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RESPONSE OF DIFFERENT WEED MANAGEMENT STRATEGIES ON GROWTH & YIELD OF BLACK GRAM AT DEHRADUN, INDIA

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ABSTRACT

A field experiment was conducted during Kharif season of 2021 at research farm, Department of Agriculture Dev Bhoomi Uttarakhand University, Dehradun, Uttarakhand, in order to investigate the response of different weed management strategies on growth & yield of black gram at Dehradun. The layout of experimental field was laid randomized block design (RBD) with 10 treatments and 3 replications. Consisting of T₁ Pendimethalin PE@(1000g/ha), T₂ Pendimethalin PE@(500g/ha), T₃ Pendimethalin PE@(500g/ha)+ Hand Weeding @ 40 DAS, T₄ Imazethapyr P.OE @(500g/ha), T₅ Imazethapyr P.OE @(1000g/ha), T₆ Pendimethalin PE@(1000g/ha)+ Hand Weeding @ 20 DAS, T₇ Hand Weeding @ 20 DAS & 40 DAS, T₈ Hand Weeding @ 40 DAS, T₉ Hand Weeding @ 20 DAS, T₁₀ Weedy check (control plot). The results indicated that among all the treatments, T₆ (Pendimethalin PE@(1000g/ha)+ Hand Weeding @ 20 DAS) overall was found best for farmer point of view with respect to plant height (60.66cm), branches/plant (15.66), seed yield (13.66q/ha), straw yield (81.00 q/ha). Based on present investigation, it can be concluded that the combination of both Pendimethalin PE@(1000g/ha)+ Hand Weeding @ 20 DAS are applied that improved growth and yield of black gram crop under present agro-climatic conditions.

Keywords : RDF, Pendimethalin, weed Management, Imazethapyr, NPK.

Introduction

Black gram is one of the important pulse crop grown in India. It being a short duration crop suits well in the cropping system, as it vacates field well in time giving the opportunity to many winter crops like mustard, lentil etc grown in limited and rainfed situation. Black gram is grown in about 3.25 million ha with productivity of 604 kg/ha in India. Black gram is infested with different categories of weeds. Among broad leaved weeds *Parthenium hysterophorus*, *Phyllanthus niruri*, *Amaranthus viridis*, *Celosia argentea*, *Cleome viscosa*, *Trianthema portulacastrum*; among grassy *Echinochloa spp.*, *Setaria glauca*, *Digera arvensis*, *Elusine indica*, *Dectyloctenium aegyptium*, *Cynodon dactylon* and among sedges *Cyperus rotundus*, *Cyperus difformis* dominate. *Echinochloa colona* alone, one of the major weeds in black gram, may reduce the seed yield to the extent of 49-80%. No phytotoxic effects on blackgram in terms of epinasty, hyponasty, necrosis, vein clearing and wilting at 3, 5, 7 and 15 days after application of quizalofop-ethyl @ 37.5 g/ha, fenoxaprop-p-ethyl 100 @ g/ha and thus, found completely safe for the crop and also found no residual effect on soil. Keywords Blackgram, Legumes occupy a special place in human nutrition with protein (24%), carbohydrates (59.6%), fat (1.5%), minerals (3.2%) and it also contains 154 mg calcium, 9.1 mg iron and 38 mg beta-carotene per 100 g of dal (Gowda and Kaul, 1982). Among various production

factors, weed plays vital role in influencing black gram yield. Weeds compete with the resources like nutrient, moisture and light. High temperature coupled with frequent rains during growing period infests the crop heavily with weeds which adversely affect the productivity of this crop. An initial period of 20-40 days is very critical (Saraswat and Mishra, 1993). The yield loss of black gram due to weeds has been reported to the extent of 27 to 90% depending upon type and intensity of weed flora (Kumar *et al.*, 2000 and Singh *et al.*, 2010).

Material and Methods

The present investigation was carried out during Kharif season of 2021 in the research farm, Department of Agriculture Dev Bhoomi Uttarakhand University, Dehradun, Uttarakhand. It is located in the north western region of Uttarakhand at an altitude of 450m above mean sea level (MSL) and 3088 square kilometers in size. Geographically, the location of Dehradun is in between 29°58' and 31°2'30" North latitude and 77°34'45" and 78°18'30" east longitudes.

The climate of Dehradun is humid subtropical. Summer temperature can reach up to 44°C for a few days and a hot wind called Loo blows over North India. Winter temperatures are usually between 1 and 20°C and fog is quite common in winters like plains. Although the temperature in Dehradun can reach below freezing during severe cold snaps,

this is not common. During the monsoon season, there is often heavy and protracted rainfall.

