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Short communication

Management of common vetch and other weeds in relay crop of black gram

A. Aliveni*, A.S. Rao, A.V. Ramana and J. Jagannadham
Department of Agronomy, Agricultural College, Naira, Andhra Pradesh 532 185

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Cultivation of blackgram (*Vigna mungo*) as a relay crop in Krishna-Godavari and North Coastal Zones of Andhra Pradesh in India is an unique system where sprouted seeds of blackgram are broadcasted in standing rice crop two to three days prior to its harvest and the crop sown in this system survives on residual moisture and fertility only. As this system does not ensure uniform plant population and being short duration and initially slow growing, crop is heavily infested with many weeds, which compete with the crop during initial growth stage resulting in yield loss of 45 to 60% (Sasikala *et al*. 2014). Continuous use of post-emergence grassy herbicides has resulted in weed flora shift towards broad-leaved weeds like common vetch (*Vicia sativa* L.), which is one of the problematic weeds in relay crop of blackgram, spreading vigorously in recent years in the North coastal zone of Andhra Pradesh. (Jayalalitha and Rao 2006). Keeping this in view, the present experiment was conducted to find out the most suitable weed management practice for control of this location specific weed

A field experiment was conducted during *Rabi*, 2015-16 at the Agricultural College Farm, Naira, Andhra Pradesh. The soil was sandy clay loam in texture with a neutral pH of 7.13 and EC of 0.10 dS/m, medium in organic carbon (0.54%), low in available nitrogen (173.4 kg/ha), high in available phosphorus (46.1 kg/ha) and potassium (326.1 kg/ha). The seeds of blackgram cultivar '*LBG 645*' 25 kg/ha were soaked in water for about eight hours and were dibbled at 30 × 10 cm apart. The experiment comprising of 10 treatments (Table 1) was laid out in a randomized block design replicated thrice. In case of treatments involving sand mix application, the required quantity of herbicide was mixed in dry sand 50 kg/ha and then broadcasted uniformly immediately after sowing of blackgram followed by water spray 500 l/ha as pre-emergence application. The crop survived entirely on residual fertility and moisture only. The data on weed density and dry weight was subjected to square root transformation using $\sqrt{x+0.5}$ to reduce large variations.

***Corresponding author:** aliveni165@gmail.com

The important weed flora observed in this investigation were *Ammania baccifera, Cardanthera uliginosa, Ludwigia parviflora, Trianthema portulacastrum, Hydrolea zeylanica, Vicia sativa, Cardiospermum helicacabum, Chrozophora rottleri, Gnaphalium polycaulon, Grangea maderaspatana* and *Phyllanthus maderaspatensis. Vicia sativa* was the dominant weed among all the species at all the stages of observation, which consisted about 75% of total weed population.

Among the weed control treatments at 60 DAS, significantly lower density, dry weight and the highest weed control efficiency (WCE) of 91% of *Vicia sativa* was observed with acifluorfen + clodinafop-propargyl 0.4 kg/ha as post-emergence at 25 DAS , which was at par with other treatments and also with hand weeding at 15 and 30 DAS, which had the lowest density and dry weight (Table 1). Significantly higher density and dry weight of other weeds was observed in weedy check treatment while the lowest density, dry weight and highest weed control efficiency of 80% of other weeds were recorded with acifluorfen + clodinafop-propargyl 0.4 kg/ha as post-emergence at 25 DAS comparable with hand weeding at 15 and 30 DAS. Effectiveness of acifluorfen + clodinafop-propargyl in controlling all weeds except *Cuscuta* in rice fallow blackgram was also reported by Rao (2015). Among the herbicide treatments, the highest seed (762 kg/ha) and haulm yield (1.52 t/ha) were obtained with acifluorfen + clodinafop-propargyl 0.4 kg/ha as post-emergence at 25 DAS and it was at par to its lower doses 0.35 kg and 0.3 kg and also was comparable with hand weeding at 15 and 30 DAS (Table 2). Reduction in seed yield in relay crop of blackgram to an extent of 75% due to weed competition was also reported by Rao (2008a). Regarding economics, the treatment that received the highest dose (0.4 kg/ha) of acifluorfen + clodinafop-propargyl resulted in highest net returns (` 53240/ha), which was closely followed by its lower doses (0.35 kg/ha and 0.3 kg/ha) but the highest benefit : cost ratio (2.28) was obtained with acifluorfen + clodinafop-propargyl 0.3 kg/ha as post-emergence at 25 DAS.

