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## Impact of different weed management practices on yield attributes of blackgram (*Vigna mungo* L.)

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### Abstract

Field investigation was carried out during the post-Kharif season of 2020-21 in Bairister Thakur Chhedilal College of Agriculture & Research Station, Sarkanda, Bilaspur (C.G.). The results showed that treatment T<sub>3</sub> - (Two hands weeding at 20 and 40 DAS) has recorded maximum number of pods plant<sup>-1</sup>, number of seeds pod<sup>-1</sup>, test weight, seed yield, straw yield and harvest index. The higher weed control efficiency and weed control index was also recorded maximum in T<sub>3</sub> (Two hand weeding at 20 and 40 DAS) followed by treatment T<sub>4</sub> - (Pendimethalin 30EC @ 1kg ha<sup>-1</sup> as pre-emergence). The treatment T<sub>3</sub> - (Two hand weeding at 20 and 40 DAS) registered highest gross return, net return and B:C ratio, followed by treatment T<sub>4</sub> - (Pendimethalin 30EC @ 1kg ha<sup>-1</sup> as pre-emergence).

**Keywords:** B:C ratio, Net return, Pre-emergence and weed management of blackgram.

### Introduction

Blackgram (*Vigna mungo* L.) is one of the important pulse crops grown in India, which belong to the family "Leguminosae". It is consumed in various forms as whole or split, husked and unhusked. It is rich in protein, carbohydrate, fat, amino acids, vitamins and also provides large quantity of green fodder which serves as the nutrition food for the livestock. It contains 48.0 per cent carbohydrate, 22.3 per cent protein, 154 mg calcium, 9.1 mg iron, 1.4 g fat, 0.37 g riboflavin and 0.42 mg thiamine in per 100 g of blackgram (Asaduzzaman *et al.*, 2010)<sup>[1]</sup>.

In India, blackgram is sown in 5.03 million hectares area with total production of 3.28 million tonnes and productivity 652 kg ha<sup>-1</sup>. It is extensively grown in the states of Madhya Pradesh, Rajasthan, Maharashtra, Andhra Pradesh, Tamil Nadu and Uttar Pradesh whereas, Chhattisgarh it occupies 1.66 Lakh hectares area with total production of 0.62 Lakh tonnes and productivity 373 kg ha<sup>-1</sup>. It is mainly cultivated in arid and semi-arid districts viz; Mahasamund, Rajnandgaon, Durg, Bemetara and Raigarh.

Blackgram can be grown on all types of soils ranging from sandy loam to heavy clay except the alkaline and saline soil. However, it does well on heavier soils such as black cotton soils which retain moisture better.

The number of factor responsible for low productivity (receives low fertilizer input, moisture, pesticides, poor quality seed etc.) of blackgram, among that factors most important but not recognized factor liable for poor yield due to inadequate weed control. Weed offer severe competition to their crop during early stage of growth and reduce the yield ranges between 27 to 90 per cent due to uncontrolled weed growth. However, different weed control methods like cultural, physical/mechanical, biological and chemical management practices to effectively controlled weeds. Hence, physical/mechanical methods of weed control were achieved by hand weeding or any small weeder (twice) at 20 and 40 DAS not effectively because of high labour wages, continuous rainfall and non availability at peak period of crop weed competition. Now days, greater number of herbicides are available for controlling many weed species very effectively. When in fact, high quantity of herbicides is applied into soil it will contaminating the soil fertility, soil living organisms etc., finally led to damage or affect the lives of plants, wildlife and even human beings. Keeping all the above points in mind, the present investigation was, undertaken.

