



On Farm Evaluation of Post Emergence Herbicides for Control of *Echinochloa* spp. in Rice Fallow Blackgram (*Vigna radiata* L)

E Venkateswarlu

District Agricultural Advisory and Transfer of Technology Centre, RARS, Lam, Guntur –522 034

ABSTRACT

An on farm trial was conducted on farmers' fields in Krishna Western Delta of Guntur district in Andhra Pradesh at two locations each during rabi 2003-04 and 2004-05 to evaluate the efficacy of post emergence herbicides to control *Echinochloa* spp in rice fallow black gram. Results indicated that all the post emergence herbicides effectively controlled *Echinochloa* spp. with a WCE ranging from 83 to 90 per cent and also increased the grain yield ranging from 40 to 47 per cent when compared to weedy check. Among the herbicides, post emergence application of cladinofop proparxyl 52.5 g/ha recorded the highest seed yield (922kg/ha) but considering economics, fenoxaprop ethyl 56.25 g/ha was found to be the most economical with an ICBR of 3.93.

Key words : Echinocloa sp., Rice fallow black gram, Post emergence herbicides.

Black gram is one of the important pulse crops in Andhra Pradesh and was grown in an area of 3.51 lakh ha with an average grain yield of 637 kg/ha and a total productivity of 2.24 lakh tons during rabi, 2004-05 (<http://agri.ap.nic.in>). Even though black gram is a traditional crop of Andhra Pradesh the average grain yield is low and competition from weeds is one of the important reasons for its low yields. Weed problem particularly *Echinochloa* is more in rice fallows as the crop is sown with out any preparatory cultivation. *Echinochloa* was reported to be a dominant weed (Rao and Rao, 2003) and yield reduction up to 53 per cent was reported due to uncontrolled weed growth (Appanna et al., 1998). Hence, weed control is critical in realizing economic yields in black gram. Manual weeding is costly and difficult due to scarcity and increased cost of labour. Mechanical measures like inter-cultivation can not be practiced in rice fallows as the crop is sown by broad casting, leaving usage of post emergence herbicides as the only option. Hence, the present trial was conducted to evaluate the efficacy of post emergence herbicides for control of *Echinochloa* in rice fallow black gram.

MATERIAL AND METHODS

An on farm trial was conducted on farmers' fields in Krishna Western Delta of Guntur district in Andhra Pradesh at two locations each during rabi 2003-04 and 2004-05. The soils of the experimental fields were heavy black, with a pH range of 7.8-8.1,

low in organic carbon, medium in available Phosphorus and Potash. Black gram variety LBG.645 was sown during the second fortnight of December by broadcasting of seed @ 40 kg/ha in the standing crop of rice two days before harvest. The crop was raised by adopting all recommended package of practices expect weed control and was harvested during the second fortnight of March. The crop survived on residual moisture and fertility except for one supplementary irrigation at 30-35 DAS.

Three post emergence herbicides (Table.1) were sprayed using a spray volume of 500 l/ha at 20 DAS with a flat fan nozzle. Only grassy weeds like *Echinochloa* were allowed to grow in the experimental field by removing others before treatments imposition. Data on weed dry weight was recorded at 30 DAS using a quadrate of one meter square and Weed control efficiency was calculated by using the following formula.

$$\text{WCE (\%)} = \frac{XY}{X} \times 100$$

Where WCE = Weed control efficiency in percentage

X = Weed dry weight per unit area in weedy check

Y = Weed dry weight per unit area in treatment for which WCE is to be calculated

Table 1. Effect of different treatments on weed dry matter, yield and yield components of black gram (Mean of two years: 2003-04&2004-05)

