



## Azimsulfuron as an effective herbicides against sedges in transplanted rice

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### ABSTRACT

A field experiment was carried out at Pantnagar during *Kharif* seasons of 2013 and 2014 to know the bio-efficacy of different doses of azimsulfuron 50 DF against sedges in transplanted rice. The soil of the experimental field was clay loam in texture, medium in organic carbon (0.67%), available phosphorus (29.6 kg/ha) and potassium (176.4 kg/ha) with pH 7.2. Major sedges were: *Scirpus roylei*, *Cyperus iria*, *Cyperus difformis* and *Fimbristylis miliacea*. Application of azimsulfuron 17.5, 26.25 and 35 g/ha with 0.2% surfactant and 35 g/ha without surfactant provided complete control of *Scirpus roylei*, *Cyperus iria* and *Cyperus difformis*. The lowest dry matter of weeds was recorded with azimsulfuron with 0.2% surfactant from 17.5 to 35 g/ha, which was found at par with azimsulfuron 35 g/ha without surfactant. Among herbicidal treatments, the highest grain yield (6.12 and 6.09 t/ha) was obtained in azimsulfuron + 0.2% surfactant at 26.25 and 35 g/ha, which was significantly similar to azimsulfuron + 0.2% surfactant 17.5 g/ha and azimsulfuron 35 g/ha without surfactant.

**Key words:** Azimsulfuron, Sedges, Surfactant, Transplanted rice, Weed management

Rice is grown in about 45 million hectares with production of 96 million tonnes contributing 45% to the total food grain production of India. In transplanted rice, weed competition is one of the prime yield limiting biotic constraints resulting into yield reduction of 28-45% (Raju and Reddy 1995, Singh *et al.* 2003). But weeds were still the major threats, which are competing with rice for resources and thus reducing the yield levels. Pre-emergence herbicides are most commonly used against grassy weeds in transplanted rice. But post-emergence herbicides are becoming need of the day due to emergence of sedges and broad-leaf weeds at later growth stages of crop. Azimsulfuron is known to be used as post-emergence sulfonylurea herbicide for controlling weeds in rice fields (Valle *et al.* 2006). This study was undertaken to know the bio-efficacy of azimsulfuron 50 DF for the control of sedges in transplanted rice.

### MATERIALS AND METHODS

A field trial was conducted during *Kharif* seasons of 2013 and 2014 at G.B. Pant University of Agriculture & Technology, Pantnagar to evaluate the bio-efficacy of azimsulfuron 50 DF. Experiment consisted of nine treatments with three doses of azimsulfuron 7.5, 26.25 and 35 g/ha with or without surfactant including bispyribac-sodium 25 g/ha as standard check as well as weed free and untreated

checks. The rice variety 'HKR-47' was used during 2013 and 2014, respectively with a spacing of 20 x10 cm. The herbicidal treatments were applied as post-emergence at 24 days after transplanting (2-4 leaf stage of weeds) of the rice crop. Herbicides were applied by using a knap-sack sprayer fitted with flat-fan nozzle using spray of 300 litres/ha. Recommended package of practices were followed to raise the crop. For measuring phytotoxicity effect, visual rating at the scale of 0-10 for azimsulfuron applied 35 and 70 g/ha with or without 0.2% surfactant was made on rice crop.

### RESULTS AND DISCUSSION

The experiment field was infested mainly with *Scirpus roylei*, *Cyperus iria*, *Cyperus difformis* and *Fimbristylis miliacea* as sedges in the rice crop during 2013 and 2014 respectively. Results revealed that all the treatments gave significant control of weed population (Table 1). Application of azimsulfuron with surfactant 35 g/ha recoded significantly lowest density of sedges, *viz.* *Scirpus roylei*, *Cyperus iria*, *Cyperus difformis* and *Fimbristylis miliacea* and this treatment was at par to its lower doses 17.5 and 26.25 g/ha and 35 g/ha without surfactant at both the stages 30 and 45 DAS during both the years. While the application of bispyribac-sodium 25 g/ha was found least effective against the sedges. Untreated check recorded significantly higher density of sedges. Application of azimsulfuron at all the doses resulted in significant

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reduction in the dry weight of *Scirpus roylei*, *Cyperus iria*, *Cyperus difformis* and *Fimbristylis miliacea* than bispyribac-sodium and untreated check at 45 DAA during both the years. Among the herbicidal treatments, application of azimsulfuron with 0.2% surfactant from 17.5 to 35 g/ha resulted in the lowest dry weight of these weeds which was found at par with azimsulfuron 35 g/ha without surfactant. The highest weed dry weight was registered in unweeded control plot. The results are in conformity with the findings of Saini (2003). Among the weed control treatments, application of azimsulfuron with surfactant 35 g/ha recorded 100% weed control efficiency during 2013 and 2014, respectively (Table 3), which was followed by the same herbicide with

lower doses of 17.5 and 26.25 and 35 g/ha without surfactant during 2013 and 2014, respectively. The weed control efficiency under bispyribac-sodium 25 g/ha was lesser than that of all the doses of azimsulfuron during both the years.

