The Andhra Agric. J 64 (2): 295-298, 2017

Nutrient Uptake by *Vicia Sativa* and Other Weeds in Rice-Fallow Blackgram

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

ABSTRACT

A field experiment was conducted during *rabi*, 2015-16 on sandy clay loam soils of Agricultural College, Naira, to study the effect of aciflourfen+clodinafop-propargyl on nutrient uptake by *Vicia sativa* L. and other weeds in rice-fallow blackgram. The results revealed that at all the intervals of sampling, all the herbicide treatments significantly lowered the dry weight of total weeds except T_3 and T_4 at 30 DAS and harvest which were comparable with weedy check (T_1) and the lowest nutrient uptake by *Vicia sativa* and other weeds and maximum nutrient uptake by blackgram was recorded with acifluorfen+clodinafop-propargyl @ 0.4 kg a.i ha^{-1} (T_{10}) at 25 DAS which was on par with its lower doses 0.35 kg (T_9) and 0.3 kg a.i ha^{-1} (T_8). The seed yield of blackgram also followed the similar trend.

Key words: *Nutrient uptake, Rice-fallow blackgram, Vicia sativa.*

In Krishna-Godavari and North Coastal Zones of Andhra Pradesh, blackgram is mostly grown as a relay crop, where in sprouted seeds of blackgram are broadcasted in standing rice crop two to three days before its harvest and this system does not ensure uniform plant population and severe weed infestation under zero tilled conditions deprives the crop of its major requirements of nutrients and moisture which results in poor crop growth and culminates yield loss up to an extent of 45 to 60 per cent (Sasikala *et al*., 2014). Due to continuous use of post emergence grassy herbicides the broadleaved weeds like *Vicia sativa* L. became dominant and spreading vigorously in recent years in the North Coastal Zone of Andhra Pradesh. This weed being leguminous it is difficult to control even with imazethapyr and manual weeding is difficult due to its twining habit and presence of dense stubbles of rice. As the information pertaining to nutrient uptake of *Vicia* and other weeds in rice-fallow blackgram is very limited, the present investigation was conducted to find out the efficacy of acifluorfen+clodinafop-propargyl on nutrient uptake of *Vicia sativa* and other weeds in rice-fallow blackgram.

MATERIAL AND METHODS

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 dSm^{-1}, medium in organic carbon (0.54%), low in available nitrogen (173.4 kg ha^{-1}), high in available phosphorus (46.1 kg ha^{-1}) and high in available potassium (326.1 kg ha^{-1}). The experiment was laid out in randomized block design comprising of 10 treatments (Table 1) and replicated thrice. The blackgram variety LBG 645 was sown by dibbling immediately after harvest of rice by adopting a spacing of 30 x 10 cm. The crop survived entirely on the residual moisture and fertility only. In case of treatments (T_3 & T_4) involving sand mix application (SMA), the required quantity of herbicide was mixed in dry sand @ 50 kg ha^{-1} and then broadcasted uniformly immediately after sowing of blackgram followed by water spray @ 500 l ha^{-1} as pre-emergence application. In case of post-emergence herbicide treatments (T_5 to T_{10}), the required quantity of herbicide was sprayed using a spray volume of 500 l ha^{-1} with Knapsack Sprayer. At harvest, the N, P and K content of weeds and crop were estimated by microkjeldahl, vanado-molybdo phosphoric yellow colour and flame photometer methods respectively (Jackson, 1973).

RESULTS AND DISCUSSION

The important weed flora observed in this investigation consisted of eleven species of weeds

Table 1. Dry matter accumulation and nutrient uptake (kg ha^{-1}) by *Vicia sativa* and other weeds as influenced by weed control treatments at harvest in rice-fallow blackgram.

