



EFFECT OF NEW GENERATION HERBICIDES ON WEED PARAMETERS OF BLACKGRAM

S. Elankavi, S. Ramesh *, G. Baradhan and S. M. Sureshkumar

Department of Agronomy, Annamalai University, Annamalai Nagar - 608 002 (Tamil Nadu), India

Abstract

A Field experiment was conducted at Experimental Farm of the Department of Agronomy, Annamalai University, Annamalai Nagar during Feb – Apr 2016 to find out the impact of new generation herbicides in irrigated blackgram. Among the different weed control treatments hand weeding twice at 20 and 35 DAS registered lowest weed population. This was followed by application of Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha⁻¹ at 20 DAS (T₃) and these treatments registered lowest weed population, weed dry matter production, highest weed control efficiency, weed control index and registered maximum yield. The least weed control index and yield were recorded with unweeded control.

Key Words: Herbicides, Weed Control Index, Blackgram, Yield

Introduction

Blackgram [*Vigna mungo* (L.) Hepper] is an important legume crop cultivated worldwide in tropical and subtropical regions and is valued for high protein in its seeds. India is the largest producer and consumer of blackgram in the world. Being nitrogen fixing crop, it provides good returns to farmers even with low level of farm inputs. In India, 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. In general, weed control technology is an integral part of production system to increase the crop yield and maintain the soil fertility. Timely removal of weeds using a suitable weed control method is very much crucial to harvest optimum yields of black gram. Among the weed control practices, hand weeding is the best one because it is ecofriendly to improve soil fertility and provide aeration to the crop. In this practice, weeds are completely removed along with roots hence the crops are free from weeds during their growth period but hand weeding is laborious, time consuming, costly and tedious job, furthermore, timely unavailability of labour as well as

season continuous rains do not permit timely hand weeding.

Looking to situation, use of herbicides offers a best alternative for possible effective control of weeds in blackgram. The current trends and further development of intensive agriculture are likely to seek the help of herbicide as an effective tool for weed management. Several new early post emergence herbicides are introduced in the market and they need to be test verified for their efficiency to manage the weeds in black gram. Recently, some new post emergence herbicides *viz.*, Sodiumacifluorfen, clodinafoppropargyl and Propaquizafop *etc.* are being marketed with the assurance of selective control of weeds in blackgram. Keeping these in view, field investigation was carried out to study the response of blackgram to different post emergence herbicides.

Materials and methods

The Experiment was conducted at Department of Agronomy, Annamalai University, Annamalainagar during Feb – Apr 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⁻¹ (T₁), Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @ 1000 ml ha⁻¹ (T₂), Sodium acifluorfen 16.5% + Clodinafop - propargyl 8% EC @

1250 ml ha⁻¹ (T₃), Sodium acifluorfen 20% SL @ 825 ml ha⁻¹ (T₄), Clodinafop - propargyl 15%WP @ 530 g ha⁻¹ (T₅), Propaquizafop 10% EC @ 1000 ml ha⁻¹ (T₆), Hand weeding @ 20 & 35 DAS (T₇) and Weedy check (T₈) 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⁻¹) medium in available P (18.5 kg ha⁻¹) and high in available K (280.75 kg ha⁻¹). Observations on individual weed count, total weed flora and weed biomass were taken at 15 and 45 days after sowing (DAS) and also the final yield was taken at the time of harvesting.

Results and discussion

Weed dynamics and population. (Table.1)

The weed species *viz.*, *Echinochola colonum*, *Cyperus rotundus*, *Digitaria longiflora*, *Chloris barbata*, *Trianthema portulacastrum*, *Commelina benghalensis* were observed in the blackgram field. The occurrence of above weeds at varying population significantly differs under different treatments of various times of observations. The total weed population recorded at 30 and 45 DAS was classified under three broad groups *viz.*, grasses, sedges and broad leaved weeds. Weed control efficiency indicated the magnitude of effective reduction of weed population and their competition by weed control practices over weedy check. This was highly influenced by different weed control treatments.

Among the different weed control treatments hand

weeding twice at 20 and 35 DAS registered lowest weed population. This was followed by the herbicide treatment Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha⁻¹ as post emergence at 20 DAS (T₃) and the values were on par with each other. This might be due effective removal of weeds from both inter and intra rows by hand weeding twice at 20 and 35 DAS and the broad spectrum activity of application of this post emergence herbicide on weed and their greater efficiency to retard cell division of meristems as a result of which weeds died rapidly (Kalpana and Velayuthum, 2004).

