

## Efficacy of Azimsulfuron for Weed Control in Transplanted Rice

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### ABSTRACT

A field study was carried out at Kathalagere, Karnataka in red loamy soil to evaluate the effectiveness of azimsulfuron on weed control, crop safety and grain yield of transplanted rice. Associated major weeds were *Echinochloa glabrescence*, *Cyperus* spp., *Scripus roylei*, *Fimbristylis miliacea*, *Ludwigia parviflora*, *Lindernia verbenaeifolia* and *Glinus oppositifolius*. Hand weeding twice (20 and 40 DAT) recorded lower weed dry weight and higher mean rice grain and straw yield. Among the herbicides, application of azimsulfuron @ 30 g a. i./ha+0.2% non-ionic surfactant applied at 19 DAT recorded higher mean rice grain and straw yield.

**Key words :** Surfactant, herbicide efficacy, increased grain yield

### INTRODUCTION

Rice is the staple food of more than 60% of the world's population. With the advent of capital intensive technology, farmers have achieved a breakthrough in increasing the yield of transplanted rice. It is the major crop of India and occupies largest cropped area of 43 m ha with an annual production of 109.5 mt. In Karnataka, rice is grown over an area of 1.42 m ha with a production of 3.6 mt (Anonymous, 2004). But weeds, being the major threat, are competing with rice for resources and thus reducing the yield significantly. Since hand weeding and other weed control methods are difficult, chemicals are the obvious alternative, indispensable and cost efficient weed control practices. For this, many pre-emergent herbicides viz., butachlor, pretilachlor and anilophos were recommended and used by farmers. But, very few post-emergent herbicides are available for the control of weeds in transplanted rice. So, there is a need to evaluate the new post-emergence herbicides in transplanted rice. The present study was undertaken to evaluate the bioeffectiveness of azimsulfuron in comparison with hand weeding and butachlor (standard check), on weed control, crop safety and grain yield of transplanted rice.

### MATERIALS AND METHODS

A field study was carried out during **kharif** 2006, summer, 2007 and **kharif** 2007 in red loamy soil at Agricultural Research Station, Kathalagere, Channagiri Taluk, Davangere district in the southern transitional zone of Karnataka. The field experiment

was laid out in randomised complete block design with three replications of nine treatments viz., azimsulfuron 12.5, 15.0, 17.5, 27.5, 30.0 and 35.0 g/ha, butachlor 1.25 kg/ha (standard check), untreated weedy check and hand weeding twice [20 and 40 days after transplanting (DAT)]. A 0.2% surfactant was added to all azimsulfuron treatments.

The gross plot size of the experiment was 18.0 m<sup>2</sup> (6.0 x 3.0 m) in **kharif** 2006 and 15.6 m<sup>2</sup> (6.0 x 2.6 m) in summer 2007 and **kharif** 2007 seasons. After puddling and levelling the land, a thin film of water was stagnated in the field. Fifty per cent of recommended N (100 kg/ha) and 100% recommended P<sub>2</sub>O<sub>5</sub> and K<sub>2</sub>O (50 kg/ha each) were applied as basal dose. The remaining 50% N was top dressed in two equal splits at 25 and 50 DAT. Twenty-three, 28 and 30 days old seedlings of cv. IR-64 were transplanted at 20 x 10 cm spacing during **kharif** 2006, summer 2007 and **kharif** 2007, respectively. Azimsulfuron+0.2% surf. treatments were applied at 19 DAT, while butachlor @ 1.25 kg/ha was applied at 3 DAT, using hand operated knapsack sprayer fitted with herbicide nozzle of Aspee ULV 100. The spray volume used was 300 l/ha. The Inditran surfactant was used at 0.2% as per the treatments.

Density of weeds viz., grasses, sedges and broad leaved weeds was recorded species-wise in a fixed 0.25 m<sup>2</sup> area at pre-treatment, 15, 30 and 45 days after herbicide treatment (DAT). Dry weight of these weeds was recorded from 0.25 m<sup>2</sup> area by destructive sampling. The grain and straw yields (kg/ha) were recorded at harvest. The data on weed density and dry weight were computed using square root ( $\sqrt{x+0.5}$ ) transformation.