Numbers of grains per panicles, grain weight per panicles and 1000 grain weight were not influenced by different herbicidal treatments during 2013-14 and 2014-15 (Table 4). Uncontrolled weeds reduced the grain yield of rice by 60.8 and 65.9% during 2013 and 2014, respectively. All the herbicidal treatments gave significantly higher yield than weedy check during both the years. Among herbicidal treatments, the highest grain yield (6.11 and 6.09 t/ha)

**Table 1. Effect of azimsulfuron 50 DF + 0.2% surf on density of weeds at 30 days after sowing in transplanted rice during 2013 and 2014**

Treatment	Dose g/ha	<i>Scirpus roylei</i>		<i>Cyperus iria</i>		<i>Cyperus difformis</i>		<i>Fimbristylis miliacea</i>		Total	
		2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
Azimsulfuron 50 + 0.2% surfactant	17.5	2.7(6.7)	2.3(5.3)	1.0(0.0)	1.0(1.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	2.7(6.7)	2.3(5.3)
Azimsulfuron 50 + 0.2% surfactant	26.25	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)
Azimsulfuron 50 + 0.2% surfactant	35	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)
Azimsulfuron 50	17.5	5.3(28.0)	5.0(24.0)	2.7(6.7)	2.5(5.3)	2.7(6.7)	2.5(5.3)	3.2(9.3)	6.7(48.0)	5.9(34.7)	
Azimsulfuron 50	26.25	4.6(20.0)	4.2(17.7)	2.4(5.3)	1.8(2.7)	1.8(2.7)	2.0(4.0)	2.4(5.3)	5.9(33.3)	5.0(23.7)	
Azimsulfuron 50	35	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.8(2.7)	1.0(0.0)	1.0(0.0)	1.8(2.7)	
Bispyribac-sodium	25	9.0(81.3)	8.9(79.3)	3.6(12.0)	3.37(10.7)	3.9(14.7)	3.5(11.7)	4.2(17.3)	11.2(125)	10.1(101)	
Weed free	-	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	
Untreated check		21.5(446)	25.4(650)	4.9(24.0)	4.8(22.7)	4.5(20.0)	4.0(15.3)	5.3(28.0)	22.8(518)	26.2(688)	
LSD (P=0.05)		0.55	0.51	0.31	0.25	0.20	0.30	0.21	0.57	0.45	

Values within parentheses are original. Data are subjected to square root transformation  $\sqrt{x+1}$

**Table 2. Effect of azimsulfuron 50DF + 0.2% surf on density of weeds at 45 days after sowing in transplanted rice during 2013 and 2014**

Treatment	Dose g/ha	<i>Scirpus roylei</i>		<i>Cyperus iria</i>		<i>Cyperus difformis</i>		<i>Fimbristylis miliacea</i>		Total	
		2013	2014	2013	2014	2013	2014	2013	2014	2013	2014
Azimsulfuron 50 + 0.2% surfactant	17.5	2.3(5.3)	2.3(5.3)	1.0(0.0)	1.0(1.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	2.3(5.3)	2.6(6.7)	
Azimsulfuron 50 + 0.2% surfactant	26.25	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	
Azimsulfuron 50 + 0.2% surfactant	35	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	
Azimsulfuron 50	17.5	4.9(24.0)	5.0(24.0)	2.4(5.3)	2.5(5.3)	3.2(9.3)	2.5(5.3)	2.7(6.7)	6.7(45.3)	5.2(26.6)	
Azimsulfuron 50	26.25	4.1(16.0)	4.2(17.7)	2.2(4.0)	1.8(2.7)	2.2(4.0)	2.0(4.0)	2.4(5.3)	5.5(29.3)	4.2(17.4)	
Azimsulfuron 50	35	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.8(2.7)	1.0(0.0)	1.0(0.0)	1.0(0.0)	
Bispyribac-sodium	25	11.6(136)	8.9(79.3)	3.6(12.0)	3.37(10.7)	3.7(13.3)	3.5(11.7)	4.2(17.3)	13.3(178)	12.5(156)	
Weed free	-	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	
Untreated check		20.5(42.0)	25.4(650)	4.5(20.0)	4.8(22.7)	4.8(22.7)	4.0(15.3)	5.3(28.8)	22.1(490)	24.0(578)	
LSD (P=0.05)		0.44	0.51	0.13	0.25	0.27	0.30	0.21	0.44	0.52	

