

# PERFORMANCE OF DIFFERENT HERBICIDES ON GROWTH AND YIELD OF BLACKGRAM

\*Elankavi, S., S. Ramesh, S. Jawahar, K. Suseendran and P. Sudhakar  
Department of Agronomy, Annamalai University, Annamalai Nagar - 608 002  
Tamil Nadu, India

## ABSTRACT

Field experiment was conducted in the Annamalai University Experimental Farm, Department of Agronomy, Faculty of Agriculture, Annamalai University, Annamalai Nagar, Tamilnadu during February - April 2016 to evaluate the suitable weed management practices for irrigated blackgram. The experiment was laid out in Randomized Block Design with three replications. There were altogether eight treatments viz., Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 750 ml ha<sup>-1</sup> (T<sub>1</sub>), Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 1000 ml ha<sup>-1</sup> (T<sub>2</sub>), Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 1250 ml ha<sup>-1</sup> (T<sub>3</sub>), Sodium acifluorfen 20% SL @ 825 ml ha<sup>-1</sup> (T<sub>4</sub>), Clodinafop - propargyl 15% WP @ 530 g ha<sup>-1</sup> (T<sub>5</sub>), Propaquizafop 10% EC @ 1000 ml ha<sup>-1</sup> (T<sub>6</sub>), Hand weeding @ 20 & 35 DAS (T<sub>7</sub>) and Weedy check (T<sub>8</sub>). Among the treatments compared, hand weeding @ 20 & 35 DAS (T<sub>7</sub>) recorded the higher growth attributes viz., plant height, LAI and Dry matter production and yield attributes viz., number of pods plant<sup>-1</sup>, number of seeds pod<sup>-1</sup>, test weight and seed yield and haulm yield. This was on par with Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 1250 ml ha<sup>-1</sup> (T<sub>3</sub>). Weedy check recorded the least seed yield of irrigated blackgram.

**Keywords:** Herbicides, Weed Control Index, Blackgram, Yield

## INTRODUCTION

Pulses are commonly known as food legumes which are secondary to cereals in production and consumption in India. Pulses are cheaper than meat; they are often referred as 'poor man's meat' in developing countries. Pulses are an important source of dietary protein, energy minerals and vitamins for the mankind. Pulses provide 25 per cent of protein requirement of predominantly vegetarian population. The world health organization (WHO) recommends a per capita consumption of pulses at 80g per day where as Indian council of medical research has recommended a minimum consumption of 47 g per day but actual availability is 30-35g per day. India is the largest producer and consumer of pulses in the world accounting for 33 per cent of world area and 22 per cent of world population. Among the grain legumes, blackgram is an ancient and well known leguminous crop of Asia, as they improve physical condition of soil and provide nutritious food and fodder; it is popular because of its nutritional quality having rich protein (26.2%), carbohydrates (56.6%), fat (1.2%), mineral, amino acids, phosphoric acid, minerals and vitamins.

In India, blackgram occupies an area of 3.06 m ha with a production of 1.70 mt and the productivity of 555 kg ha<sup>-1</sup>. In Tamil Nadu, blackgram is cultivated in an area of 94.8 thousand ha with production of 160.4 metric tonnes and a productivity of 406 kg ha<sup>-1</sup> (Directorate of Economics and statistics, ICAR, 2015). The yield potential of blackgram is very low. Among the various factors responsible for low productivity of irrigated blackgram, weeds are considered to pose serious problems like severe competition with crop plants for nutrients, moisture, solar energy and space.

The losses due to weeds in irrigated blackgram have been put on range of 10 per cent to as high as 80-90 per cent (Parveen kumar *et al.*, 2000). Blackgram is less competitive against many weeds during early stage of crop and the most sensitive period of weed competition is between 15 to 45 days after sowing (Khot *et al.*, 2016). Weed control plays a key role in increasing the productivity of blackgram. Keeping these in view, field investigation was carried out to study the response of blackgram to different weed management practices in respect of growth and yield attributes and yield .