Treatments	Dosage (g a.i./ha)	Time of application (DAS)	Weed dry matter at 30 DAS (g/ sq.m)	Weed control efficiency (%)	No. of pods/plant	No. of grains/pod	Grain yield (kg/ha)	Additional returns due to herbicide treatment (Rs/ha)	Incremental cost benefit ratio (Rs.)
T ₁ -Weedy check	-	-	78	-	22	5.1	626	-	-
T ₂ -Fenoxaprop ethyl	56.25	20	10	87	34	6.2	916	3930	3.93
T ₃ -Cyhalofop butyl	100.00	20	13	83	31	5.9	875	2258	1.14
T ₄ -Cladinofof propargyl	52.50	20	8	90	33	6.2	922	3144	1.67

The effect of herbicides on yield parameters and grain yield of black gram was recorded and the economics of different treatments was worked on the basis of prevailing market prices of various inputs and out put.

RESULTS AND DISCUSSION

Effect on weeds

The dominant weed flora of the experimental field consisted of *Echinochloa colona* (more than 80%) and other weed species like *Echinochloa crusgalli*, *Leptochloa chinensis*, *Panicum xylopodium* vari. *Trin.* etc. were also present but their population was negligible.

All the herbicidal treatments were effective in controlling the weeds. Among the herbicides cladinofof propargyl @ 52.50 g/ha recorded the lowest weed dry weight and highest weed control efficiency of 90% followed by fenoxaprop ethyl @ 56.25 g/ha with 87% and cyhalofop butyl @ 100g/ha with 83% (Table 1). The weed control efficiency in various treatments was in agreement with the results reported earlier (Rao and Rao, 2003 & Gousia Begam and Rao, 2006).

Effect on crop

All the post emergence herbicides applied at 20 DAS did not cause any phytotoxicity to black gram. An increased grain yield of 40 to 47 per cent compared to weedy check was recorded in all the herbicidal treatments (Table 1). Among the post

emergence herbicides cladinofof propargyl @ 52.50 g/ha recorded the highest grain yield increase of 47 per cent followed by fenoxaprop ethyl @ 56.25 g/ha (46 per cent). The increase in grain yield in these herbicidal treatments can be attributed to the effective control of *Echinochloa* as evidenced by the higher weed control efficiency and more number of pods per plant and more number of seeds per pod. The uncontrolled weed growth caused 32 per cent reduction in grain yield compared to cladinofof propargyl @ 52.50 g/ha which recorded the highest grain yield of 922 kg ha⁻¹. The results are in agreement to those reported by Gousia Begam and Rao, 2006 and Rao, 2008.

Economics

The economic analysis of different treatments indicated that post emergence application of fenoxaprop ethyl @ 56.25 g/ha recorded the highest additional return of Rs.3930 ha⁻¹ with an ICBR of 3.93 compared to untreated control. This may be due to higher WCE and lower cost of treatment. This was closely followed by cladinofof propargyl @ 52.50 g/ha with an additional return of Rs.3144/ha with an ICBR of 1.67. The results of the trial revealed that post emergence application of fenoxaprop ethyl @ 56.25 g/ha is the most effective and economical herbicide for the control of grassy weed *Echinochloa* spp. in rice fallow black gram with out any crop injury. It can be concluded that penoxaprop ethyl @ 56.25 g/ha was found to be the most economical in recording monetary returns and ICBR.

LITERATURE CITED

- Appanna G, Subrahmaneswara Rao A, Sriharinarayana Rao R and Ravikumar A 1998.** Evaluation of herbicides for weed control in rice-fallow black gram. The Andhra Agricultural Journal, 45: 116-118.
- Gousia Begum and Rao A S 2006.** Efficacy of herbicides on weeds and relay crop of black gram. Indian Journal of Weed Science, 38: 145-147.
- Rao A S and Rao R S N 2003.** Bioefficacy of cladinofop propargyl on *Echinochloa* spp. in black gram. Indian Journal of Weed Science, 35: 251-252.
- Rao A S 2008.** Effect of time and dose of post emergence herbicides on Echinochloa (L.) Link. in black gram as relay crop. Indian Journal of Weed Science, 40: 165-168.

(Received on 29.11.2010 and revised on 20.12.2010)