The soil of experimental site is classified as 'sandy loam' with characteristics as deep, well drained, coarse loamy cover over fragmental soils and of medium fertility. Total five soil samples were taken from upper (0-15 cm) layer of the soil and mixed properly from different sites of the field. After proper mixing of the soil, a representative sample was taken for its physiochemical process. A composite soil sample was prepared and analyzed separately for different physio-chemical characteristics of the soil. The analysis revealed that the soil of the experimental site was Sandy loam in texture poor in organic matter, low in available nitrogen, medium in available phosphorus and Potassium contents with neutral in reaction and normal in electrical conductivity.

The experimental site having neutral pH and experiment was laid out in completely Randomized block design (RBD). The experiment was replicated thrice with 8 treatments viz., T₁ Pendimethalin PE @ (1000g/ha), T₂ Pendimethalin PE@(500g/ha), T₃ Pendimethalin PE@ (500g/ha)+ Hand Weeding @ 40 DAS, T₄ Imazethapyr P.OE @ (500g/ha), T₅ Imazethapyr P.OE @ (1000g/ha), T₆ Pendimethalin PE@(1000g/ha)+ Hand Weeding @ 20 DAS, T₇ Hand Weeding @ 20 DAS & 40 DAS, T₈ Hand Weeding @ 40 DAS, T₉ Hand Weeding @ 20 DAS, T₁₀ Weedy check (control plot). Gross plot size was 9.2m (4m x 2.3m) and net plot size was 6m(3mx2m). Total number of plots were 30.

Result and Discussion

Plant height (cm)

Observations on the plant height were recorded at harvest and the data were statistically analyzed. The mean values have been presented in Table 1.1. At harvest stage, maximum height recorded under T₆ (60.66 cm) i.e. Pendimethalin PE@(1000g/ha)+ Hand Weeding @ 20 DAS,

followed by T₃(59.00cm), T₅(57.33cm), and least height recorded on control plots i.e. T₁₀(49.00cm). Further, it was also observed that all the other treatments were significantly better in plant height than the control treatment.

Branches / plant

Observations on branches / plant were recorded at harvest and the data were statistically analyzed. The mean values have been presented in Table 1.1. At harvest stage, maximum number of branches / plant recorded under T₆ (15.66) i.e. Pendimethalin PE@(1000g/ha) + Hand Weeding @ 20 DAS, followed by T₃(15.33), T₅ (14.00), and least height recorded on control plots i.e. T₁₀ (10.00). Further, it was also observed that all the other treatments were significantly better in branches / plant than the control treatment.

Pods / plant

Observations on the pods / plant were recorded at harvest and the data were statistically analyzed. The mean values have been presented in Table 1.1. At harvest stage, maximum pods/plant were recorded under T₆ (55.66) i.e. Pendimethalin PE@(1000g/ha) + Hand Weeding @ 20 DAS, followed by T₃(54.00), T₅ (52.66), and least pods / plant recorded on control plots i.e. T₁₀ (40.00). Further, it was also observed that all the other treatments were significantly better in pods/plants than the control treatment.

Seeds / pods

Observations on seeds / pods were recorded at harvest and the data were statistically analyzed. The mean values have been presented in Table 1.1. At harvest stage, maximum seeds / pods recorded under T₆ (6.00) i.e. Pendimethalin PE@(1000g/ha) + Hand Weeding @ 20 DAS, followed by T₁(5.66), T₃(5.33), and least seeds / pods recorded on T₈(4.00). Further, it was also observed that all the other treatments were significantly better in seeds / pods than T₈.

Table 1.1 : Effect of different treatments on growth & yield of Black Gram.

| | Treatments | Plant Height (cm) | Branches /Plant | Pods /Plants | Seeds /Pods |
|-----------------|--|-------------------|-----------------|--------------|-------------|
| T ₁ | Pendimethalin PE@(1000g/ha) | 56.00 | 13.00 | 52.00 | 5.66 |
| T ₂ | Pendimethalin PE@(500g/ha) | 53.33 | 11.66 | 49.66 | 5.00 |
| T ₃ | Pendimethalin PE@(500g/ha)+ Hand Weeding @ 40 DAS | 59.00 | 15.33 | 54.00 | 5.33 |
| T ₄ | Imazethapyr P.OE @ (500g/ha) | 55.00 | 12.33 | 51.00 | 5.00 |
| T ₅ | Imazethapyr P.OE @ (1000g/ha) | 57.33 | 14.00 | 52.66 | 5.66 |
| T ₆ | Pendimethalin PE@(1000g/ha)+ Hand Weeding @ 20 DAS | 60.66 | 15.66 | 55.66 | 6.00 |
| T ₇ | Hand Weeding @ 20 DAS & 40 DAS | 52.66 | 11.33 | 49.00 | 4.66 |
| T ₈ | Hand Weeding @ 40 DAS | 50.33 | 11.00 | 43.00 | 4.00 |
| T ₉ | Hand Weeding @ 20 DAS | 49.66 | 10.33 | 41.33 | 4.66 |
| T ₁₀ | Weedy Check (control plot) | 49.00 | 10.00 | 40.00 | 4.33 |
| SEM± | | 0.81 | 0.63 | 0.69 | 0.50 |
| | CD(P=0.05) | 2.33 | 1.81 | 1.98 | 1.44 |

