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Evaluation of weed management practice in rice fallow blackgram to manage *Vicia sativa* in farmers fields in Vizianagaram district of north coastal zone of Andhra Pradesh

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Abstract

Blackgram is major predominant crop during Rabi in Vizianagaram district of Andhra Pradesh, cultivated in an area of 40,000 ha, out of total cropped area of 75,273 ha with productivity of 250 kg/ha. Farmers grow crop by adopting traditional method of cultivation in rice fallow situation, before harvesting of paddy fields blackgram seed broadcasted and crop is grown with residual soil moisture and nutrients. Among these factors, 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. To manage the weeds and increase the yield of rice fallow blackgram, post emergence chemical weed management with Sodium Acifluorfen 16.5% and Clodinafop-propargyl 8% EC with dosage of 1000 ml/ha ensured effective control of both dicot and monocot weeds in black gram introduced by DAATT Centre, Vizianagaram District of ANGRAU, in collaboration with Department of Agriculture, Vizianagaram. Chemical weed management method is boon to farmers by controlling the weeds helps in increasing the availability of residual moisture and nutrient to Blackgram crops than normal method. DAATT Centre, Vizianagaram has organized On-Farm Demonstrations (OFDs) with help of Department of Agriculture, Vizianagaram in 6 locations randomly covering entire district in Rabi, 2015-16 and Rabi, 2016-17. Grain yield increase was achieved to a tune of 31.34% in Chemical weed management method (714 kgha⁻¹) over normal method of cultivation (544 kgha⁻¹). The increase in grain yield could be attributed reduction in weeds helped in more availability of nutrients and moisture which intern increase in yield attributes and yield.

Keywords: Rice fallow pulse, blackgram, OFDS, yield and yield attributes, B:C ratio

Introduction

Black gram (*Vigna mungo* L.) is one of the important pulse crops in Andhra Pradesh, grown under irrigated, rainfed and rice fallow conditions. Rice fallow pulse is the major cropping system in the Vizianagaram district covering an area of 40,000 ha. Rice fallow black gram is grown during the month of November to December in Vizianagaram District, Andhra Pradesh in an area of 0.40 lakh hectares. It grows in the residual soil moisture, which is broadcasted 7-10 days before the harvest of paddy crop in waxy soil condition. Since black gram is grown under paddy stubbles, it has to survive in the residual nutrients and moisture present in the soil, besides frost and mist available during the period and complete the lifecycle within 75-80 days of sowing. Productivity of rice fallow black gram is low and highly variable (250-500 kg/ha) and mostly depends on the management practices followed. Use of poor quality seeds, poor germination of seeds, water stress at flowering stage, no fertilizer application, non-adoption of fertilizers spraying and no weed management are the reasons for lower yield of rice fallow black gram. Among these factors, 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. Rice fallow pulse is the major cropping system in the Vizianagaram district covering an area of 40,000 ha. 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. 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, early post-emergence herbicides could be a viable option for weed management in rice fallow black gram where concrete solution has not been found so far. There are few findings available in irrigated pulses on the use of early post emergence herbicides. Ready-mix application of Sodium Acifluorfen 16.5%

and Clodinafop-propargyl 8% EC with dosage of 1000 ml/ha ensured effective control of both dicot and monocot weeds in black gram Caverzane *et al.*, 2019 and Lakra, 2017 [3]. Clodinafop propargyl controls grassy weeds by inhibiting acetyl-CoA carboxylase while Acifluorfen controls both grassy and broadleaves by inhibiting protoporphyrinogen oxidase. Presently, imazethapyr is a very effective post emergence herbicide for controlling broad leaf and some grassy weeds in green gram. The sampled weeds were then categorized into grasses, broad-leaves and sedges. By identifying this technological gap DAATT Centre educated about weed management in Blackgram in rice fallow pulses to the farmers.

Objectives

1. To evaluate the weed management in rice fallow blackgram with Sodium Acifluorfen 16.5% and Clodinafop-propargyl 8% EC in the Vizianagaram District through On Farm Trials (OFTs).
2. To record the yield in improved method of weed management in comparison with normal method to convince the farmer.
3. To analyze the economics of Rice fallow Blackgram cultivation in Vizianagaram District.

