Indian Journal of Weed Science **48**(3): 339–340, 2016
DOI: 10.5958/0974-8164.2016.00086.1

Short communication

Bio-efficacy of quizalofop-ethyl + imazethapyr in black gram

T. Ramesh
Tamil Nadu Rice Research Institute, Tamil Nadu Agriculture University, Aduthurai, Tamil Nadu 612 101

Received: 4 June 2016; Revised: 29 July 2016

Key words: Black gram, Seed yield, Economics, Imazethapyr, Quizalofop-ethyl, Weed control efficiency

Black gram (*Vigna mungo*) is one of the important pulses grown in Tamil Nadu. The area under black gram in the state is around 2.15 lakh ha with a production of 0.71 lakh tons, which accounts for an average productivity of 328 kg/ha. The earlier studies revealed that period from sowing upto 30 days is the critical stage of weed competition and any measure taken to control the weeds in this period will result in additional grain yield. Pre-emergence application of pendimethalin at 2 l/ha at 3 days after sowing (DAS) is commonly recommended to control the weeds (Rathi *et al.* 2004). However, farmers are not following pendimetalin application due to various reasons. As hand weeding is laborious and costly besides non availability of labour for weeding, use of suitable early post-emergence herbicides for weed management in irrigated black gram is the only option available with the farmers. Quizalofop-ethyl, a selective post-emergence herbicide, controls annual and perennial grassy weeds effectively in blackgram (Mundra and Maliwal 2012). Hence, this experiment was proposed to evaluate early post-emergence herbicides, quizalofop-ethyl + imezethapyr on weed control efficiency, productivity and profitability in summer irrigated black gram.

A field experiment was conducted at Tamil Nadu Rice Research Institute, Aduthurai to evaluate the quizalofop-ethyl alone and tank mix with imazethapyr for the control of weeds in irrigated blackgram during Summer season 2012. The soil of the experimental field was alluvial clay with pH of 7.7 and EC of 0.4 dS/m. The experimental soil was low, high and medium in available nitrogen, phosphorus and potassium contents, respectively. The experiment was laid-out in a randomized block design with seven treatment in three replications. The blackgram (*ADT 5*) was sown at 25 kg/ha seed rate in 30 x 10 cm spacing. Herbicides were sprayed at 15 DAS when the weeds were 2-4 leaves stage using flat-fan nozzle as per treatments schedule. Spray volume at 250 l/ha was used. Observations on weed density, weed dry weight and seed yield were recorded. Weed count was recorded by using 0.25 m^2 quadrate at four places in each plot and expressed as number/m^2. Square root transformation ($\sqrt{x + 0.5}$) was used to analyze the data on weeds as described by Bartlett (1947).

***Corresponding author:** agronramesh@gmail.com

Weed species like *Corchorus olitorius, Cliome viscose, Trianthema portulacastrum, Eclipta alba, Acalifa indica* in broad-leaved weeds, *Cynodon doctylon, Panicum repens* and *Echinochloa colona* in grasses and *Cyperus rotuntus* in sedges were predominant in the experimental field. Among the weeds, grasses including germinated rice seedlings from shattered paddy seeds (65.2%) were dominant followed by broad-leaved weeds (25.4%) and sedges (9.4%). Effect of early post-emergence herbicides on weed density revealed that all the treatments recorded significantly lesser grassy weeds density in comparison to unweeded check at 10 and 30 DAT. Among treatments, quizalofop-ethyl at 31.25 g/ha + imazethapyr at 62.5 g/ha, weed free check and quizalofop-ethyl at 37.5 and 50 g/ha recorded significantly less grassy weeds in comparison to remaining treatments mainly due to quizalofop-ethyl, which controlled the grasses as it affects the acetyl CoA synthesis in plants (Table 1). These findings were in accordance with Mundra and Maliwal (2012) who reported that spraying of quizalofop-ethyl at 50 g/ha as selective post-emergence herbicide recorded the lowest grasses density and dry weight at 30 DAS and at harvest stages in blackgram. The sedges population was found to be significantly less in quizalofop-ethyl at 31.25 g/ha + imazethapyr at 62.5 g/ha and weed free check in comparison to remaining treatments and both were at par with each other. Minimum weed dry weight of 10.0 and 18.4 g/m^2 at 10 and 30 DAT, respectively obtained in weed free check, closely followed by quizalofop-ethyl at 31.25 g/ha + imazethapyr at 62.5 g/ha and both the treatments were significantly superior over remaining treatments and also were at par with each other. Higher weed control efficiency of 82.7% and 94.2% was recorded at 10 and 30 DAT in weed free check, respectively closely followed by quizalofop-ethyl at

Table 1. Effect of early post emergence herbicides on the weed density and dry weight at 10 and 30 DAT in black gram