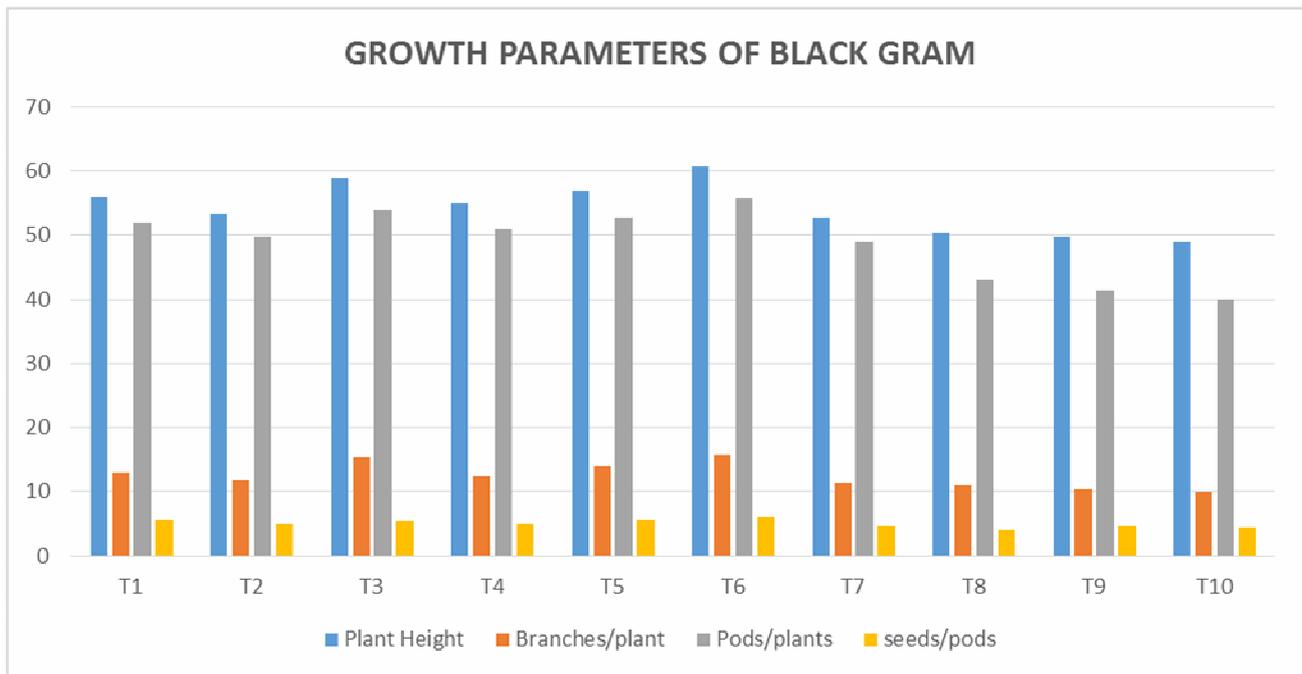


Fig. 1: Graphical presentation of effect of different treatments on growth

Seed yield (q / ha)

Observations on seed yield were recorded at harvest and the data were statistically analyzed. The mean values have been presented in Table 1.2. At harvest stage, maximum seed yield recorded under T6 (13.66q/ha) i.e. Pendimethalin PE @ (1000g/ha) + Hand Weeding @ 20 DAS, followed by T3 (12.66q/ha), T5 (12.33q/ha), and least seed yield recorded on control plots i.e. T10 (7.33q/ha). Further, it was also observed that all the other treatments were significantly better in seed yield than the control treatment.

Straw Yield (q / ha)

Observations on the straw yield were recorded at harvest

and the data were statistically analyzed. The mean values have been presented in Table 1.2. At harvest stage, maximum straw yield recorded under T6 (81.00q/ha) i.e. Pendimethalin PE @ (1000g/ha) + Hand Weeding @ 20 DAS, followed by T3 (79.00q/ha), T1 (75.00q/ha), and least height recorded on control plots i.e. T10 (51.00q/ha). Further, it was also observed that all the other treatments were significantly better in straw yield than the control treatment.

Harvesting Index

The maximum harvesting index was found under T5 (15.47 %) followed by T6 (14.43%), T3 (14.09%), and least harvesting index was on T2 (11.85%).

