



Control of nutsedge and other weeds in sugarcane with ethoxysulfuron

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Received: 8 December 2014; Revised: 12 February 2015

ABSTRACT

A field experiment was carried out at Pantnagar, Uttarakhand during 2009-10 and 2010-11 to study the effect of rates of herbicide ethoxysulfuron for the control of *Cyperus rotundus* and other weeds in sugarcane. Ethoxysulfuron at 60 g/ha effectively reduced the density of *Cyperus rotundus* as well as *Trianthema monogyna*, *Digera arvensis*, *Cleome viscosa* and *Ipomoea* spp. The highest cane yield was obtained with hand weeding thrice at 30, 60 and 90 days after planting. Among the herbicides, ethoxysulfuron at 60 g/ha being at par with ethoxysulfuron at 56.25 g/ha recorded significantly higher cane yield than 2,4-D at 1000 g/ha.

Key words: Bio-efficacy, Ethoxysulfuron, Sugarcane

Sugarcane being a long duration crop with slow initial growth habit initial log growth and wider row spacing favours competition between crop and weeds for the inputs supplied is severely affected by weeds. *Cyperus rotundus* emerges even before the germination of sugarcane and removes moisture from field causing poor germination of sugarcane sets. Besides it, other weeds also emerge at later stages causing reduction in cane yield. Various workers have estimated loss in cane yield due to weeds form 12 to 83% (Sathyavelu *et al.* 2002 and Kanwar *et al.* 1992). Only a few chemicals are available for control of *Cyperus rotundus* and other weed flora in sugarcane. Therefore, this study was undertaken to evaluate the bio-efficacy of ethoxysulfuron for the control of *Cyperus rotundus* and other weeds in sugarcane.

MATERIALS AND METHODS

A field experiment was conducted during 2009-10 and 2010-11 at NEB Crop Research Centre of G.B.P.U.A.&T., Pantnagar to evaluate the bio-efficacy of ethoxysulfuron (Sunrise 15 WG) against *Cyperus rotundus* and other weeds in sugarcane. The soil of the experiment field was silty-clay-loam in texture, medium in organic C (0.58%), higher in available P (35.6 kg /ha) and medium in available K (164.5 kg/ha) content with a pH of 7.6. Sugarcane "Co Pant 90223" was planted on March 07, 2009 and April 09, 2010 with recommended package of practices at a row spacing of 75 cm. Different doses of ethoxysulfuron 46.87, 56.25 and 60 g/ha were compared with 2,4-D Na salt 1000 g/ha along with hand weeding at 30,60 and 90 days after planting (DAP) and weedy check (Table 1). All the herbicides

were applied at 3-4 leaf stage of *C. rotundus*. Thus, six treatments were replicated thrice in randomized block design. Treatments were applied by using a knapsack sprayer at a spray volume of 500 litres of water/ha. The data on density (no./m²) and dry matter accumulation (g/m²) of weeds was taken at 30 and 60 DAS. Data on density and dry weight of weeds were subjected to log_e(x+1) transformation before statistical analyses.

To study the phytotoxic effect of this herbicides on crop, visual rating on the scale of 0 -10 for two treatments of ethoxysulfuron *i.e.* 60 and 120 g/ha was made and compared with untreated check.

RESULTS AND DISCUSSION

The major weeds of experimental field in weedy plots were *Cyperus rotundus*, *Echinochloa* spp, *Digitaria sanguinalis*, *Dactyloctenium aegyptium*, *Trianthema monogyna*, *Digera arvensis* and *Ipomoea* spp. during 2009. However, *Cyperus rotundus*, *Echinochloa* spp, *Digitaria sanguinalis*, *Bracharia reptans*, *Trianthema monogyna*, *Cleome viscosa* and *Ipomoea* spp. were the predominant weeds during 2010.