Treatment	Dry weight of *Vicia sativa* (kg ha^{-1})	Nutrient depletion by *Vicia sativa* (kg ha^{-1})			Dry weight of other weeds (kg ha^{-1})	Nutrient uptake by other weeds (kg ha^{-1})		
		N	P	K		N	P	K
T_1: Weedy check	0.79 (6.9)	12.1	4.8	19.3	0.53 (2.8)	7.5	4.4	17.2
T_2: Hand weeding at 15 and 30 DAS	0.25 (0.6)	2.1	0.7	4.2	0.19 (0.3)	1.4	0.5	1.8
T_3: Pendimethalin @ 1 kg a.i ha^{-1} as sand mix application	0.74 (6.0)	11.4	3.9	18.3	0.49 (2.5)	6.2	3.3	14.5
T_4: Imazethapyr @ 75 g a.i ha^{-1} as sand mix application	0.70 (5.3)	11.0	3.5	18	0.44 (1.9)	4.3	3.2	12.1
T_5: Imazethapyr @ 50 g a.i ha^{-1} as PoE at 20 DAS	0.68 (4.9)	9.4	3.1	16.0	0.37 (1.3)	3.4	3.0	9.3
T_6:Acifluorfen+Clodinafop-propargyl @ 0.2 kg a.i ha^{-1} as PoE	0.47 (2.6)	8.5	2.7	13.3	0.32 (1.0)	2.6	2.6	6.7
T_7:Acifluorfen+Clodinafop-propargyl @ 0.25 kg a.i ha^{-1} as PoE	0.37 (1.7)	6.9	2.3	11.4	0.28 (0.7)	2.2	1.6	6.0
T_8:Acifluorfen+Clodinafop-propargyl @ 0.3 kg a.i ha^{-1} as PoE	0.34 (1.3)	5.9	1.9	9.8	0.26 (0.6)	1.9	1.1	4.2
T_9:Acifluorfen+Clodinafop-propargyl @ 0.35 kg a.i ha^{-1} as PoE	0.31 (1.1)	5.6	1.6	9.1	0.25 (0.5)	1.8	0.7	4.0
T_{10}: Acifluorfen+Clodinafop-propargyl @ 0.4 kg a.i ha^{-1} as PoE	0.29 (0.9)	4.6	1.2	8.9	0.23 (0.4)	1.6	0.6	3.8
S.Em±	0.04	0.5	0.1	0.7	0.04	0.2	0.1	0.4
LSD (P=0.05)	0.14	1.4	0.4	2.2	0.10	0.7	0.4	1.3

NOTE: In case of weed dry weight data were subjected to square root transformation $\sqrt{x+0.5}$.
Figures in parenthesis are original values.

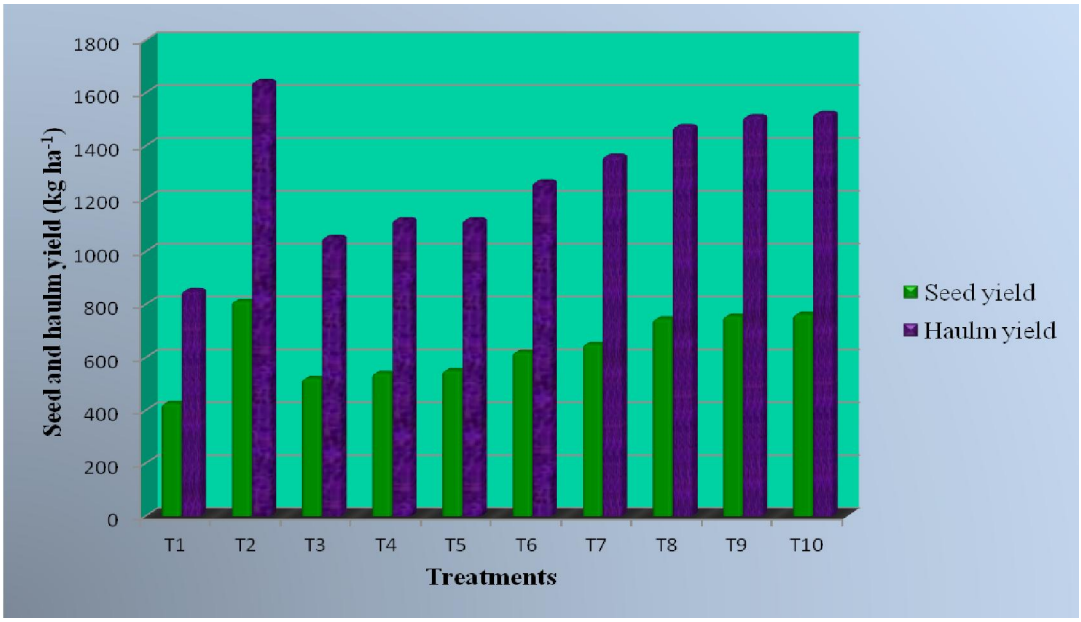

Figure 1. Seed and haulm yield as influenced by weed control treatments in rice-fallow blackgram.