Table 1. Density, dry weight and weed control efficiency of *Vicia sativa* and other weeds as influenced by weed control treatments in relay crop of blackgram at 60 DAS

Treatment	Density of *Vicia sativa* (no./m^2)	Dry weight of *Vicia sativa* (kg/ha)	Weed control efficiency of *Vicia sativa*	Density of other weeds (no./m^2)	Dry weight of other weeds (kg/ha)	Weed control efficiency of other weeds
Hand weeding at 15 and 30 DAS	5.04 (25)	0.44 (2.1)	93	4.00 (17)	0.46 (2.1)	90
Pendimethalin 1 kg/ha as sand mix application	13.65 (191)	1.51 (22.9)	16	10.80 (116)	1.10 (12.1)	34
Imazethapyr 75 g/ha as sand mix application	13.39 (182)	1.22 (14.9)	41	10.30 (106)	1.06 (11.1)	39
Imazethapyr 50 g/has PoE at 20 DAS	13.09 (175)	1.14 (13.0)	49	10 (100)	0.88 (7.6)	57
Acifluorfen + clodinafop-propargyl 0.2 kg/ha as PoE	7.77 (60)	0.65 (4.2)	82	7.2 (51)	0.74 (5.5)	67
Acifluorfen + clodinafop-propargyl 0.25 kg/has PoE	7.27 (52)	0.64 (4.1)	83	6.3 (45)	0.68 (4.7)	71
Acifluorfen + clodinafop-propargyl 0.3 kg/ha as PoE	7.00 (49)	0.54 (2.9)	89	5.2 (27)	0.64 (4.2)	75
Acifluorfen + clodinafop-propargyl 0.35 kg/ha as PoE	6.55 (44)	0.53 (2.8)	90	4.8 (23)	0.62 (3.8)	78
Acifluorfen + clodinafop-propargyl 0.4 kg/ha as PoE	6.00 (42)	0.50 (2.4)	91	4.5 (20)	0.57 (3.3)	80
Weedy check	14.12 (208)	1.65 (27.6)	-	11.20 (127)	1.40 (20.0)	-
LSD (P=0.05)	3.07	0.25	15.77	2.28	0.24	15.54

Data were subjected to square root transformation $\sqrt{x+0.5}$. Figures in parenthesis are original values

Table 2. Yield attributes, yield and economics as influenced by weed control treatments in relay crop of blackgram

Treatment	Branches / plant	Pods/ plant	Seeds/ pod	Test weight (g)	Seed yield (kg/ha)	Haulm yield (t/ha)	Net returns (x10^3 `/ha)	BCR (Rs.)
Hand weeding at 15 and 30 DAS	9.8	11.0	6.4	4.7	812	1.64	52.19	1.75
Pendimethalin 1 kg/ha as sand mix application	5.8	8.4	5.8	4.3	520	1.05	30.19	1.35
Imazethapyr 75 g/ha as sand mix application	6.2	8.6	5.8	4.7	540	1.12	32.81	1.51
Imazethapyr 50 g/haasPoE at 20 DAS	6.3	9.4	5.9	4.3	550	1.12	33.31	1.50
Acifluorfen + clodinafop-propargyl 0.2 kg/ha as PoE	7.3	9.9	6.1	4.5	620	1.26	40.41	1.82
Acifluorfen + clodinafop-propargyl 0.25 kg/haasPoE	8.5	10.0	6.1	4.6	650	1.36	43.09	1.91
Acifluorfen + clodinafop-propargyl 0.3 kg/ha as PoE	9.1	10.9	6.2	4.4	745	1.47	52.28	2.28
Acifluorfen + clodinafop-propargyl 0.35 kg/ha as PoE	9.2	10.9	6.2	4.6	755	1.51	52.93	2.27
Acifluorfen + clodinafop-propargyl 0.4 kg/ha as PoE	9.3	10.9	6.3	4.6	762	1.52	53.24	2.25
Weedy check	4.9	8.0	5.5	4.4	426	0.85	22.57	1.10
LSD (P=0.05)	0.79	1.15	NS	NS	99	0.19	9.88	0.44

Seed: ` 100/kg, Haulm: ` 0.50/kg.

SUMMARY

Broad-leaved weeds like common vetch (*Vicia sativa* L.), has become a problematic weeds in relay crop of blackgram, in recent years in the North coastal zone of Andhra Pradesh. Present experiment was conducted to find out the most suitable weed management practice for control of this location specific weed. Post-emergence application of acifluorfen + clodinafop-propargyl 0.3 kg/ha was found to be most effective and economical in managing *Vicia sativa* and other weeds in rice fallow blackgram as an alternative to manual weeding.

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