Table 1.2: Effect of different treatments on yield of Black Gram.

| | Treatments | Seed Yield (q/ha) | Biological Yield (q/ha) | Straw Yield (q/ha) | Harvesting Index (%) |
|------|---|-------------------|-------------------------|--------------------|----------------------|
| T1 | Pendimethalin PE @ (1000g/ha) | 11.33 | 86.33 | 75.00 | 13.12 |
| T2 | Pendimethalin PE @ (500g/ha) | 9.33 | 78.66 | 69.33 | 11.85 |
| T3 | Pendimethalin PE @ (500g/ha) + Hand Weeding @ 40 DAS | 12.66 | 90.00 | 79.00 | 14.09 |
| T4 | Imazethapyr P.OE @ (500g/ha) | 11.00 | 84.00 | 73.00 | 13.08 |
| T5 | Imazethapyr P.OE @ (1000g/ha) | 12.33 | 79.66 | 67.33 | 15.47 |
| T6 | Pendimethalin PE @ (1000g/ha) + Hand Weeding @ 20 DAS | 13.66 | 94.66 | 81.00 | 14.43 |
| T7 | Hand Weeding @ 20 DAS & 40 DAS | 8.66 | 65.66 | 57.00 | 13.19 |
| T8 | Hand Weeding @ 40 DAS | 7.66 | 61.00 | 53.33 | 12.56 |
| T9 | Hand Weeding @ 20 DAS | 8.00 | 60.00 | 52.00 | 13.33 |
| T10 | Weedy Check (control plot) | 7.33 | 58.33 | 51.00 | 12.56 |
| SEm± | | 0.60 | 1.00 | 0.81 | 0.82 |
| | CD(P=0.05) | 1.72 | 2.88 | 2.33 | 2.36 |

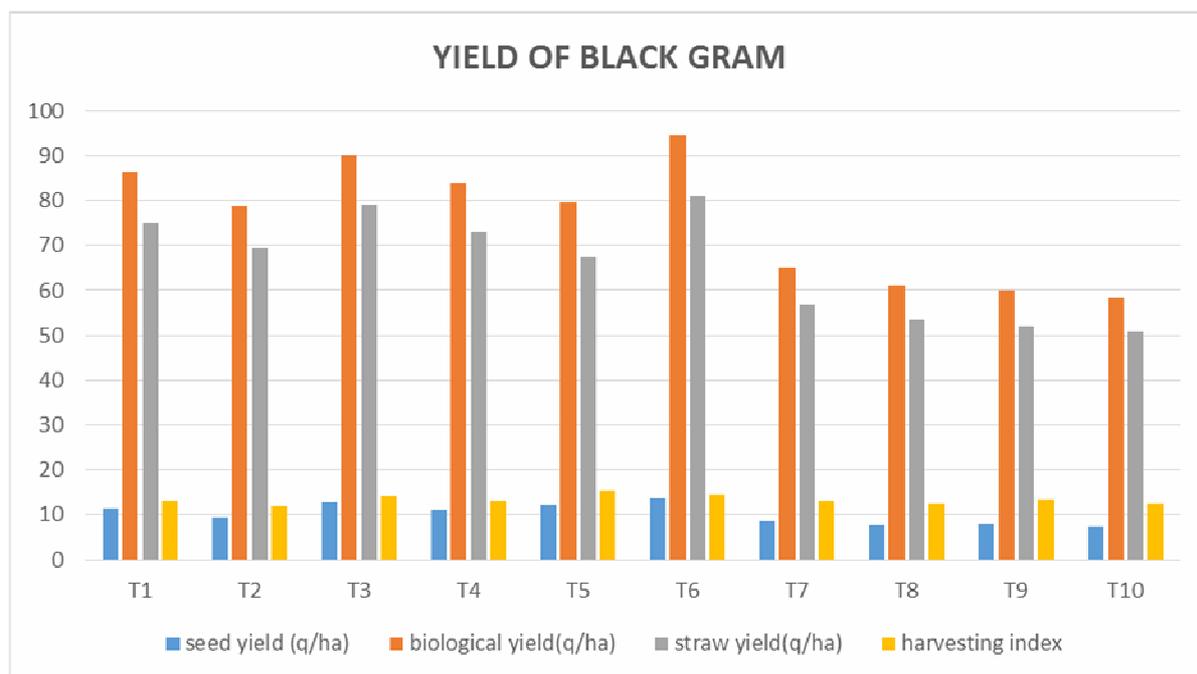


Fig. 2: Graphical presentation of effect of different treatments on Yield.

Conclusion

On the basis of field experiment conducted it is concluded that weed management treatment T6 Pendimethalin PE@ (1000g/ha) + Hand Weeding @ 20 DAS was found superior among the other treatments on growth and yield of Black gram. Treatment 6 is the most recommended to the farmers.

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