Table 2. Dry matter accumulation and nutrient uptake and yield (kg ha^{-1}) of rice-fallow blackgram as influenced by weed control treatments at harvest.

Treatment	Crop dry weight (kg ha^{-1})	Nutrient depletion by crop (kg ha^{-1})			Seed yield (kg ha^{-1})
		N	P	K	
T_1: Weedy check	1380	37.7	5.7	21.3	426
T_2: Hand weeding at 15 and 30 DAS	2888	71.1	12.7	45.4	812
T_3: Pendimethalin @ 1 kg a.i ha^{-1} as sand mix application	1671	40.0	5.8	23.2	520
T_4: Imazethapyr @ 75 g a.i ha^{-1} as sand mix application	1693	41.5	6.0	25.1	540
T_5: Imazethapyr @ 50 g a.i ha^{-1} as PoE at 20 DAS	1714	43.4	6.5	27.5	550
T_6:Acifluorfen+Clodinafop-propargyl @ 0.2 kg a.i ha^{-1} as PoE	1888	45.4	7.4	30.3	620
T_7:Acifluorfen+Clodinafop-propargyl @ 0.25 kg a.i ha^{-1} as PoE	2083	49.0	8.1	32.8	650
T_8:Acifluorfen+Clodinafop-propargyl @ 0.3 kg a.i ha^{-1} as PoE	2271	53.5	8.7	35.2	745
T_9:Acifluorfen+Clodinafop-propargyl @ 0.35 kg a.i ha^{-1} as PoE	2319	57.4	9.2	37.8	755
T_{10}: Acifluorfen+Clodinafop-propargyl @ 0.4 kg a.i ha^{-1} as PoE	2323	59.9	9.5	39.7	762
S.Em±	173.4	2.6	0.4	1.7	33.19
LSD (P=0.05)	515.5	7.7	1.3	5.1	99

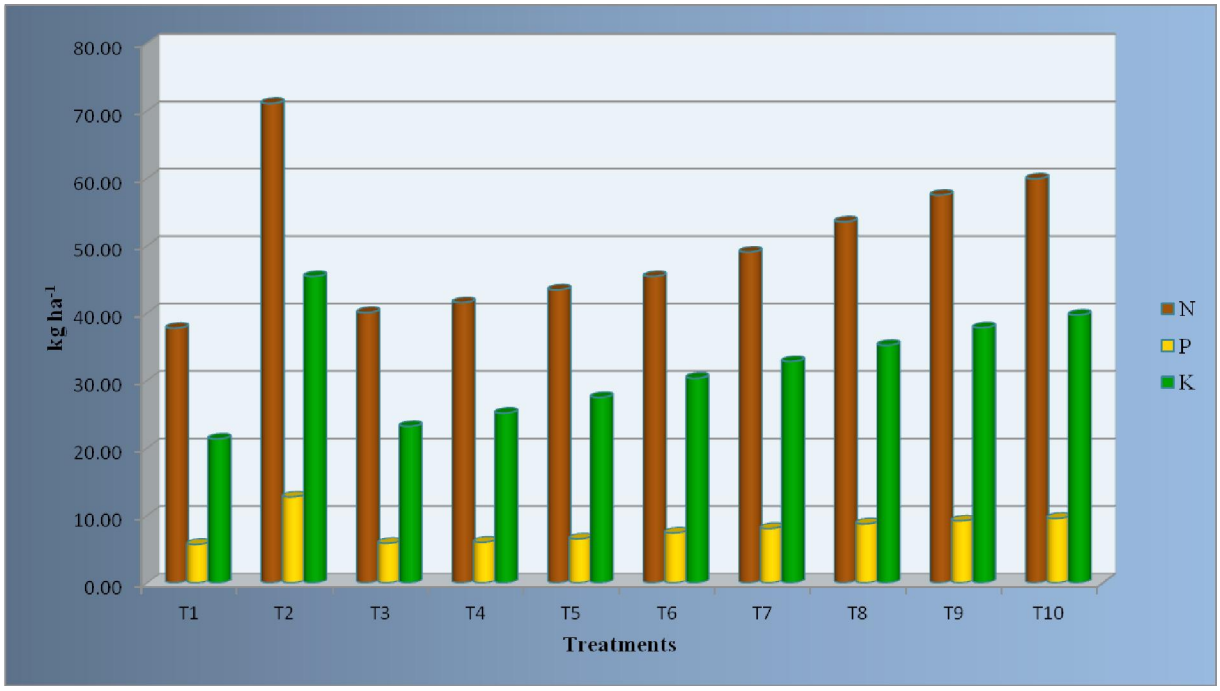

Figure 2. Nutrient uptake by rice-fallow blackgram as influenced by weed control treatments at harvest.

belong to nine different families. The observed species 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 the total weed population.

