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Bio-efficacy of Triazolopyramidine Sulfonamide Against Weeds in Transplanted Rice

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ABSTRACT

Post-emergence application of triazolopyrimidine sulfonamide at 15 to 25 g ha^{-1} applied at 15 days after transplanting (DAT) was more effective in reducing the weed growth and increased crop growth, yield and yield components than pre-emergence herbicides (anilofos, butachlor and pretilachlor) and was on par with hand weeding done at 20 and 40 DAT.

INTRODUCTION

One of the reasons for low yields of rice is weed problem. Uncontrolled weeds compete with transplanted rice and reduce yields upto 76% (Singh *et al.*, 2004). Most of the present day recommendations in transplanted rice consist of using pre-emergence herbicides like anilofos, butachlor, pretilachlor, etc. which are mostly grassy herbicides only. The continuous use of these herbicides is leading to weed shift from grasses to non-grasses i. e. sedges and broadleaf weeds. Presently, there is a limited choice for post-emergence herbicides, that control all groups of weeds in transplanted rice. Triazolopyrimidine sulfonamide (XDE-638), a new broad spectrum ALS inhibitor herbicide has been developed for post-emergence control of mixed weed flora in transplanted rice with excellent safety to rice. Therefore, the present study was undertaken to evaluate the performance of this herbicide in transplanted rice and associated weeds.

MATERIALS AND METHODS

A field experiment was conducted at Agricultural College Farm, Bapatla during **kharif** 2000 and 2001. The soil of the experimental field was sandy clay loam in texture with low organic carbon (0.44%) and phosphorus (6.62 kg P_2O_5 ha^{-1}) and medium available potassium (235.5 kg K_2O ha^{-1}) and slightly alkaline in reaction (pH 8.1) Eleven treatments consisting of five doses of triazolopyrimidine sulfonamide (10, 12.5, 15, 20 and 25 g ha^{-1}) applied 15 DAT anilofos at 450 g ha^{-1}, butachlor 2000 g ha^{-1}, pretilachlor 750 g ha^{-1} and oxadiargyl at 70 g ha^{-1}) applied 4 DAT, hand weeding at 20 and 40 DAT and weedy check (Table 1) with three replications were laid out in a randomised block design.

Herbicides were sprayed using knapsack sprayer fitted with a flat fan nozzle at a spray volume of 500 l ha^{-1}. Rice cultivars MTU 2077 and BPT 4358 were transplanted during first and second years, respectively, at a spacing of 15 x 15 cm. All the recommended package of practices except weed control were adopted in both the years. However, during the first year of experimentation due to heavy rains and floods during second fortnight of August 2000 rice transplanting was much delayed and yield levels were low.

RESULTS AND DISCUSSION

Effect on Weeds

The experimental field was predominantly infested with *Echinochloa colonum* (30%), *Paspalum distichum* (20%), *Cyperus rotundus* (10%), *Eclipta alba* (20%), *Ammania baccifera* (10%), *Bergia capensis* (5%) and *Ludwigia octovalvis* (5%).

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Table 1. Effect of treatments on density and dry weight of weeds in transplanted rice

