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Chemical Management of Common Vetch (Vicia sativa L.) Weed in Rice Fallow Black Gram in Vizianagaram District of Andhra Pradesh

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ABSTRACT: In Vizianagaram district of Andhra Pradesh Vicia sativa (common vetch) weed is major constraint for Black gram cultivation in Rice fallow situations. Manual weeding is followed for its management which is high labor intensive and increases cost of cultivation, sometimes due to scarcity of labour delayed weeding severely affects crop yields. District Agricultural Advisory and Transfer of Technology Centre (DAATTC) Vizianagaram, conducted four front line demonstrations on chemical control of *Vicia sativa L*. (common vetch) in rice fallow black gram for two consecutive years during *rabi* 2012-13 and 2013-14. Chemical weed management of Vicia weed with Acifluorfen 16.5 % + Clodinafop-p-propagryl 8 % EC (Iris 24.5% EC) was sprayed on blackgram at the rate of 1.5 ml L^{-1}at the age of 25 days old crop as post emergence herbicide reduced cost of cultivation by 22.6 percent. The chemical weed management resulted in increased blackgram seed yield of 15.46 percent compared to manual weeding. Gross and net returns were significantly more in chemical weed management compared to manual weeding. The average benefit cost ratio in chemical weed management in rice fallow blackgram was 2.19 compared to 1.55 in manual weeding.
Keywords: Black gram, Vicia sativa, Iris, Benefit cost ratio, Front line demonstrations, Grain yield.

1. Introduction

India is largest producer of Blackgram with 1.9 million tones with average productivity of 500 kg ha-1(Ministry of Agriculture, Government of India, 2011-12). In Andhra Pradesh, Blackgram is one of the important pulse crops cultivated in 3.15 lakh hectares, with production of 2.84 lakh tonnes and productivity of 900 kg ha-1 (Anonymous, 2013). In North Coastal Andhra Pradesh, Black gram is grown as Rice fallow pulse crop by sowing a week before harvest of Rice crop to save the season. By the time rice crop is harvested the black gram germinates using residual soil moisture. occurrence of weeds including re-growth of rice stubbles is one of the important factors during early stages as the weeds compete for scarce soil moisture and nutrients. Since, the black gram is sown under zero till condition, weed growth is severe and effectively competes with the crop. Since there is no field preparation, a weed species Common vetch (Vicia sativa L.), locally called as *Rangam minumu* and *Koora* is one of the important weeds, spreading vigorously causing as high as 50- 80 percent reduction in black gram yields. The area affected by this weed is about 15,000 ha in Vizianagaram district (Anonymous, 2012).

The weed (common vetch) not only competes for moisture, light and nutrients but also add its seed with black gram, being similar in size and shape, fetching lower market price also. The yields of black gram affected by vicia weed are very low and farmers are doing hand weeding which is costly and labour intensive. Under rice fallow black gram, pre emergence application of herbicide is not possible, which forces the farmers to go for hand weeding and it is costly and timely availability of labour also is a problem. Hand weeding is also difficult because of the presence of dense rice stubbles in addition to the problem of trampling of black gram seedlings, which are broadcasted on the soil surface. Under these circumstances, post-emergence herbicides could be a viable option for weed management in rice fallow black gram.

There are few findings available in irrigated soybean on the use of post-emergence herbicides. The potential advantage of Acifluorfen 16.5 % + Clodinafop-p-propagryl 8 % Ec (Iris) 24.5% EC as a selective post emergence herbicide in Soybean was investigated by Jha et al (2013). Keeping the foreground in view an onfarm demonstration was taken up by Disrict Agricultural Advisory and Transfer of Technology Centre (DAATTC), Vizianagaram in four locations for consecutive two years from 2012-13 to 2013-14 in random locations of predominant blackgram cultivating areas of the vizianagarm district.

2. Materials and Methods

Chemical control of Vicia sativa L. (common vetch) in rice fallow black gram was evaluated in 4 front line demonstrations for two consecutive years during *rabi* 2012-13 and 2013-14. The demonstrations were conducted in 4 predominantly blackgram growing mandals of Vizianagaram district by using popular black gram variety LBG 645. The soil texture of the demonstrations area was sandy clay loam with a pH ranging from 7.1 to 7.9, electrical conductivity ranging from 0.26 to 1.02 dSm^{-1} estimated by adopting the procedure as outlined by Jackson (1973).

Black gram seeds at the rated of 25 kg ha-1, were soaked in water for about eight hours and were broad casted on standing crop of rice a week before harvest after proper draining of excess water in the field. The herbicide Acifluorfen 16.5 % + Clodinafop-p-propagryl 8 % Ec (Iris) 24.5% EC was sprayed on blackgram a the rate of 1.5 ml L^{-1}at the age of 25 days old crop as post emergence. The plot size was 0.2 ha. Plant population of blackgram was counted at 20DAS using $1m^2$ quadrate and was expressed as number of number of plants m^{-2}, total number of branches per

plant and total number of pods per plant from ten randomly selected plants was counted and expressed as number of pods plant^{-1}. After harvest and threshing and drying, the grain yield was expressed as Kg ha^{-1}. The economics of weed management features viz., cost of cultivation, gross and net income in INR was computed. The benefit cost ratio was calculated by considering input costs and output prices prevailing at the time of harvest. The significance of treatment effect was tested with help of t test at 5% level of significance (Panse and Sukhatme, 1978).