Treatment	Weed density at 10 DAT (no/m^2)			Weed dry wt. (g/m^2) 10 DAT	Weed density at 30 DAT (no/m^2)			Weed dry wt. (g/m^2) 30 DAT
	Grasses	Sedges	BLW		Grasses	Sedges	BLW	
Farmers practice (2 HW on 15 and 30 DAS)	120.0 (11.0)	79.0 (7.98)	25.0 (4.96)	16.67	95.0 (9.77)	28.20 (5.35)	12.0 (3.53)	39.3
Quizalofop-ethyl 37.5 g/ha	8.0 (2.97)	80.0 (8.89)	28.0 (5.33)	17.2	7.0 (2.79)	220.0 (14.8)	30.0 (5.51)	90.1
Quizalofop-ethyl 50.0 g/ha	10.0 (3.27)	85.0 (9.18)	23.3 (4.85)	13.6	6.0 (2.58)	170.0 (13.0)	28.0 (5.35)	85.2
Quizalofop-ethyl + imazethapyr (31.25 + 62.5 g/ha)	9.0 (3.13)	30.0 (5.21)	8.0 (2.97)	11.0	4.0 (2.16)	10.0 (3.26)	12.0 (3.55)	20.4
Quizalofop-ethyl + imazethapyr (15 + 30 g/ha)	110.0 (10.5)	40.0 (6.36)	19.0 (4.61)	44.0	120 (11.0)	45.0 (6.74)	22.0 (4.74)	89.7
Weed free check	22.0 (4.74)	8.0 (2.95)	4.0 (2.20)	10.0	20.0 (4.56)	32.0 (5.66)	8.0 (2.94)	18.4
Unweeded check	632.3 (25.1)	90.0 (9.45)	18.0 (4.32)	55.8	592.0 (24.3)	60.0 (7.63)	20.0 (4.56)	317.4
LSD (P=0.05)	2.08	1.57	1.63	5.97	1.47	2.43	1.78	22.32

DAT: Days after treatment, DAS: Days after sowing, Figures in parentheses are transformed values $\sqrt{x+0.5}$

Table 2. Weed control efficiency, grain yield and economics of irrigated black gram as influenced by early post emergence herbicides

Treatment	Weed control efficiency (%)		Grain yield (t/ha)	% increase over unweeded check	Net monetary returns (x10^3 `/ha)	Benefit Cost Ratio
	10 DAT	30 DAT				
Farmers practice (2 HW on 15 and 30 DAS)	70.4	87.6	1.01	212.3	26.26	2.9
Quizalfop-ethyl 37.5 g/ha	69.2	71.6	0.73	125.4	18.39	2.7
Quizalofop-ethyl 50.0 g/ha	75.6	73.2	0.82	154.5	21.78	3.0
Quizalofop-ethyl + imazethapyr (31.25 + 62.5 g/ha)	80.3	93.6	0.98	202.8	27.58	3.4
Quizalofop-ethyl + imazethapyr (15 + 30 g/ha)	21.1	71.7	0.79	145.6	21.19	3.0
Unweeded check	-	-	0.32	-	3.82	1.4
Weed free check	82.1	94.2	1.04	223.3	26.16	2.7
LSD (P=0.05)			0.12	-		

DAT: Days after treatment

31.25 g/ha + imazethapyr at 62.5 g/ha (80.3% and 93.6% at 10 and 30 DAT, respectively). The farmer practice (2 hand weeding on 15 and 30 DAS) registered the weed control efficiency of 70.4% and 87.6% at 10 days after first weeding and 15 days after 2nd weeding, respectively.

Weed free check (1.04 t/ha), farmers' practice of two hand weeding (1.01 t/ha) and application of quizalofop-ethyl 31.25 g/ha + imazethapyr 62.5 g/ha (0.98 t/ha) recorded significantly higher seed yield as compared to remaining treatments and these three treatments were at par with each other, recorded more than 200% higher yield over unweeded check (Table 2). Application of quizalofop-ethyl 31.25 g/ha + imazethapyr 62.5 g/ha as tank mix registered higher net monetary returns (` 27582/ha), followed by farmers practice of two hand weeding at 15 and 30 DAS (` 26260/ha) and weed free check (` 26160/ ha). Higher benefit-cost ratio (BCR) of 3.4 was obtained with tank mix application of quizalofop-ethyl + imazethapyr at 31.25 + 62.5 g/ha as compared to farmers' practice (2.9) mainly due to higher cost of manual weeding.

SUMMARY

Tank mix application of quizalofop-ethyl 31.25 g/ha + imazethapyr 62.5 g/ha in 250 litre of water (2.5 ml each/litre of water) at 15 days after sowing was found most effective in controlling all type of weeds including volunteer paddy besides higher productivity and profitability of irrigated blackgram.

REFERENCES

Bartlett MS. 1947. The use of transformation. *Biometrics* **3:** 1-2.

Mundra SL and Maliwal PL. 2012. Influence of quizalofop-ethyl on narrow-leaved weeds in blackgram and its residual effect on succeeding crops. *Indian Journal of Weed Science* **44**(4): 231-234

Rathi JPS, Tewari AN and Kumar M. 2004. Integrated weed management in black gram (*Vigna mungo* L.). *Indian Journal of Weed Science* **36:** 218-220.