Material and Methods

Scientists in DAATT Centre, Vizianagaram District of ANGRAU in collaboration with Department of Agriculture, Vizianagaram District has introduced chemical weed management in rice fallow Blackgram with Clodinafop-propargyl and Acifluorfen sodium by comparing normal method of cultivation through organizing On-Farm Trials (OFTs) during Rabi, 2015-16 and Rabi, 2016-17 in 6 locations.

Wide publicity through Print & Electronic Media

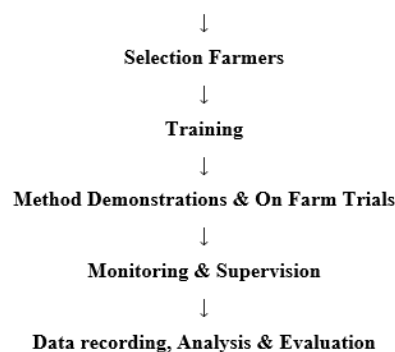


Fig 1: Flow chart of handed over of chemical weed management in rice fallow blackgram to the farmers

Farmer fields are selected to conduct On Farm Trials (OFTs) with suitable soils condition with regulation of water. Blackgram seed was broadcasted 7-10 days before the harvest of paddy crop in waxy soil condition in the farmer's fields. Need based plant protection measures were taken up during crop growth period. Means of yield attributes, yield and cost of cultivation were arrived for yield in both chemical weed management method and normal methods. Percentage yield increase over normal method was calculated and comparative analysis of cost benefit ratio per hectare was arrived and presented in the tables.

Results and Discussions

The On-Farm Demonstrations on Chemical weed management method is conducted in 6 locations across the District in Rabi, 2015-16 and Rabi, 2016-17 seasons in farmer fields and yield attributes and yield are depicted in following tables.

Table 1: Mean data on yield and yield attributes of on-farm demonstrations on chemical weed management conducted during rabi, 2015-16 and rabi, 2016-17

Sl. No.	Season	No. of locations	No. of branches per plant		No. of pods per plant		Yield (Kg/ha)		Percentage increase in yield over check
			Demo	Check	Demo	Check	Demo	Check	
1	Rabi, 2015-16	3	6	3	25	18	807	630	16.94
2	Rabi, 2016-17	3	4	3	23	14	621	458	35.67
			5	3	24	16	714	544	31.34

Average no. of branches per plant

The average no. of branches per plant (Table.1) is recorded, it was observed that there is 2 more number of branches were observed in chemical weed management practice when compared to normal blackgram cultivation.

Yield attributes

More number of pods per plant was recorded in chemical weed management method i.e., 24 when compared 16 (Table.1). This might be due to good vegetative growth of blackgram plants in chemical weed management due to

reduction of weeds and weed competition to residual nutrients and moisture.

Yield

Grain yield (Table.1) increase was achieved to a tune of 31.34% in Chemical weed management method (714 kg/ha) over normal method of cultivation (544 kg/ha). The Higher yield in Chemical weed management method in rice fallow blackgram is contributed by more number of pods and supported by profuse plant growth with more number of branches.

Table 2: Economics of the chemical weed management method vs normal method of rice fallow blackgram cultivation during Rabi, 2015-16 and Rabi, 2016-17 seasons

Sl. No.	Particulars	Demo	Farmers practice	Additional advantage
1	Grain Yield Kg/ha	714	544	170
2	Grain Value (Rs.60/kg)	42840	32640	10200
3	Cost of cultivation Rs./ha	18500	17400	1100
4	Net income Rs./ha	18820	15240	3580
5	C:B ratio	2.02	1.87	0.15

Economics

Additional grain yield (Table.3) of 170Kgha⁻¹ recorded in Chemical weed management method compared with normal method of cultivation of rice fallow Blackgram, this could be due to more availability of residual plant nutrients and moisture to Blackgram crop in rice fallow situation. Additional net income of Rs.3580 ha⁻¹ received in chemical weed management method with additional of cost of cultivation of Rs.1100 ha⁻¹. It was mainly due to the cost of chemical and spraying operation. It was observed that the cost-benefit ratio was higher in Zero tillage method (2.02) which is significantly higher than in conventional method (1.87).

Conclusions

The results from the study showed that the farmers realized the 31.34 % increase in grain yield, it could be attributed reduction in weeds helped in more availability of nutrients and moisture which intern increase in yield attributes and yield.

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