically at par with weed free upto harvest. Maximum grain yield (12.42 q/ha) was recorded weed free upto harvest.

When weeds were allowed to remain beyond 30 days yield was significantly reduced. 30 to 45 days weed free period beyond 30 DAS had no beneficial effect on yield. Thus, crop-weed competition during 30-45 DAS was critical.

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