All the weed control treatments caused significant reduction in the density of total weeds over weedy check during both the years. The highest reduction in the density of total weeds occurred with the execution of three hand weedings at 30, 60 and 90 days after planting (DAP). The lowest weed density was observed with ethoxysulfuron at 60 g/ha though the differences were non-significant, when compared with ethoxysulfuron at 46.87 and 56.25 g/ha at 30 and 60 days during both the years. Application of ethoxysulfuron at all the rates effectively controlled

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Table 1. Weed density as influenced by ethoxysulfuron in sugarcane during 2009

Treatment	Dose (g/ha)	Weed density/m ²								Total
		CR	ES	DS	BR	TM	CV	IS	OW	
<i>30 Days after application</i>										
Ethoxysulfuron	46.87	10	13	7	4	3	3	0	5	3.83(45)
Ethoxysulfuron	56.25	5	16	5	3	2	1	0	4	3.61(36)
Ethoxysulfuron	60.00	3	12	8	3	1	0	0	3	3.43(30)
2,4-D Na salt 80 WP	1000.0	43	15	7	4	7	0	0	4	4.39 (80)
Hand weeding at 30, 60, and 90 DAP	-	16	2	0	1	0	0	0	1	3.05(20)
Untreated control	-	92	14	8	3	28	12	4	7	5.13(168)
LSD (P=0.05)	-	-	-	-	-	-	-	-	-	0.54
<i>60 Days after application</i>										
Ethoxysulfuron	46.87	5	32	7	4	3	3	1	3	4.08(58)
Ethoxysulfuron	56.25	3	27	9	5	0	1	0	4	3.91(49)
Ethoxysulfuron	60.00	1	29	11	3	0	0	0	3	3.87(47)
2,4-D Na salt	1000.0	19	31	9	5	4	1	0	5	4.32(74)
Hand weeding at 30, 60, and 90 DAP	-	3	1	0	0	0	0	1	1	1.95(6)
Untreated control	-	45	29	12	5	12	7	5	9	4.83(124)
LSD (P=0.05)	-	-	-	-	-	-	-	-	-	0.37

Table 2. Weed Density as influenced by ethoxysulfuron 15 WG in sugarcane during 2010

Treatment	Dose (g/ha)	Weed density/m ²								Total
		CR	ES	DS	BR	TM	CV	IS	OW	
<i>30 Days after application</i>										
Ethoxysulfuron	46.87	13	13	13	5	1	3	0	5	3.99(53)
Ethoxysulfuron	56.25	8	18	9	4	0	1	0	4	3.81(44)
Ethoxysulfuron	60.00	5	15	11	3	0	0	0	4	3.64(37)
2,4-D Na salt	1000.0	32	17	12	4	3	1	1	5	4.33(75)
Hand weeding at 30, 60, and 90 DAP	-	19	1	3	0	0	0	0	0	3.18(23)
Untreated control	-	71	18	11	5	24	4	3	8	4.93(144)
LSD (P=0.05)	-	-	-	-	-	-	-	-	-	0.51
<i>60 Days after application</i>										
Ethoxysulfuron	46.87	5	25	16	5	1	3	0	8	4.16(63)
Ethoxysulfuron	56.25	0	21	13	7	0	1	0	5	3.87(47)
Ethoxysulfuron	60.00	0	23	15	5	0	0	0	4	3.87(47)
2,4-D Na salt	1000.0	12	24	17	5	3	0	0	7	4.23(68)
Hand weeding at 30, 60, and 90 DAP	-	4	3	1	0	0	0	0	1	2.30(9)
Untreated control	-	29	27	15	7	9	5	7	11	4.71(110)
LSD (P=0.05)	-	-	-	-	-	-	-	-	-	0.32

*Original values are given in parenthesis, DAA – Days after application of herbicide; CR= *Cyperus rotundus*, ES= *Echinochloa* spp, DS= *Digitaria sanguinalis*, BR= *Bracharia reptans*, TM= *Trianthema monogyna*, CV= *Cleome viscosa*, IS= *Ipomoea* spp, OW=other weeds

the *C. rotundus*, and broad- leaved weeds, but it was not effective against grassy weeds (Table 1 and 2).

All the weed control treatments recorded significantly lower dry weight of weeds in comparison to weedy check (Table 3). The lowest dry weight of all the weeds were recorded with three hand weedings at 30, 60 and 90 DAP at both the stages. Application of ethoxysulfuron at 56.25 and 60 g/ha recorded significantly lower dry weight of broad-leaved weeds and sedge at 30 and 60 days during 2009 and at 30 days during 2010 over 2,4-D Na salt. During 2010, at 60 days, application of this

herbicide at 56.25 and 60.0 g/ha caused complete control of *Cyperus rotundus*.