## Materials and Methods

A field experiment was conducted at the research farm of Barrister Thakur Chhedilal, College of Agriculture & Research Station, Sarkanda, Bilaspur (C.G.) in post- *Kharif* season of 2020-21. The soil of the experimental area was clayey in texture with medium in available nitrogen (313kg $ha^{-1}$ ), phosphorus (13.44kg $ha^{-1}$ ) and potassium (190kg  $ha^{-1}$ ) contents and the soil was neutral in reaction (pH 7.10). The experiment was laid out in randomized block design with three replications. There were seven treatments consisting *i.e.* T<sub>1</sub> - (Weedy check), T<sub>2</sub> - (Oxyfluorfen 23.5% EC @ 200 g $ha^{-1}$  as pre-emergence), T<sub>3</sub> - (Two hand weeding at 20 and 40 DAS), T<sub>4</sub> - (Pendimethalin 30 EC @ 1kg  $ha^{-1}$  as pre- emergence), T<sub>5</sub> - (Imazethapyr 10% SL @ 100 g  $ha^{-1}$  at 20 DAS as post-emergence), T<sub>6</sub> - (Quizalofop-p-ethyl 5 EC @ 50 g  $ha^{-1}$  at 20 DAS as post-emergence) and T<sub>7</sub> - [Odyssey (Imazamox 35 WG + Imazethapyr 35 WG) @ 40 g  $ha^{-1}$  at 20 DAS as post-emergence]. The black gram variety "Indira Urd Pratham" was shown on 17/09/2020 at a spacing of 30 cm x 10cm with a seed rate of 20 kg  $ha^{-1}$ . NPK @ 20:50:20 kg  $ha^{-1}$  were applied in the form of urea, single superphosphate and muriate of potash during the final land preparation. Weeding was done as per treatments. Herbicides were sprayed with a knap sack sprayer. Hand weeding was done using a khurpi. The crop was harvested on 09/12/2020.

The growth and yield attributes were recorded from five selected plants in each plot. Observations were recorded with the help of a quadrat placed randomly at two spots in each plot at 20, 40 and 60 DAS. Weeds were cut at ground level, washed with tap water, sun drying for five days and then weighted. Total dry matter was determined by the summing up the dry weight of each plant. Weed control efficiency was calculated using weed density data and weed control index was calculated using weed dry weight data at 60 DAS which was maximum during weed

growth period irrespective of treatments. Economics of different weed control treatments was also worked out by taking the selling price of blackgram and existing market prices of the inputs.

## Results and Discussion

### Effect of different weed management on weed flora

The major weed flora in the experimental plots were *Euphorbia hirta*, *Cynodon dactylon*, *Parthenium hysterophorus*, *Physalis minima*, *Alternanthera sessilis*, *Trianthema monogyna*, *Phyllanthus niruri*, *Echinochloa colonum* and *Cyperus rotundus*. Total weed density (No.  $m^{-2}$ ) was significantly lowest under treatment T<sub>3</sub> - (Two handweeding at 20 and 40 DAS) at 20, 40 and 60 DAS. The maximum weed dry weight (g  $m^{-2}$ ) was registered in treatment T<sub>1</sub> - (Weedy check) plot and minimum in treatment T<sub>3</sub> - (Two hands weeding at 20 and 40 DAS). The treatment T<sub>3</sub> - (Two hand weeding at 20 and 40 DAS) resulted in higher value of weed control efficiency and weed control index, followed by treatment T<sub>4</sub> - (Pendimethalin 30EC @ 1 kg  $ha^{-1}$  as pre-emergence) and treatment T<sub>2</sub> - (Oxyfluorfen 23.5% EC @ 200 g  $ha^{-1}$  as pre-emergence) (Table 1). Higher weed control treatment may be attributed to reduced growth and number of weeds due to application of herbicides. Kumar and Tewari (2004) [4] reported very good control of *Trianthema monogyna* by pendimethalin as this herbicide does not allow the emergence and growth of weed seedlings because of reduced cell division and cell elongation. In general, sequential treatments were found to be superior to individual application of herbicides (Rao and murthy *et al.*, 2004) [7]. Weed control efficiency of treatments varied from 59.04 to 88.06% and weed control index varied from 42.94 to 62.75%. Similar results were reported by Navneet Aggarwal, Guriqbal Singh, Hari Ram and Veena Khanna (2014).