Treatment	Dose ($g\ ha^{-1}$)	Application stage (DAT)	Weed density (No. m^{-2})				Weed dry weight ($g\ m^{-2}$)			
			30 DAT		60 DAT		30 DAT		60 DAT	
			2000	2001	2000	2001	2000	2001	2000	2001
Triazolopyrimidine sulfonamide	10	15	6.7 (45)	3.4 (11)	6.6 (43)	4.9 (24)	4.3 (17)	2.8 (7)	6.3 (38)	2.6 (8)
Triazolopyrimidine sulfonamide	12.5	15	6.5 (42)	3.1 (9)	6.3 (40)	4.3 (18)	4.2 (16)	2.4 (5)	5.6 (30)	2.4 (6)
Triazolopyrimidine sulfonamide	15.0	15	5.0 (25)	2.3 (5)	5.1 (26)	3.2 (9)	3.3 (10)	1.8 (2)	4.0 (15)	1.3 (3)
Triazolopyrimidine sulfonamide	20.0	15	4.8 (23)	1.7 (2)	4.9 (24)	2.2 (5)	2.5 (5)	1.6 (2)	3.4 (11)	1.1 (1)
Triazolopyrimidine sulfonamide	25.0	15	4.2 (17)	1.2 (1)	4.4 (19)	2.0 (4)	1.9 (3)	1.0 (0)	3.6 (13)	1.0 (0)
Pretilachlor	750	4	5.8 (41)	4.6 (21)	6.1 (37)	6.2 (38)	4.7 (21)	3.3 (10)	7.1 (49)	2.7 (10)
Butachlor	2000	4	6.2 (38)	4.1 (16)	6.5 (42)	5.9 (34)	4.7 (21)	3.3 (10)	6.7 (45)	3.0 (11)
Anilofos	450	4	6.6 (46)	5.2 (26)	6.6 (43)	6.4 (40)	5.7 (32)	4.2 (17)	7.5 (55)	2.8 (10)
Oxadiargyl	70	4	4.6 (21)	4.1 (16)	5.1 (26)	4.8 (22)	4.8 (22)	2.9 (7)	6.2 (37)	2.0 (6)
Hand weeding	-	20 & 40	2.9 (8)	0.9 (0.3)	4.7 (22)	2.3 (5)	1.5 (2)	1.0 (0)	3.4 (11)	1.0 (0)
Weedy check	-	-	9.9 (99)	6.9 (48)	11.5 (132)	8.6 (73)	9.6 (91)	6.6 (42)	10.6 (111)	7.9 (62)
LSD (P=0.05)	-	-	1.4	0.4	0.9	0.6	1.1	0.1	0.8	0.3

DAT–Days after transplanting, data transformed to $\sqrt{x+0.5}$ transformation. Original values are given in parentheses.

Table 2. Effect of treatments on yield and yield components of transplanted rice

Treatment	Dose (g ha^{-1})	Application stage (DAT)	No. of grains/ panicle		1000-grain weight (g)		Grain yield (kg ha^{-1})	
			2000	2001	2000	2001	2000	2001
Triazolopyrimidine sulfonamide	10	15	112.6	150.2	21.4	22.0	1856	4667
Triazolopyrimidine sulfonamide	12.5	15	117.6	155.0	21.6	22.5	2078	5367
Triazolopyrimidine sulfonamide	15	15	118.5	160.2	21.6	22.6	2181	5866
Triazolopyrimidine sulfonamide	20	15	118.4	162.6	21.8	22.6	2444	6000
Triazolopyrimidine sulfonamide	25	15	118.9	166.2	21.8	22.8	2667	6033
Pretilachlor	750	4	108.0	153.4	21.0	21.8	1811	5144
Butachlor	2000	4	113.1	150.6	21.0	22.0	1784	5256
Anilofos	450	4	099.9	148.0	21.0	21.2	1733	4367
Oxadiargyl	70	4	112.9	152.6	21.4	22.4	1967	5700
Hand weeding		20 & 40	113.1	164.0	21.6	22.8	2889	6078
Weedy check		-	096.2	140.2	21.0	21.6	1633	4256
LSD (P=0.05)			4.2	10.2	NS	NS	0600	0256

NS–Not Significant.

All the weed control treatments significantly reduced the total weed density and dry weight of weeds over weedy check at both the stages of observations (Table 1). Triazolopyrimidine sulfonamide at 25 g ha^{-1} significantly reduced the weed density and dry weight and was comparable to hand weeding at 20 and 40 DAT. This was followed by the lower doses of this herbicide (20, 15, 12.5 and 10 g ha^{-1}). The higher dose of triazolopyrimidine sulfonamide (15 to 25 g ha^{-1}) recorded higher weed control efficiencies ranging from 80 to 100% at both the stages.

Effect on Crop

There was no phytotoxic effect on transplanted rice due to triazolopyrimidine sulfonamide at any of the doses applied at 15 DAT. All the weed control treatments significantly increased the number of grains per panicle and grain yield (Table 2). Numbers of tillers were affected significantly due to treatments during the second year of study only. Triazolopyrimidine sulfonamide at 25 g ha^{-1} recorded the highest grain yield among the herbicide treatments and was on par with its lower doses of 15 and 20 g ha^{-1} and also with hand weeding at 20 and 40 DAT. The increased yield in these treatments might be due to reduced weed growth and increased crop growth and yield components. Among the pre-emergence herbicides, oxadiargyl at 70 g ha^{-1} was found to be effective in both the years over others.

REFERENCE

Singh, V. P., Govindra Singh and Mahendra Singh. 2004. Efffect of fenoxaprop-ethyl on transplanted rice and associated weeds. *Indian J. Weed Sci.* **36** : 190-192.