## RESULTS AND DISCUSSION

### Weed Flora

The major weeds observed in the experimental plots were *Echinochloa glabrescence* Munro ex Hook. f. among the grasses, *Cyperus* sps., *Scripus roylei* (Nees) Parker and *Fimbristylis miliacea* (L.) Vahl. among sedges and *Ludwigia parviflora* Roxb., *Lindernia verbenaeifolia* (Colsm.) Pennell and *Glinus oppositifolius* (L.) A. DC. among the broad-leaved weeds. The other weeds observed in lesser numbers were *Alternanthera sessilis* (L.) R. Br. Ex Roem. & Schult., *Eclipta prostrata* (L.), *Rotala verticilaris* and *Spilanthes labadicensis* A. H. Moore. Occurrence of similar weed flora in transplanted rice was also reported by Natarajan and Kuppusamy (2001), Bhattacharya *et al.* (2004) and Ramphool *et al.* (2007).

### Weed Density

Application of azimsulfuron @ 35.0 g/ha+0.2% S recorded significantly lower density of grasses, sedges

and broad-leaved weeds at 45 DAT (Table 1). This was followed by application of azimsulfuron @ 30.0 g/ha+0.2% S and azimsulfuron @ 27.5 g/ha+0.2% S. Untreated check recorded significantly higher density of grasses, sedges and broad-leaved weeds.

### Weed Dry Weight

Hand weeding twice (20 and 40 DAT) recorded significantly lower dry weight of grasses, sedges and broad-leaved weeds at 45 DAT than other weed control treatments (Table 2). Among the herbicide treatments, azimsulfuron 35.0 g/ha+0.2% S recorded significantly lower dry weight of grasses, sedges and broad-leaved weeds at 45 DAT. This was followed by application of azimsulfuron 30.0 g/ha+0.2% S and azimsulfuron 27.5 g/ha+0.2% S. The results are in conformity with the findings of Saini (2003).

### Grain and Straw Yield and Number of Panicles

Hand weeding twice (20 and 40 DAT) recorded higher mean rice grain and straw yield than other weed

Table 1. Total weed density (No./0.25 m<sup>2</sup>) at 45 DAT as influenced by azimsulfuron in transplanted rice

Treatments	Kharif 2006			Summer 2007			Kharif 2007		
	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
Azimsulfuron 12.5 g	1.56 (2.00)	2.67 (6.67)	5.26 (27.17)	1.86 (3.00)	3.12 (9.33)	4.71 (21.67)	1.76 (2.67)	2.35 (5.00)	4.81 (22.67)
Azimsulfuron 15.0 g	1.465 (1.67)	1.73 (3.00)	4.76 (22.17)	1.68 (2.33)	2.55 (6.00)	4.26 (17.67)	1.67 (2.33)	1.64 (2.33)	4.56 (20.33)
Azimsulfuron 17.5 g	-	-	-	1.56 (2.00)	1.65 (2.67)	3.94 (15.00)	1.58 (2.00)	1.00 (0.67)	3.93 (15.00)
Azimsulfuron 27.5 g	1.27 (1.17)	0.88 (0.33)	3.05 (8.83)	1.34 (1.33)	0.71 (0.00)	2.67 (6.67)	1.46 (1.67)	0.88 (0.33)	3.58 (12.33)
Azimsulfuron 30.0 g	-	-	-	1.46 (1.67)	0.71 (0.00)	1.87 (3.00)	1.34 (1.33)	0.71 (0.00)	3.03 (8.67)
Azimsulfuron 35.0 g	-	-	-	1.23 (1.00)	0.71 (0.00)	1.39 (1.67)	1.34 (1.33)	0.71 (0.00)	2.26 (4.67)
Butachlor 50 EC @ 1.25 kg/ha	2.00 (3.50)	3.36 (10.83)	3.63 (12.67)	1.46 (1.67)	4.18 (17.0)	5.27 (27.33)	1.76 (2.67)	2.78 (7.33)	0.07 (25.33)
Untreated check	2.04 (4.00)	7.93 (62.33)	7.67 (58.33)	2.68 (6.67)	9.75 (95.0)	9.12 (83.00)	2.91 (8.00)	7.64 (58.33)	10.62 (112.33)
Hand weeding twice (20 and 40 DAS)	1.10 (0.83)	2.90 (8.00)	3.36 (10.83)	1.64 (2.33)	2.41 (5.33)	3.57 (12.33)	1.46 (1.67)	2.53 (6.00)	3.67 (13.00)
LSD (P=0.05)	NS	0.63	0.30	0.41	0.53	0.55	0.42	0.64	0.42

All azimsulfuron treatments included 0.2% NIS.  
NS-Not Significant.