All the herbicidal treatments significantly influenced drymatter accumulation and nutrient uptake by weeds and crop (Table 1 and 2). Among the post-emergence herbicides, maximum dry weight of blackgram and minimum dry weight of *Vicia sativa* and other weeds at harvest was registered with acifluorfen+clodinafop-propargyl @ 0.4 kg a.i ha^{-1} at 25 DAS (T_{10}) to other herbicide treatments which was however on par with its lower doses 0.35 kg (T_9), 0.3 kg (T_8) and 0.25 kg (T_7) which were comparable with hand weeding at 15 and 30 DAS (T_2). The N, P and K uptake by blackgram was significantly superior in hand weeding (T_2) followed by acifluorfen+clodinafop-propargyl @ 0.4 kg a.i ha^{-1} at 25 DAS (T_{10}) and its lower doses 0.35 kg (T_9) and 0.3 kg (T_8) and the lowest in weedy check (T_1). Significantly higher quantity of nitrogen uptake by *Vicia sativa* was noticed in pendimethalin @ 1 kg a.i ha^{-1} as SMA (T3) and imazethapyr @ 75 g a.i ha^{-1} as SMA (T4), which were comparable with weedy check (T_1) treatment, while it was minimum with (T_{10}), (T_9) and (T_8) all being on par with each other. Among the herbicide treatments, minimum phosphorus uptake by *Vicia sativa* was registered with T_{10} which was superior to all herbicide treatments and weedy check followed by T_9 and T_8. Regarding the uptake of potassium by *Vicia sativa* due to various weed control treatments, the trend remained same as it was observed with the uptake of nitrogen by *Vicia sativa*. The nutrient uptake by other weeds do not alter much, the trend remained same as observed with *Vicia sativa*. The lower N, P and K uptake by weeds in these treatments i.e., $T_{10,}$ T_9 and T_8 might be attributed to the fact that dry matter of weeds recorded in these treatments was significantly lower compared to rest of the weed control treatments as well as weedy check (T_1) which might have favoured for higher uptake by crop and resulted in higher yields. Significantly more depletion of N, P and K by weeds was observed in weedy check (T_1) because of higher weed dry weight in this treatment. The results were in agreement with those reported by Jha *et al*. (2014) regarding N uptake. The superiority of acifluorfen+clodinafop-propargyl in controlling weeds was also reported by Bera *et al.* (2012) which were in agreement with the present study. Seed yield, markedly varied with the weed management practices. The highest seed yield was recorded with treatment acifluorfen+clodinafop-propargyl @ 0.4 kg a.i ha^{-1} at 25 DAS (T_{10}) and it was at par to its lower doses 0.35 kg (T_9) and 0.3 kg (T_8) comparable with hand weeding at 15 and 30 DAS (T_2). All the herbicide treatments registered the significantly higher seed yield compared to weedy check (T_1) except pendimethalin @ 1 kg a.i ha^{-1} as SMA (T_3).

LITERATURE CITED

Bera S, Pal D and Ghosh R K 2012 Bio-efficacy and phytotoxicity of new molecule herbicides for weed management in soybean. *Journal of Crop and Weed*, 8 (2): 113-116.

Jackson K L 1973 *Soil Chemical analysis*, Prentice hall Indian Private Limited, New Delhi pp: 179.

Jha B K, Chandra R and Singh R 2014 Influence of post emergence herbicides on weeds, nodulation and yields of soybean and soil properties. *Legume Research*, 37 (1): 47-54.

Sasikala K, Ramachandra Boopathi S N M and Ashok P 2014 Evaluation of methods of sowing and post emergence herbicides for efficient weed control in zero till sown rice fallow blackgram (*Vigna mungo* L.). *International Journal of Farm Sciences*, 4 (1): 81-91.

(Received on 9.06.2016 and revised on 14.10.2016)