

Studies on Phytotoxic Effect of Sulfonylurea Herbicide on Different Rice Cultivars

Dhiman Mukherjee and R. P. Singh

Department of Agronomy
Institute of Agricultural Sciences
Banaras Hindu University, Varanasi-221 005 (U. P.), India

Rice is the most important cereal crop throughout Indo Gangetic belt of India extensively grown during rainy (*kharif*) season. It has high yielding capacity but weed infestation is one of the major constraints in rice cultivation. The effective control of weeds at initial stages (20-40 DAT) can help in improving the productivity of this crop. Sulfonylurea herbicides have been introduced to widen weed control spectrum in rice crop. The rice varieties may have different response to these herbicides, particularly relative to their selectivity and phytotoxic effects. Therefore, an attempt has been made to find out phytotoxic effect of low doses herbicides on different rice cultivars.

Four pot culture experiments were conducted at Research Farm of Institute of Agricultural Sciences, Banaras Hindu University, Varanasi during two consecutive monsoon seasons (*kharif*) of 2001 and 2002 to study the possible phytotoxic effects of low doses herbicides on different rice cultivars. Four rice cultivars (Pant 12, Swarna, Sarju 52 and Malvia 36) were transplanted in pot (39 x 50 cm) on July 22 and 24 during 2001 and 2002, respectively. The herbicides taken were metsulfuron-methyl at 8 g, chlorimuron-ethyl at 20 g and almix at 25 g ha⁻¹. The pot culture experiments were laid out in randomized block design with three replications. Herbicidal treatments were applied at 8 DAT after mixing with water at the rate of 500 l ha⁻¹ with the help of hand sprayer. The moisture level at the time of herbicide application was maintained 5±2 cm with watering as and when necessary. Visual phytotoxicity of herbicides on different cultivars was recorded at 11 and 30 DAT using a visual scoring scale of 0 to 10, where, 0=no injury and 10=complete destruction (Rao, 2001). Observations on crop growth parameters of different rice cultivars were taken at 30 DAT for testing possible phytotoxic effects of herbicides on different rice cultivars.

All the cultivars were affected and showed herbicidal injury at initial stage (11 DAT) of crop growth (Table 1). Metsulfuron-methyl at 8 g ha⁻¹ on cultivar Pant 12 showed slight phytotoxic effect at initial stage (11 DAT), but crop recovered within a week. Whereas almix at 25 g ha⁻¹ had severe injury on Pant 12 and it persisted to some extent upto 30 DAT. Almix at 25 g ha⁻¹ showed severe phytotoxic effect at initial stage (11 DAT) on Swarna cultivar, but during course of time its phytotoxic effect was reduced and there were moderate symptoms of toxicity at 30 DAT. Metsulfuron-methyl at 8 g ha⁻¹ was moderately phytotoxic on Sarju 52 and showed discolouration of leaf at 11 DAT; however, at later stage of observation, plant showed slightly stunted growth and discolouration on leaves. Almix at 25 g ha⁻¹ showed moderate phytotoxicity at 11 DAT on cultivar Malvia 36 and persisted at 30 DAT.

Growth parameters of different rice cultivars were significantly influenced by various herbicidal treatments (Table 1). Metsulfuron-methyl at 8 g ha⁻¹ and almix at 25 g ha⁻¹ reduced all the growth parameters of cv. Pant 12. Chlorimuron-ethyl at 20 g ha⁻¹ had no phytotoxic effect on crop, and it was significantly superior to rest of treatments and was on par with control. Almix at 25 g ha⁻¹ had severe phytotoxic effect on Swarna cultivar, which led to significantly minimum plant growth parameters. Chlorimuron-ethyl at 20 g ha⁻¹ and almix at 25 g ha⁻¹ did not affect plant height and fresh weight of Sarju 52. However, metsulfuron-methyl at 8 g ha⁻¹ recorded significantly lower dry weight of plant in 2001 and chlorophyll content in both the years. Almix at 25 g ha⁻¹ showed severe phytotoxic effect on Malvia 36, which led to significantly lower plant height, fresh weight and dry weight of plant.

REFERENCE

- Rao, V. S. 2001. *Principles of Weed Science*. Oxford and JBH Pub. Co., New Delhi. pp. 450-451.

Table 1. Effect of different treatments on growth parameters along injury

Treatment	Plant height (cm)		Fresh weight (g plant ⁻¹)		Dry weight (g plant ⁻¹)		Chlorophyll content (SPAD)		Crop injury scoring			
	2001	2002	2001	2002	2001	2002	2001	2002				
									II DAT	30 DAT	II DAT	30 DAT
Pant 12												
Control	47.2	45.6	6.5	7.3	3.3	3.3	36.9	36.3	0	0	0	0
Metsulfuron-methyl	36.3	36.0	4.9	5.1	1.6	1.6	29.3	30.3	3	1	3	2
Chlorimuron-ethyl	46.6	44.6	6.3	7.0	2.9	3.2	35.9	36.1	1	0	1	0
Almix	33.3	32.7	4.8	5.1	1.2	1.5	26.3	26.0	7	6	7	6
LSD (P=0.05)	4.3	07.8	0.5	1.2	0.8	0.9	01.7	04.9				
Swarna												
Control	44.2	44.7	7.4	6.1	2.8	2.6	36.5	35.7	0	0	0	0
Metsulfuron-methyl	41.7	42.0	6.8	6.0	1.9	2.3	35.3	32.9	1	0	1	0
Chlorimuron-ethyl	40.7	41.3	5.9	5.5	1.7	2.1	35.4	35.0	3	1	3	1
Almix	38.6	37.6	5.8	5.4	1.7	2.1	24.2	25.7	4	2	4	2
LSD (P=0.05)	05.9	03.0	1.1	0.5	0.6	0.3	5.43	04.7				
Sarju 52												
Control	45.3	48.0	7.5	7.4	2.6	2.4	35.7	35.6	0	0	0	0
Metsulfuron-methyl	42.0	41.3	7.9	6.1	1.9	2.0	29.9	29.4	3	2	3	1
Chlorimuron-ethyl	44.3	44.0	7.0	6.7	2.3	2.7	28.6	29.5	1	0	2	0
Almix	44.7	44.7	7.3	6.6	2.4	2.3	30.5	30.8	1	0	1	0
LSD (P=0.05)	N.S	N.S	N.S	N.S	0.2	N.S	02.1	04.3				
Malvia 36												
Control	45.3	47.0	7.6	7.4	3.4	3.6	36.3	35.2	0	0	0	0
Metsulfuron-methyl	44.0	45.3	7.1	6.8	2.9	3.0	34.1	33.9	2	0	2	0
Chlorimuron-ethyl	45.3	47.0	7.5	7.5	3.2	3.4	34.3	34.1	1	0	1	0
Almix	41.0	34.0	6.5	6.0	2.4	2.1	33.1	34.1	3	2	3	3
LSD (P=0.05)	02.8	06.5	0.7	NS	0.4	0.9	NS	NS				

NS-Not Significant.