**Table 1:** Effect of various weed management practices on total weed density (No.  $m^{-2}$ ), weed dry weight (g  $m^{-2}$ ), weed control efficiency (%) and weed control index (%) at 60 DAS

Treatments	Weed density (no. $m^{-2}$ )	Weed dry weight (gm $^{-2}$ )	WCE (%)	WCI (%)
T <sub>1</sub> -(Weedy check)	195.33(13.99)	10.55(3.32)	0.00	0.00
T <sub>2</sub> -(Oxyfluorfen 23.5%EC@200 g/ha <sup>1</sup> as pre-emergence)	29.33(5.46)	4.95(2.33)	84.98	53.08
T <sub>3</sub> -(Two hand weeding at 20 and 40 DAS)	23.33(4.88)	3.93(2.10)	88.06	62.75
T <sub>4</sub> -(Pendimethalin30EC@1kgha <sup>1</sup> as pre-emergence)	28.00(5.34)	4.01(2.12)	85.66	61.99
T <sub>5</sub> -(Imazethapyr10%SL@100gha <sup>1</sup> at 20 DAS as post-emergence)	80.00(8.97)	6.02(2.55)	59.04	42.94
T <sub>6</sub> -(Quizalofop-p-ethyl5EC@50gha <sup>1</sup> at20DASaspost-emergence)	74.67(8.67)	5.68(2.49)	61.77	46.16
T <sub>7</sub> -[Odyssey (Imazamox35WG+Imazethapyr35WG)@40 gha <sup>1</sup> at 20 DAS as post-emergence].	65.67(8.13)	5.61(2.47)	66.38	46.82
S.Em±	2.77(1.81)	0.27(0.88)	-	-
CD(P=0.05)	8.53(3.00)	0.85(1.16)	-	-

### Effect of different weed management on crop yield and attributes

All the weed control treatments recorded significantly higher yield attributing character *viz.*; number of pods plant<sup>-1</sup>, number of seed pod<sup>-1</sup>, test weight, seed and straw yield as compared to weedy check. This was due to least competition from weeds for the light, space as well as above and below ground resources. The treatment T<sub>3</sub>-(Two hand weeding at 20 and 40 DAS) recorded significantly higher number of pods plant<sup>-1</sup> and test weight, followed by treatment T<sub>4</sub> - (Pendimethalin 30EC @ 1 kg  $ha^{-1}$  as pre-emergence), while maximum number of seed pod<sup>-1</sup> was recorded in treatment T<sub>3</sub>-(Two hand weeding at 20 and 40 DAS) which was *at par* with treatment T<sub>4</sub> - (Pendimethalin 30 EC @ 1kg  $ha^{-1}$  as pre- emergence) and

treatment T<sub>2</sub> - (Oxyfluorfen 23.5% EC @ 200 g  $ha^{-1}$  as pre-emergence). All the herbicides were found to be superior over individual weed control treatments. This might be due to the effect of herbicide in checking the weed growth successfully. The significantly higher seed yield was recorded in treatment T<sub>3</sub>-(Two hand weeding at 20 and 40DAS) but it was *at par* with T<sub>4</sub> - (Pendimethalin 30EC @ 1kg  $ha^{-1}$  as pre-emergence) (Table 2). The increased yield in these treatments was due to effective control of weeds in early stage, which reduced weed growth and gave higher yield attributes of black gram and finally resulted to higher yield. Similar results were reported by S. S. Rana, Gurdeep Singh, M.C. Rana, Neelam Sharma and D. Badiyala (2019) [10]. Similar results were also recorded by Sanbagavalli S., Chinnusamy C., Marimuthu S. and Sivamurugan A.P. (2016) [9].