3. Results and Discussion

Yield attributes

The results revealed that chemical control of common vetch (Vicia sativa L.) in rice fallow blackgram using the herbicide Acifluorfen 16.5 % + Clodinafop-p-propagryl 8 % Ec (Iris) 24.5% EC at the rate of 1.5 ml L^{-1} at the age of 25 days old crop as post emergence recorded significantly more number of plants m^{-2} (29.5), number of pods plant^{-1}(18.6) than manual weeding i.e. 26.9 and 17.0, respectively (Table.1). This might be due to timely control of the vicia weed caused early seedling vigour of black gram resulted in more number of branches and more number of pods per plant. Similar increase in yield attributes with chemical control of weeds in Soybean was also reported by Jha et al (2013). Higher number of tillers and number of branches plant^{-1} and pods plant^{-1} obtained by chemical weed management in Soybean was by Pal *et al.* (2013). The mean number of branches per plant and number of pods per plant increased by 18.71% and 8.6, respectively in chemical weed management than manual weeding. The chemical weed control although recorded slightly higher number plants per square meter but did not differ significantly with manual weed management.

Grain yield

The results indicated that chemical weed management of rice fallow black gram using post emergence herbicide Acifluorfen 16.5 % + Clodinafop-p-propagryl 8 % Ec (Iris) 24.5% EC at the rate of 1.5 ml L^{-1} recorded significantly higher grain yield over manual transplanting in all the two consecutive years (Table.1). The mean grain yield in chemical weed management was 687 kgs ha^{-1} as compared to 595 kgs ha^{-1} in case of manual weeding method, The higher blackgram seed yield in chemical weed management method might be due to more number of brancher per plan and more number of pods per plant owing to lesser crop- weed competition, better translocation of photosynthates from source to sink. Higher seed yields of rice fallow blackgram by chemical weed management methods than hand

weeding was also reported by Rao (2008). The grain yield of chemical weed management in rice fallow black gram was increased by 15.46 percent compared to manual weeding.

Economics

The present study revealed that the in chemical weed control in rice fallow blackgram was significantly less (Rs. 19,609 ha^{-1}) compared to manual weeding (Rs. 24,050). The study indicated that cost of cultivation was reduced by 22.6 percent in chemical weed management. An amount of Rs.4,441 ha^{-1} can be saved by adopting direct chemical weed management in rice fallow blackgram in Vizianagaram district of North Coastal Andhra Pradesh. The saving is mainly due to saving of manual labour. Similar findings were also reported by Rao (2008) and Ramesh & Rathika (2014).

Gross and net returns were significantly more in chemical weed management compared to manual weeding. The data from three consecutive seasons shows that the average benefit cost ratio was more in chemical weed management in rice fallow blackgram (2.19), than manual weeding method (1.55). This might be due to increased seed yield and relatively low cost of cultivation in chemical weed management method than manual weeding method. These results are in conformity with those of Bera *et al*. (2012), Pal et al (2013) and Jha et al (2013).

4. Conclusion

The results of front line demonstrations revealed that by adopting chemical weed management in rice fallow blackgram resulted in higher yields and high BC ratio and overcoming labour scarsity problem is possible in Vizianagaram district of North Coastal Andhra Pradesh.

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Table 1. Yield attributes, grain yield, gross returns and net returns of rice fallow blackgram as influenced by the chemical control of Vicia weed.

Year	Particulars	Number of plants m^{-2}	Number branches $plant^{-1}$	Number pods $plant^{-1}$	Yield $t\ ha^{-1}$	Cost of cultivation Rs. ha^{-1}	Gross returns Rs. ha^{-1}	Net returns Rs. ha^{-1}	Benefit Cost Ratio
2012	Manual weeding	24.6	6.91	15.9	532	22850	31,920	9,070	1.40
	Chemical weed control	27.1	8.15	17.4	659	18294	39,540	21,246	2.16
	SEm +/-	0.83	0.23	0.39	13.8	611.2	896.1	1036	0.24
	CD (0.05)	2.61	0.67	1.15	41.7	1865.9	2708.6	3108	0.74
2013	Manual weeding	26.4	7.74	18.1	658	25250	42770	17520	1.69
	Chemical weed control	28.8	9.23	19.8	715	20925	46475	25550	2.22
	SEm +/-	0.98	0.29	0.21	21.7	783.6	927.3	512.8	0.18
	CD (0.05)	NS	0.59	0.62	NS	2347.8	2781.9	1538.1	0.54
Mean	Manual weeding	26.9	7.32	17.0	5.43	24050	37345	13295	1.55
	Chemical weed control	28.1	8.69	18.6	6.1	19609.5	43007.5	23398	2.19
	SEm +/-	0.88	0.251	0.33	0.18	759.7	942.7	860.3	0.21
	CD (0.05)	NS	0.773	0.98	0.56	2279.1	2829.5	2580.9	0.65

Price of 1 Kg grain: Rs. 60/- and Rs. 65/- 2012 and 2013, respectively.

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