

Performance of time and dose of post emergence herbicide application on relay cropped black gram

R. Veeraputhiran and C. Chinnusamy¹

AC & RI, Madurai (Tamil Nadu)

¹Tamil Nadu Agricultural University, TNAU, Coimbatore (Tamil Nadu)

¹E-mail: chinnusamy@hotmail.com

ABSTRACT

Field experiment was conducted to study the effect of post emergence herbicide imazethapyr on weed infestation and yield of black gram variety (ADT 3) under rice fallow situation (relay cropping). The treatments consisted of three times (14, 21 and 28 days after sowing) of application in main plot and post emergence herbicide imazethapyr at 60, 75 and 90 g/ha and an absolute control formed the subplot treatments. The effect of imazethapyr on weed density, weed dry weight and weed control efficiency was at par when applied on either 21 or 28 DAS. Imazethapyr of 90 g/ha recorded lowest weed density and weed dry weight and was at par with that of 75 g/ha. Higher growth and yield attributes of black gram were associated with imazethapyr application on 21 DAS at 90 g/ha. The highest grain yield of 759 kg/ha was recorded under 21 DAS than other times of application of herbicide. Among the doses, application of imazethapyr at 90 g/ha registered significantly high grain yield (751 kg/ha) in comparison of other doses and control. The favorable economic benefits in terms of higher gross income, net income and benefit cost ratio was high by the application of imazethapyr at 90 g/ha on 21 DAS.

Key words: Relay crop, Imazethapyr, Time and dose, Black gram.

Black gram (*Vigna mungo*) is one of the important pulse crops in Tamil Nadu which is grown under irrigated, rainfed and rice fallow conditions i.e. relay cropping after rice crop. Weeds compete for water, nutrients and space and cause up to 45 per cent yield loss in black gram (Yadav *et al.* 1997). The control of weeds during critical period of crop weed competition is very important so as to avoid yield loss. Weed control under rice fallow black gram will further enhance the productivity as it is neglected under rice fallow black gram. Selective herbicide can be one of the best alternatives for economic and timely weed control in black gram as it depends on availability of labour in time and field accessibility. Recently some post emergence herbicides are being marketed with the assurance of selective control of weeds in black gram. Since the information on the effect of these herbicides is meagre, this study was undertaken to study the effect of imazethapyr on the weeds and yield of rice fallow black gram.

MATERIALS AND METHODS

Field experiment was conducted at Agricultural College and Research Institute, Killikulam, Tamil Nadu

during January to April 2008. The experiment was laid out under split plot design with three replications. The treatments consisted of three times (14, 21 and 28 days after sowing) of application in main plot and post emergence herbicide imazethapyr at 60, 75 and 90 g/ha and an absolute control formed the subplot treatments. The soil of the experimental field was clay loam with a pH of 6.2 and having NPK status of medium, medium and low respectively. The black gram variety ADT 3 was sown four days before the harvest of paddy. The post emergence herbicide imazethapyr (Pursuit 10% SL) was applied using flat-fan nozzle as per treatment schedule. Observation on weed characters, growth and yield attributes and grain yield were recorded. The economic analysis was done on the basis of prevailing market prices of inputs used and output obtained in each treatment.

RESULTS AND DISCUSSION

Effect on weeds

The major weed flora observed in the experimental field was *Echinochloa crusgalli*, *Echinochloa colona*, *Oryza sativa*, *Cyperus rotundus* and *Cynodon dactylon*, *Cleome viscsra*. The weed population and weed dry weight

recorded by the application of herbicide at 21 days after sowing (DAS) and 28 DAS were significantly lower than that of 14 DAS (Table 1). Among the doses, imazethapyr at 90 g/ha recorded the lowest weed density (60.8/m²) and dry weight (70.0 kg/ha) which was on par with the application of imazethapyr 75 g/ha and both were on par and significantly lower than that of 60 g/ha. The weed control efficiencies were higher when herbicide was applied at later stages (21 or 28 DAS) than at earlier stages

(14 DAS). Higher dose of imazethapyr application (90 and 75 g/ha) recorded significantly higher weed control efficiencies than lower dose. Tiwari *et al.* (2007) observed that imazethapyr at 75 g/ha controlled only broad leaved weeds in soybean. Application of imazethapyr at 0.10 kg/ha controlled the weeds most effectively than other herbicides in summer irrigated black gram (Mishra and Chandrabhanu 2006).

Table 1. Effect of post emergence herbicide application on weed characters and growth of rice fallow black gram

Treatment	Weed density on 35 DAS (No/m ²)	Weed dry weight on 35 DAS (Kg/ha)	Weed control efficiency (%)	Plant height 45 DAS (cm)	LAI on 45 DAS	DMP at harvest (Kg/ha)
<i>Time of Application</i>						
14 days after sowing	227.3	190.1	42.5	41	3.09	2052
21 days after sowing	195.6	168.2	50.6	46	3.81	2478
28 days after sowing	193.8	151.9	50.8	44	3.52	2145
LSD (P=0.05)	25.1	18.7	4.9	NS	0.40	224
<i>Dose of Application</i>						
Imazethapyr @ 60 g/ha	87.0	83.6	77.7	42	3.11	2113
Imazethapyr @ 75 g/ha	74.2	79.1	81.0	46	3.47	2238
Imazethapyr @ 90 g/ha	60.8	70.0	84.6	48	3.79	2546
Absolute control	394.8	280.2	-	-	-	-
LSD (P=0.05)	18.0	14.3	8.3	4	0.31	166
Interaction	NS	NS	NS	NS	NS	NS