**Table 2:** Effect of various weed control measures on yield attributing characters and yield parameters

Number of pods/plant <sup>-1</sup>	Number of seeds pod <sup>-1</sup>	Test weight (kg ha <sup>-1</sup> )	Seed yield (kg ha <sup>-1</sup> )	Stover yield	Harvest index (%)	
T <sub>1</sub> -(Weedy check)	15.44	3.45	28.62	463.00	882.46	34.41
T <sub>2</sub> -(Oxyfluorfen23.5%EC@200gha <sup>-1</sup> aspre-emergence)	20.95	6.61	35.05	885.00	1568.56	36.07
T <sub>3</sub> -(Two hand weeding at 20 and 40DAS)	21.83	7.66	36.96	1152.33	1926.00	37.43
T <sub>4</sub> -(Pendimethalin30EC@1kgha <sup>-1</sup> as pre-emergence)	21.08	7.27	35.66	908.16	1580.62	36.49
T <sub>5</sub> -(Imazethapyr10%SL@100gha <sup>-1</sup> at 20DAS as post-emergence)	18.95	6.11	34.05	790.00	1431.33	35.56
T <sub>6</sub> -(Quizalofop-p-ethyl5EC@50gha <sup>-1</sup> at20DASaspost-emergence)	19.18	6.36	34.38	812.49	1450.00	35.91
T <sub>7</sub> -[Odyssey(Imazamox35WG+Imazethapyr35WG)@40 gha <sup>-1</sup> at 20 DAS as post-emergence].	20.12	6.45	34.82	853.16	1517.57	35.99
S.Em±	1.56	1.04	1.02	30.95	53.27	-
CD(P=0.05)	4.82	3.22	3.15	95.39	164.14	-

**Effect of different weed management on monetary returns**

Economic analysis of data (Table 3) showed that the net return and benefit: cost ratio were lowest in treatment T<sub>1</sub>- (Weedy check) plot. The treatment T<sub>3</sub> - (Two hand weeding at 20 and 40 DAS) registered highest net return and B: C ratio, followed by treatment T<sub>4</sub>- (Pendimethalin 30 EC @ 1 kg ha<sup>-1</sup> as pre-

emergence). The findings confirm the result of Surinder Singh Rana, Neelam Sharma and Dinesh Badiyala (2019) [10] also reported significantly higher net return in weed management practice involving pre-emergence application of pendimethalin with cultural practices.

**Table 3:** Effect of various weed control measures on economics

Treatments	Cost of cultivation (Rsha <sup>-1</sup> )	Gross return (Rsha <sup>-1</sup> )	Net return (Rsha <sup>-1</sup> )	B:C ratio
T <sub>1</sub> -(Weedy check)	20994.88	27780.00	6785.12	0.32
T <sub>2</sub> -(Oxyfluorfen23.5% EC@200gha <sup>-1</sup> as pre-emergence)	22439.88	53100.00	30660.12	1.37
T <sub>3</sub> -(Two hand weeding at 20 and 40 DAS)	27074.88	69139.8	42064.92	1.55
T <sub>4</sub> -(Pendimethalin30EC@1kgha <sup>-1</sup> as pre-emergence)	22611.88	54489.6	31877.72	1.41
T <sub>5</sub> -(Imazethapyr10%SL@100gha <sup>-1</sup> at 20 DAS as post-emergence)	22283.00	47400.00	25117.00	1.13
T <sub>6</sub> -(Quizalofop-p-ethyl5EC@50gha <sup>-1</sup> at 20DAS as post-emergence)	22524.88	48749.4	26224.52	1.16
T <sub>7</sub> -[Odyssey(Imazamox35WG+ Imazethapyr35WG)@40gha <sup>-1</sup> at 20DAS as post-emergence]	22869.88	51189.6	28319.72	1.24

**Conclusion**

It can be concluded from study that Treatment T<sub>3</sub> (two hand weeding at 20 and 40 DAS) had the highest number of pods per plant, number of seeds per pod, test weight, seed yield, straw yield, and harvest index, according to the data. Treatment T<sub>3</sub> (two-hand weeding at 20 and 40 DAS) had the highest weed control effectiveness and weed control index, followed by treatment T<sub>4</sub> (pre-emergence pendimethalin 30EC @ 1 kg ha<sup>-1</sup>). The maximum gross return, net return, and B:C ratio were recorded by treatment T<sub>3</sub> (two hand weedings at 20 and 40 DAS), which was followed by treatment T<sub>4</sub> (pre-emergence pendimethalin 30EC @ 1 kg ha<sup>-1</sup>)

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