Effect on crop

It was observed that the weeds in untreated weedy plot on an average reduced the cane yield by 53.4 and 55.0% during 2009 and 2010, respectively, when compared with hand weeding (Table 4). The highest cane yield (102.0 and 108.3 t/ha) was recorded from three weedings at 30, 60 and 90 DAP. Application of ethoxysulfuron at 56.25 and 60 g/ha being at par recorded higher cane yield as compared to ethoxysulfuron at 46.87 g/ha and 2,4 D Na salt.

Table 3. Weed dry weight (g/m²) as influenced by ethoxysulfuron 15 WG in sugarcane

Treatment	Dose (g/ha)	30 DAA						60 DAA					
		2009			2010			2009			2010		
		Grassy	Broad-leaved	Sedge	Grassy	Broad-leaved	Sedge	Grassy	Broad-leaved	Sedge	Grassy	Broad-leaved	Sedge
Ethoxysulfuron	46.87	3.73 (40.8)	1.84 (5.3)	1.36 (2.9)	3.85 (46.0)	2.00 (6.4)	1.46 (3.3)	4.30 (73.0)	2.61 (12.6)	0.79 (1.2)	4.50 (88.7)	2.50 (11.2)	0.83 (1.3)
Ethoxysulfuron	56.25	3.78 (42.9)	1.03 (1.8)	0.83 (1.3)	3.85 (46.0)	1.50 (3.5)	1.06 (1.9)	4.34 (76.0)	2.00 (6.4)	0.53 (0.7)	4.44 (84.1)	1.99 (6.3)	0.00 (0.0)
Ethoxysulfuron	60.00	3.74 (41.1)	0.69 (1.0)	0.53 (0.7)	3.82 (44.4)	0.59 (0.8)	0.74 (1.1)	4.32 (74.0)	1.69 (4.4)	0.18 (0.2)	4.44 (83.5)	1.79 (5.0)	0.00 (0.0)
2,4-D Na salt	1000.0	3.74 (41.3)	2.09 (7.1)	2.80 (15.5)	3.83 (45.0)	2.36 (9.6)	2.66 (13.3)	4.33 (75.0)	2.92 (17.5)	1.44 (3.2)	4.44 (84.0)	2.67 (13.4)	1.39 (3.0)
Hand weeding 30,60 and 90	-	0.47 (0.6)	0.00 (0.0)	1.13 (2.1)	0.53 (0.7)	0.00 (0.0)	1.19 (2.3)	0.26 (0.3)	0.18 (0.2)	0.41 (0.5)	0.83 (1.3)	0.00 (0.0)	0.41 (0.5)
Untreated control	-	3.97 (52.0)	3.22 (24.1)	3.69 (39.2)	3.91 (49.0)	3.42 (29.6)	3.36 (27.9)	4.29 (72.0)	4.04 (55.9)	2.84 (16.2)	4.40 (80.3)	4.02 (54.5)	2.61 (12.6)
LSD (P=0.05)	-	0.54	0.27	0.39	0.52	0.24	0.36	0.67	0.30	0.33	0.65	0.25	0.28

*Original values are given in parenthesis, DAA – Days after application of herbicide

Table 4. Yield attributing characters and cane yield as influenced by ethoxysulfuron 15 WG in sugarcane

Treatment	Dose (g/ha)	No. of millable cane (2 m row length)		Cane length (cm)		Cane girth (cm)		Cane yield (t/ha)	
		2009	2010	2009	2010	2009	2010	2009	2010
		Ethoxysulfuron	46.87	91	94	256	258	8.5	8.5
Ethoxysulfuron	56.25	97	101	260	267	8.6	8.7	76.8	80.6
Ethoxysulfuron	60.00	103	109	271	274	8.8	8.8	82.3	86.8
2,4-D Na Salt	1000.0	84	87	251	255	8.4	8.3	68.3	70.0
Hand weeding 30,60 and 90	-	136	145	274	280	8.9	9.3	102.0	108.3
Untreated control	-	58	60	215	235	6.7	7.8	47.5	48.7
LSD (P=0.05)	-	14	15	21	23	NS	NS	6.8	7.2

No phytotoxicity symptoms, viz. stunting, yellowing/chlorosis, necrosis, epinasty and hyponasty were observed on sugarcane after the application of ethoxysulfuron either at 60 and 120 g/ha during the entire crop season.

On the basis of two years field experiment, it was concluded that ethoxysulfuron at 60 g/ha provide excellent control of *Cyperus rotundus* and broad-leaf weeds while it was ineffective against grassy weeds.

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