## MATERIALS AND METHODS

The Experiment was conducted at Department of Agronomy, Annamalai University, Annamalainagar during February-April 2016. The Experiment was laid out in Randomized block design with 8 treatments viz., Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 750 ml ha<sup>-1</sup> (T<sub>1</sub>), Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 1000 ml ha<sup>-1</sup> (T<sub>2</sub>), Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 1250 ml ha<sup>-1</sup> (T<sub>3</sub>), Sodium acifluorfen 20% SL @ 825 ml ha<sup>-1</sup> (T<sub>4</sub>), Clodinafop - propargyl 15% WP @ 530 g ha<sup>-1</sup> (T<sub>5</sub>), Propaquizafop 10% EC @ 1000 ml ha<sup>-1</sup> (T<sub>6</sub>), Hand weeding @ 20 & 35 DAS (T<sub>7</sub>) and Weedy check (T<sub>8</sub>) with 3 replications. The variety ADT 3 was raised under optimum conditions of agronomic practices and plant protection measures in the field. The soil was clay in texture having pH 6.7, EC 0.34 ds/m, low in available N (246.50 kg ha<sup>-1</sup>) medium in available P (18.5 kg ha<sup>-1</sup>) and high in available K (280.75 kg ha<sup>-1</sup>). Observations on individual weed count, total weed flora and weed biomass were taken at 30 and 45 days after sowing (DAS) and also the final yield was taken at the time of harvesting.

## RESULTS AND DISCUSSION

### Growth attributes (Table.1)

Among the weed control treatments, hand weeding twice at 20 and 35 DAS significantly influenced the crop growth components like plant height, LAI and DMP (Table 2). This was on par with herbicide treatment, Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha<sup>-1</sup> as post emergence at 20 DAS (T<sub>3</sub>). A weed free environment till the critical period of the crop growth by hand weeding facilitated good growth of the crop. Improved nutrient uptake and vigour due to elimination of weed competition right from the beginning of the crop might have contributed to favourable growth components, higher nutrient uptake and consequently higher plant height, LAI and DMP in hand weeding twice treatment. Superiority of hand weeding practice at 20 and 45 DAS may be attributed to better weed control least accumulation by weeds and better aeration of the crop. Similar findings was revealed by Manoj kumar Sandil. (2015).

Similarly in Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha<sup>-1</sup> as post emergence at 20 DAS (T<sub>3</sub>) applied plots, reduction of weed density might have improved the availability of resources viz., space, soil, moisture, light, nutrients, to the blackgram crop, thus resulted in higher growth parameters. This was followed by Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1000 ml ha<sup>-1</sup> (T<sub>2</sub>) applied plots. The increase in growth attributes under these treatments might be attributed due to the reduction in weed competitiveness with the crop, which ultimately favoured better environment for growth and development of crop. Similar results also reported by Harithavarthini *et al.* (2016).

### Yield attributes and yield (Table.2)

All the treatments had a pronounced effect on the yield attributes of blackgram (Table 3). Among the treatments, hand weeding twice on 20 and 35 DAS provided a perfect weed free environment all throughout the critical period of crop growth and offered the highest value of yield components in the crop. This might be attributed to reduced crop weed competition in the critical stages which helped in synchronization of their production by increasing the number of pods plant<sup>-1</sup> and number of seeds pod<sup>-1</sup>. These results were in agreement with the findings of (Chhodavadia *et al.*, 2013; Manoj kumar Sandil *et al.*, 2015 and Khot *et al.*, 2016).

Among the various chemical weed control methods, Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha<sup>-1</sup> as post emergence at 20 DAS (T<sub>3</sub>), recorded the highest values of yield components and was on par with twice hand weeding. It could be attributed to significantly lower weed population, dry matter accumulation and higher weed control efficiency of weeds and also due to weed free environment provided by this treatment which might have increased the translocation of assimilates from source to sink and hence the yield attributes viz., number of pods plant<sup>-1</sup> and number of seeds pod<sup>-1</sup> increase in this treatment. These findings were in agreement with the findings of Patel *et al.* (2015). The lowest yield attributes were recorded under weedy check. Severe weed competition exerted by weeds for the available resources throughout the crop growth might have reduced the yield components.

Results of the study revealed that all the weed control treatments have a salutary effect on yield of blackgram over weedy check. Among different treatments, hand weeding twice on 20 and 35 DAS registered the maximum seed and haulm yields and was 51.92 and 42.71 per cent higher over control (T<sub>8</sub>).