Values within parentheses are original. Data are subjected to square root transformation  $\sqrt{x+1}$

**Table 3. Effect of azimsulfuron 50DF + 0.2% surf on dry weight of weeds at 45 days after sowing in transplanted rice during 2013 and 2014**

Treatment	Dose g/ha	<i>S. roylei</i>		<i>C. iria</i>		<i>C. difformis</i>		<i>F. miliacea</i>	Total		WCE (%)	
		2013	2014	2013	2014	2013	2014	2013	2013	2014	2013	2014
Azimsulfuron + 0.2% surfactant	17.5	1.3(1.8)	1.2(1.5)	1.2(1.5)	1.1(1.3)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.8(3.3)	1.7(2.8)	99.4	97.63
Azimsulfuron + 0.2% surfactant	26.25	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	100.0	100.0
Azimsulfuron + 0.2% surfactant	35	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	100.0	100.0
Azimsulfuron	17.5	4.3(18.1)	2.2(4.7)	2.0(3.0)	1.7(2.8)	3.5(12.1)	1.3(1.86)	3.4(11.1)	6.7(44.6)	3.1(9.4)	92.3	92.05
Azimsulfuron	26.25	3.1(9.3)	2.0(3.9)	1.6(1.8)	1.4(1.9)	2.9(8.1)	1.2(1.5)	2.8(7.0)	5.2(26.2)	2.7(7.3)	95.4	93.82
Azimsulfuron	35	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	100.0	100.0
Bispyribac-sodium	25	10.3(106)	5.0(24.8)	3.3(10.0)	2.1(4.4)	5.3(28.1)	2.9(8.7)	4.7(22.1)	12.9(166)	6.1(37.9)	71.1	68.1
Weed free	-	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	1.0(0.0)	100.0	100.0
Untreated check		22.1(490)	10.1(103.5)	5.0(24.5)	2.6(6.5)	5.8(33.1)	2.9(8.3)	5.6(31.0)	24.0(579)	10.9(118)	0.0	0.0
LSD (P=0.05)		0.33	0.30	0.12	0.20	0.21	0.28	0.24	0.27	0.48	-	-

**Table 4. Effect of azimsulfuron 50 DF + 0.2% surf on yield attributes and yield of transplanted rice during 2013 and 2014**

Treatment	Dose	No. of grains / panicles		Weight of grains / panicles (g)		1000 - grain weight (g)		Grain yield (t/ha)	
		2013	2014	2013	2014	2013	2014	2013	2014
Azimsulfuron + 0.2% surfactant	17.5	150	139	3.4	3.5	25.8	24.9	5.900	6.010
Azimsulfuron + 0.2% surfactant	26.25	153	153	3.4	3.5	25.0	24.1	6.012	6.115
Azimsulfuron + 0.2% surfactant	35	165	160	4.4	3.8	26.0	24.8	5.950	6.092
Azimsulfuron	17.5	138	142	3.3	3.5	25.5	24.9	5.622	5.708
Azimsulfuron	26.25	140	144	3.5	4.1	25.1	25.3	5.730	5.850
Azimsulfuron	35	155	137	3.9	3.5	25.9	25.8	5.900	6.070
Bispyribac-sodium	25	150	146	3.0	3.3	25.1	22.7	4.950	5.040
Weed free	-	166	164	4.4	4.1	26.1	24.4	5.990	6.095
Untreated check	-	140	147	2.9	3.6	22.0	24.8	2.333	2.074
LSD (P=0.05)		NS	NS	NS	NS	NS	NS	0.130	0.124

was found in azimsulfuron + 0.2% surfactant 26.25 and 35 g/ha, which was found significantly similar to azimsulfuron + 0.2% surfactant 17.5 g/ha and azimsulfuron 35 g/ha without surfactant. Similar observations were also made by Sharma *et al.* (2004).

There was no phytotoxicity symptoms, *viz.* yellowing, stunting and necrosis after the application of azimsulfuron 35 and 70 g/ha with and without surfactant during both the years.

On the basis of field study, it can be concluded that azimsulfuron 50 DF + 0.2% surfactant 17.5 g/ha could be the standard dose for post emergence application in rice to achieve effective control of *Scirpus roylei*, *Cyperus iria* and *Cyperus difformis*. This treatment also produced higher grain yield of rice due to effective control of these weeds.

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