Weed control indices (Table.2)

The highest weed control index was noticed with two hand weeding treatment at 20 and 35 DAS. Among the different herbicides, Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha⁻¹ as post emergence at 20 DAS (T₃) was found superior to the rest of herbicide treatments in respect of weed control index. This was due to greater reduction in weed biomass in this treatment which might have increased the weed control index. Similar result was reported by Harithavarthini *et al.* (2016). This was followed by the Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1000 ml ha⁻¹. The lowest weed control index was recorded over the weedy check plot. Similar findings were reported by Chaudhari *et al.* (2016).

Among the different weed management practices twice hand weeding at 20 and 35 DAS (T₇) was on par with Sodium acifluorfen 16.5% + Clodinafop propargyl 8% EC @ 1250 ml ha⁻¹ (T₃) registered significantly higher

Table 1: Effect of post emergence herbicides on individual weed flora m⁻² on grasses, sedges and broad leaved weeds on 30 and 45 DAS

Treatments	Grasses		Sedges		Broad leaved leaf	
	30 DAS	45 DAS	30 DAS	45 DAS	30 DAS	45 DAS
T ₁ - Sodium acifluorfen 16.5% + Clodinafop - propargyl 8%EC @ 750 ml ha ⁻¹	14.91 (3.92)	24.43 (4.99)	5.98 (2.54)	11.62 (3.48)	3.82 (2.07)	10.62 (3.33)
T ₂ - Sodium acifluorfen 16.5% + Clodinafop - propargyl 8%EC @ 1000 ml ha ⁻¹	13.04 (3.67)	22.79 (4.82)	5.01 (2.35)	10.54 (3.32)	2.77 (1.80)	9.49 (3.16)
T ₃ - Sodium acifluorfen 16.5% + Clodinafop - propargyl 8%EC @ 1250 ml ha ⁻¹	10.48 (3.23)	20.94 (4.63)	4.47 (2.22)	9.67 (3.18)	2.05 (1.59)	7.92 (2.90)
T ₄ - Sodium acifluorfen 20 % SL @ 825ml ha ⁻¹	15.88 (4.04)	25.33 (5.08)	6.25 (2.59)	12.08 (3.54)	4.17 (2.16)	11.50 (3.46)
T ₅ - Clodinafop - propargyl 15% WP @ 530 g ha ⁻¹	18.71 (4.38)	27.76 (5.31)	7.56 (2.83)	12.89 (3.65)	5.46 (2.44)	13.01 (3.67)
T ₆ - Propaquizafop 10%EC @ 1000 ml ha ⁻¹	20.16 (4.54)	28.97 (5.42)	8.25 (2.92)	13.42 (3.73)	6.59 (2.66)	13.68 (3.76)
T ₇ - Hand weeding @ 20 & 35 DAS	9.90 (3.22)	19.93 (1.55)	4.25 (2.17)	9.32 (3.13)	1.98 (1.57)	7.16 (2.76)
T ₈ - Weedy check	79.61 (8.95)	107.49 (10.39)	32.57 (5.75)	37.20 (6.14)	37.87 (6.19)	66.42 (8.18)
S.Ed	0.11	0.06	0.06	0.05	0.09	0.07
CD(P=0.05)	0.24	0.13	0.12	0.10	0.20	0.15

(Figures in parentheses indicate $\sqrt{X+0.5}$ transformed values.)

Table 2: Effect of post-emergence herbicides on total weed count, dry matter of weeds, weed control index (WCI), Weed control efficiency WCE, grain yield and haulm yield of blackgram