Table 2. Total weed dry weight (g/0.25 m<sup>2</sup>) at 45 DAT as influenced by azimsulfuron in transplanted rice

Treatments	Kharif 2006			Summer 2007			Kharif 2007		
	Grasses	Sedges	BLW	Grasses	Sedges	BLW	Grasses	Sedges	BLW
Azimsulfuron 12.5 g	1.64 (2.19)	1.22 (1.00)	1.39 (1.42)	1.15 (0.82)	0.83 (0.19)	1.32 (1.24)	1.04 (0.58)	0.81 (0.16)	1.30 (1.20)
Azimsulfuron 15.0 g	1.54 (1.87)	1.06 (0.62)	1.34 (1.29)	1.13 (0.77)	0.78 (0.11)	1.23 (1.01)	1.03 (0.55)	0.79 (0.12)	1.29 (1.17)
Azimsulfuron 17.5 g	NT	NT	NT	1.11 (0.74)	0.75 (0.02)	1.15 (0.83)	1.02 (0.54)	0.78 (0.10)	1.28 (1.15)
Azimsulfuron 27.5 g	1.41 (1.50)	0.84 (0.21)	1.20 (0.95)	1.00 (0.50)	0.71 (0.00)	0.96 (0.42)	1.00 (0.50)	0.77 (0.09)	1.27 (1.10)
Azimsulfuron 30.0 g	NT	NT	NT	0.98 (0.46)	0.71 (0.00)	0.82 (0.18)	1.00 (0.48)	0.72 (0.02)	1.18 (0.90)
Azimsulfuron 35.0 g	NT	NT	NT	0.95 (0.41)	0.71 (0.00)	0.75 (0.06)	0.98 (0.46)	0.71 (0.00)	1.04 (0.58)
Butachlor 50 EC @ 1.25 kg/ha	2.03 (3.62)	1.32 (1.24)	1.31 (1.21)	1.13 (0.78)	0.91 (0.32)	1.37 (1.38)	1.03 (0.56)	0.88 (0.28)	1.33 (1.28)
Untreated check	2.24 (4.50)	2.04 (3.67)	1.88 (3.04)	1.68 (2.32)	1.61 (2.09)	2.25 (4.55)	1.46 (1.62)	1.63 (2.14)	2.39 (5.21)
Hand weeding twice (20 and 40 DAS)	1.19 (0.92)	1.08 (0.69)	1.13 (0.78)	0.71 (0.00)	0.78 (0.10)	0.93 (0.36)	0.71 (0.00)	0.76 (0.08)	0.89 (0.29)
LSD (P=0.05)	0.19	0.15	0.10	0.15	0.02	0.06	0.03	0.03	0.05

All azimsulfuron treatments included 0.2% NIS.  
NT–Not tested.

control treatments (Table 3). The increase in grain and straw yield was mainly due to effective weed control. These findings are in line with those of Prasad (1995) and Kathirvelan and Vaiyapuri (2003). Among the herbicide treatments, application of azimsulfuron @ 30 g/ha+0.2% S recorded higher mean rice grain and straw

yield. This was followed by application of azimsulfuron @ 35.0 g/ha+0.2% S and azimsulfuron @ 27.5 g/ha+0.2% S. This was mainly due to effective control of weeds by azimsulfuron at these doses than at lower doses and application of butachlor @ 1.25 kg/ha. Similar observations were also made by Sharma *et al.* (2004).

Table 3. Grain and straw yield as influenced by azimsulfuron in transplanted rice

Treatments	Grain yield (kg/ha)				Straw yield (kg/ha)			
	Kharif	Summer	Kharif	Mean	Kharif	Summer	Kharif	Mean
Azimsulfuron 12.5 g/ha+0.2% S	4597	4959	4857	4804	5179	5562	5501	5414
Azimsulfuron 15.0 g/ha+0.2% S	4702	5009	4907	4873	5250	5612	5530	5464
Azimsulfuron 17.5 g/ha+0.2% S	NT	5320	5134	5227	NT	5967	5696	5832
Azimsulfuron 27.5 g/ha+0.2% S	5858	5824	5355	5679	6619	6503	5880	6334
Azimsulfuron 30.0 g/ha+0.2% S	NT	6136	5737	5937	NT	6862	6247	6555
Azimsulfuron 35.0 g/ha+0.2% S	NT	5772	6078	5925	NT	6448	6626	6537
Butachlor 50 EC @ 1.25 kg/ha	6084	5040	4924	5349	6835	5653	5510	5999
Untreated check	3415	3645	3555	3538	3860	4100	4003	3988
Hand weeding twice (20 and 40 DAS)	6076	6069	6034	6060	6866	6774	6576	6739
LSD (P=0.05)	74.0	1305	1150	-	136	1450	1273	-

NT–Not tested.

From this study, it can be concluded that hand weeding twice (20 and 40 DAT) is needed to obtain effective weed control and higher mean rice grain and straw yield. Next best treatment for effective weed management and increased rice grain and straw yield was azimsulfuron @ 30 g/ha+0.2% NIS.

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