This might be due to better control of all categories of weeds which reduced the crop weed competition by providing no weed situation in blackgram field. Thus, the crop plants being vigorous by efficiently utilization of nutrients, moisture, sunlight with space and gave better yield. Application of Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha<sup>-1</sup> as a post emergence at 20 DAS (T<sub>3</sub>) was next in order and recorded 51.17 and 41.78 per cent of seed and haulm yield over weedy check (T<sub>8</sub>) and it was on par with the twice hand weeding. This increase might be due to effective control of weeds which reduced the crop - weed competition and increased the yield of blackgram. Also increased seed yields under hand weeding and Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha<sup>-1</sup> at 20 DAS (T<sub>3</sub>) was attributed to effective weed control by these treatments which was evident from superiority in yield attributes due to lower weed population and weed biomass (Veeraputhiran, 2009). The weedy check plot gave significantly lowest yield due to heavy competition for nutrient, moisture and light between the crops and weeds.

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**Table 1. Effect of weed management practices on plant height, leaf area index and dry matter production in Blackgram**

Treatments	Plant height(cm)	Leaf area index	Dry matter production
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	30 DAS	45 DAS		(kg ha <sup>-1</sup> )
T <sub>1</sub> - Sodium acifluorfen 16.5% + Clodinafop – propargyl 8%EC @ 750 ml ha <sup>-1</sup>	25.96	45.92	3.07	2185.5
T <sub>2</sub> - Sodium acifluorfen 16.5% + Clodinafop – propargyl 8%EC @ 1000 ml ha <sup>-1</sup>	27.03	48.53	3.68	2274.4
T <sub>3</sub> - Sodium acifluorfen 16.5% + Clodinafop – propargyl 8%EC @ 1250 ml ha <sup>-1</sup>	29.03	50.60	4.14	2398.0
T <sub>4</sub> - Sodium acifluorfen 20 % SL @ 825ml ha <sup>-1</sup>	25.37	44.97	2.88	2144.0
T <sub>5</sub> -Clodinafop – propargyl 15% WP @ 530 g ha <sup>-1</sup>	22.52	42.76	2.51	2041.3
T <sub>6</sub> -Propaquizafop 10%EC @ 1000 ml ha <sup>-1</sup>	21.98	41.91	2.37	1999.4
T <sub>7</sub> - Hand weeding @ 20 & 35 DAS	29.72	51.07	4.28	2442.6
T <sub>8</sub> - Weedy check	19.36	38.09	1.98	1796.5
S.Ed	0.38	0.60	0.08	22.8
CD(p=0.05)	0.81	1.29	0.18	49.0



Table 2. Effect of weed management practices on yield and yield attributes of blackgram

Treatments	Number of pods plant <sup>-1</sup>	Number of grains pod <sup>-1</sup>	Grain yield (kg ha <sup>-1</sup> )	Haulm yield (kg ha <sup>-1</sup> )	Hundred grain Weight(g)
T <sub>1</sub> – Sodium acifluorfen 16.5% + Clodinafop – propargyl 8%EC @ 750 ml ha <sup>-1</sup>	12.30	6.1	701	1367	3.18
T <sub>2</sub> – Sodium acifluorfen 16.5% + Clodinafop – propargyl 8%EC @ 1000 ml ha <sup>-1</sup>	13.00	6.5	760	1482	3.21
T <sub>3</sub> – Sodium acifluorfen 16.5% + Clodinafop – propargyl 8%EC @ 1250 ml ha <sup>-1</sup>	13.75	6.9	893	1723	3.25
T <sub>4</sub> – Sodium acifluorfen 20 % SL @ 825ml ha <sup>-1</sup>	12.25	6.0	686	1351	3.14
T <sub>5</sub> – Clodinafop – propargyl 15% WP @ 530 g ha <sup>-1</sup>	11.50	5.6	621	1236	3.10
T <sub>6</sub> – Propaquizafop 10%EC @ 1000 ml ha <sup>-1</sup>	11.30	5.4	609	1212	3.07
T <sub>7</sub> – Hand weeding @ 20 & 35 DAS	14.00	7.1	907	1751	3.29
T <sub>8</sub> – Weedy check	9.00	5.0	436	1003	3.02
S.Ed	0.24	0.12	7.47	14.01	0.03
CD(p=0.05)	0.53	0.26	16.00	30.00	NS