Treatments	Total weed count at 45 DAS	Dry matter of weeds at 45 DAS	WCI (%) at 45 DAS	WCE (%) at 45 DAS	Grain yield (kg ha ⁻¹)	Haulm Yield (kg ha ⁻¹)
T ₁ - Sodium acifluorfen 16.5% + Clodinafop - propargyl 8%EC @ 750 ml ha ⁻¹	46.67 (6.86)	532.89 (18.68)	56.70 (8.02)	77.57 (9.30)	701	1367
T ₂ - Sodium acifluorfen 16.5% + Clodinafop - propargyl 8%EC @ 1000 ml ha ⁻¹	42.82 (6.58)	444.22 (21.57)	63.91 (8.49)	79.42 (9.41)	760	1482
T ₃ - Sodium acifluorfen 16.5% + Clodinafop - propargyl 8%EC @ 1250 ml ha ⁻¹	38.53 (6.24)	341.39 (18.97)	70.52 (8.89)	81.48 (9.52)	893	1723
T ₄ - Sodium acifluorfen 20 % SL @ 825ml ha ⁻¹	48.91 (7.02)	543.77 (23.81)	54.34 (7.87)	76.49 (9.24)	686	1351
T ₅ - Clodinafop - propargyl 15% WP @ 530 g ha ⁻¹	53.66 (7.35)	637.13 (25.74)	48.23 (7.44)	74.21 (9.11)	621	1236
T ₆ - Propaquizafop 10%EC @ 1000 ml ha ⁻¹	55.95 (7.51)	648.38 (25.96)	46.94 (7.31)	73.11 (9.05)	609	1212
T ₇ - Hand weeding @ 20 & 35 DAS	36.41 (6.07)	330.57 (18.68)	73.14 (9.05)	82.50 (9.58)	907	1751
T ₈ - Weedy check	208.11 (14.44)	1230.70 (35.58)	-	-	436	1003
S.Ed	0.08	0.69	0.16	0.05	7.47	14.01
CD (P=0.05)	0.18	1.49	0.35	0.10	16.00	30.00

weed control efficiency of 82.50 per cent and 81.48 per cent respectively, at 45 DAS. The maximum weed control efficiency observed by the above promising weed management practices were due to greater reduction of grasses, sedges and broad leaved weeds in all the stages of crop growth which increases the weed control efficiency. These results were in line with the findings of Marimuthu *et al.* (2016).

Grain yield (Table.2)

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 (T₇) registered the maximum seed and haulm yields and was 51.92 and 42.71 per cent higher over control (T₈). 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⁻¹ as a post emergence at 20 DAS (T₃) was next in order and recorded 51.17 and 41.78 per cent of seed and haulm yield over weedy check (T₈) 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⁻¹ at 20 DAS (T₃) 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. Similar grain yield losses due to weeds was reported by Chand *et al.* (2003).

References

- Chand, R., N.P. Singh and V.K. Singh (2003). Effect of weed management practices on productivity of late planted urdbean during Kharifseason. *Indian J. of Pulses Res.*, **16**: 163-164.
- Chaudhari, V.D., L.J. Desai, S.N. Chaudhari and P.R. Chaudhari. (2016). Effect of weed management on weeds, growth and yield of summer greengram (*vigna radiata* L.). *I. quarterly J. life Sci.*, **11(1)**: 531-534.
- Harithavardhini, J., K. Jayalalitha, Y. Ashoka Rani and B. Krishnaveni (2016). Efficacy of post emergence herbicides on weed control efficiency, partitioning of drymatter and yield of blackgram (*Vignamungo*(L) Hepper). *Int. J. Food, Agric. Veterinary Sci.*, **6(2)**: 39-44. ISSN: 2277-209X.
- Kalpna, R. and A. Velayutham (2004). Effect of herbicides on weed control and yield of soybean. *Indian J. Weed Sci.*,

- 36:138-148.
- Khot, A.B., V.V. Sagvekar, Y.C. Muthal, V.V. Panchal and M.B. Dhonde (2016). Effect on summer blackgram (*Phaseolus mungo* L.) to different sowing time and weed management practices with respect to yield, quality and nutrient uptake. *Indian J. Weed Sci.*, **38**: 57-62.
- Kumar, Parveen, C.S., Saraf, Rajbirsingh and Subhash Chander (2000). Effect of weed management and sulphur fertilization on weeds and yield in greengram and blackgram intercropping system, Indian agricultural research institute, New Delhi. *Indian J. Weed Sci.*, **32(1&2)**:25-30.
- Marimuthu, S., N.S. Venkataraman and S. Sanbagavalli (2016). Weed management practices on weed control efficiency and yield of blackgram. *Int. J. Adv. Res.*, **4(12)**: 965-969.
- Veeraputhiran, R. (2009). Effect of mechanical weeding on weed infestation and yield of irrigated blackgram and greengram. *Indian J. Weed Sci.*, **41**: 75-77.