LAI- Leaf Area Index

DMP- Dry Matter Production

Effect on crop growth

The effect of time of application of post emergence herbicide on plant height was though not differed significantly, application at 21 and 28 DAS registered significantly higher LAI and dry matter production (DMP) than 14 DAS. Among the doses, the effect of imazethapyr at 90 and 75 g/ha on plant height was almost same, however imazethapyr at 90 g/ha recorded significantly higher LAI (3.79) and DMP (2546 kg/ha) than that of 75g/ha. Post emergence application of imazethapyr at 60 g/ha recorded significantly the shortest plants, lowest LAI and DMP. Lower weed population under higher dose of application minimizes the weed composition with crop hence favoured the crop growth which lead to higher growth attributes of black gram.

Effect on yield attributes

The yield attributing characters of black gram *viz.*, number of pods per plant and number of grains/pod were higher under imazethapyr applied at 21 DAS, which was significantly superior than other times of application. Among the doses, imazethapyr application of 90 g/ha produced significantly higher number of pods/plant (22.8) and number of seeds/pod (6.8) than that of lower doses of application. Lower weed controlling efficiencies and higher weed growth under low doses of imazethapyr application might have lead to poor growth of plants which in turn caused lesser yield attributing characters.

Yield

Highest grain yield of 759.4 kg/ha was observed when herbicide applied on 21 DAS which significantly superior

than other times of application (Table 2). With respect of doses, application of imazethapyr at 90 g/ha registered the significantly highest yield of 751.0 kg/ha followed by that of 75 g/ha (674.5 kg/ha). The lowest grain yield of 625.4 kg/ha was recorded by imazethapyr at 60 g/ha and this was significantly lower than other doses. The yield increments due to the application of imazethapyr at 90, 75 and 60 g/ha were 45.8, 57.4 and 75.3 per cent than control

(unweeded check). Superior yield attributing characters and effective weed control contributed to higher yields under higher doses of post emergence herbicide. In soybean, post emergence herbicide haloxyfop ethoxy-ethyl at 50 and 75 g/ha recorded higher yields (Tiwari *et al.* 2007). In rice fallow black gram highest grain yield was obtained with imazethapyr than other pre and post emergence herbicide (Gowsia Begum and Rao 2006).

Table 2. Effect of post emergence herbicide application on yield and economics of rice fallow black gram

Treatment	Number of pods / plant	Number of grains / pod	Grain yield (kg/ha)	Cost of cultivation (Rs./ha)	Gross income (Rs./ha)	Net income (Rs./ha)	Benefit cost ratio
Time of Application							
14 days after sowing	17.1	5.8	622	7140	15558	8418	2.18
21 days after sowing	21.8	7.0	759	7140	18985	11845	2.66
28 days after sowing	18.2	6.2	651	7140	16280	9140	2.28
LSD (P=0.05)	2.3	0.7	101	-	-	-	-
Dose of Application							
Imazethapyr @ 60 g/ha	17.3	5.2	625	6870	15635	8765	2.28
Imazethapyr @ 75 g/ha	19.1	5.7	675	7140	16863	9723	2.36
Imazethapyr @ 90 g/ha	22.8	6.8	751	7410	18775	11365	2.53
Absolute control	11.4	4.8	429	5540	10718	5178	1.93
LSD (P=0.05)	1.6	0.5	74	-	-	-	-
Interaction	NS	NS	NS	-	-	-	-

LAI - Leaf Area Index

DMP- Dry Matter Production

Economics

Post emergence application of imazethapyr on 21 DAS was found more remunerative as it fetched maximum gross income of Rs.18985/ha, net income of Rs.11845/ha and benefit cost ratio of 2.66 followed by application of 28 DAS. Higher economic benefit was obtained by the application of imazethapyr at 90 g/ha followed by 75 g/ha. Imazethapyr at 90 g/ha recorded higher gross income (Rs.18775 ha), net income (Rs.11365 ha) and benefit cost ratio (2.53) which surpassed the benefits than lower doses and control. Excellent control of weeds without any adverse effect on growth and yield might be attributed to superior economic indices under higher doses of application of 21 DAS. Under irrigated black gram highest monetary returns and benefit cost ratio was observed under oxyfluorfen at 0.1 kg/ha and fluchloralin 0.9 kg/ha (Shaik *et al.* 2002).

REFERENCES

- Gowsia Begum and Rao AS. 2006. Efficacy of herbicides on weeds and relay crop of black gram. *Indian Journal Weed Science* **38** (1&2) : 145-147.
- Mishra, JS and Chandra Bhanu C. 2006. Effect of herbicides on weeds, nodulation and growth of rhizobium in summer black gram (*Vigna mungo*). *Indian Journal Weed Science* **38** (1&2) : 150-153.
- Shaikh AR, Lokhande OG, Bhosale RH, Giri AN and Shinde GG. 2002. Weed management in blackgram (*Phaseolus mungo*). *Indian Journal Agronomy* **47**(2) : 231-233.
- Tiwari DK, Kewat ML, Khan JA, and Khamparia. 2007. Evaluation of efficacy of post emergence herbicides in soybean (*Glycine max*). *Indian Journal Agronomy* **52** (1) : 74-76.
- Yadav RP, Yadav KS and Srivastava UK. 1997. Integrated weed management in black gram. *Indian Journal Agronomy* **42** (2) : 24-26.