

Bio-efficacy of Glufosinate Ammonium for Weed Control in American Cotton

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American cotton (*Gossypium hirsutum* L.) is an important fiber crop of southern Punjab. This, being a long duration crop, is found infested with *Trianthema portulacastrum*, *Cyperus rotundus* and *Sorghum halepense*. Pre-emergence application of pendimethalin or pre-plant incorporation of trifluralin alone does not provide season long control of weeds, as weeds start appearing after first irrigation and cover the crop. Therefore, application of these herbicides is supplemented with one hand weeding/interculture or directed application of glyphosate or paraquat and is recommended for season long control of weeds in this crop. Carvalho *et al.* (1999) obtained effective weed control in cotton (*G. hirsutum*) with post-emergence application of glufosinate ammonium + diuron (0.3 kg+1.0 kg ha⁻¹). Application of glufosinate ammonium or glyphosate with one hand weeding provided effective weed control and yielded at par with weed-free situation (Nadanassababady *et al.*, 2000). Since it is always desirable to have a number of herbicides for weed control in a crop, glufosinate ammonium was evaluated for its efficacy in American cotton.

The field studies were conducted from 1997 to 2002 (except 1999) at Punjab Agricultural University, Ludhiana in the Department of Agronomy and Agrometeorology. The soil of the experimental field was loamy sand in texture, low in available N and medium in available P and K. The eight treatments were tested in a randomized block design with four replications (Table 1).

American cotton (cv. F- 846) was sown in the first fortnight of May during 1997 to 2001 and cv. F-1572 was sown in the second fortnight of April during 2002 by dibbling method using seed rate of 12.5 kg ha⁻¹. The crop was applied recommended

fertilizer (75 kg N and 30 kg P₂O₅ ha⁻¹). The recommended plant protection schedule was followed. Glufosinate ammonium or glyphosate was applied at 7 WAS as per treatments. The directed application of these herbicides was done using a protective hood to save the crop. In all, three pickings were made and the last picking was done in the first week of December every year.

T. portulacastrum, *C. rotundus*, *Digitaria ciliaris*, *Eleusine aegyptiacum* and *Acrachne racemosa* were the major weeds in the experimental field. Glufosinate ammonium at both the doses significantly reduced the dry weight of weeds where this herbicide was applied after either hand weeding or pre-emergence application of pendimethalin when compared with unweeded control and was at par with two hand weedings and recommended treatment of pre-emergence application of pendimethalin at 0.75 kg ha⁻¹ followed by glyphosate at 1.0 kg ha⁻¹ 7 WAS (Table 1). The killing action of glufosinate ammonium was very fast and it made a cover of killed weeds on soil surface which did not allow new weeds to emerge and provided season long control of weeds. The mixing of 3% urea with glyphosate did not increase its efficacy over its alone application. All weed control treatments yielded significantly higher than control and were at par with two hand weedings (Table 2). Application of glufosinate ammonium after pre-emergence application of pendimethalin 0.75 kg ha⁻¹ gave comparatively good control of weeds and higher seed cotton yield over its application after hand weeding (Tables 1 and 2). The weed control efficiency worked out for treatments involving glufosinate ammonium was comparable with recommended practice of application of pendimethalin supplemented with

Table 1. Effect of glufosinate ammonium on dry weight of weeds in cotton during 1997-2002

Treatment	Dry weight of weeds (q ha ⁻¹)					
	1997	1998	2000	2001	2002	Mean
Hand weeding fb glufosinate ammonium 0.75 kg ha ⁻¹	5.37	7.32	13.6	2.9	5.1	6.86
Hand weeding fb glufosinate ammonium 0.90 kg ha ⁻¹	5.75	6.64	13.4	2.3	4.8	6.58
Pendimethalin 0.75 kg ha ⁻¹ fb glufosinate ammonium 0.75 kg ha ⁻¹	4.00	3.85	14.5	2.3	2.3	5.39
Pendimethalin 0.75 kg ha ⁻¹ fb glufosinate ammonium 0.90 kg ha ⁻¹	4.75	2.84	7.1	1.5	3.1	3.86
Pendimethalin 0.75 kg ha ⁻¹ fb glyphosate 1.0 kg ha ⁻¹	6.25	3.24	6.6	2.1	2.6	4.16
Pendimethalin 0.75 kg ha ⁻¹ fb glyphosate 0.5 kg ha ⁻¹ +3% urea	-	-	20.6	3.7	4.2	9.50
2 HW	6.50	0.76	2.0	0.5	2.5	2.45
Weedy (Unweeded control)	57.50	24.76	80.8	26.3	19.7	41.81
LSD (P=0.05)	7.1	9.42	18.7	5.9	5.6	-

HW-Hand weeding, fb-followed by.

Table 2. Effect of glufosinate ammonium on seed cotton yield during 1997-2002

Treatment	Seed cotton yield (q ha ⁻¹)					
	1997	1998	2000	2001	2002	Mean
Hand weeding fb glufosinate ammonium 0.75 kg ha ⁻¹	7.53	5.26	10.01	6.40	10.42	7.92
Hand weeding fb glufosinate ammonium 0.90 kg ha ⁻¹	6.92	5.63	9.12	7.0	10.16	7.77
Pendimethalin 0.75 kg ha ⁻¹ fb glufosinate ammonium 0.75 kg ha ⁻¹	7.50	6.00	9.00	6.40	10.90	7.96
Pendimethalin 0.75 kg ha ⁻¹ fb glufosinate ammonium 0.90 kg ha ⁻¹	7.29	5.67	8.02	6.10	13.33	8.08
Pendimethalin 0.75 kg ha ⁻¹ fb glyphosate 1.0 kg ha ⁻¹	7.75	5.46	8.45	6.40	11.17	7.85
Pendimethalin 0.75 kg ha ⁻¹ fb glyphosate 0.5 kg ha ⁻¹ +3% urea	-	-	8.25	5.70	11.15	8.37
2 HW	7.09	4.61	8.49	6.10	10.33	7.32
Weedy (Unweeded control)	3.45	3.65	3.48	4.00	4.79	3.87
LSD (P=0.05)	1.0	NS	2.95	1.5	2.6	-

HW-Hand weeding, fb-followed by, NS-Not Significant.

glyphosate and was above 80% in all cases. Very good weed control including that of *T. portulacastrum* was obtained with glufosinate ammonium upto 0.6 kg ha⁻¹. Above this dose, it proved phytotoxic to the crop. The present study indicated that glufosinate ammonium could also be used as directed spray for weed control in American cotton as an alternate herbicide to glyphosate or paraquat.

REFERENCES

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