

Evaluation of Bio Efficacy on Glufosinate Ammonium 15% SL (Basta 15% SL) in Cotton Crop

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ABSTRACT

Basta 15 SL (glufosinate ammonium) @ 450 g.a.i /ha applied at 35-40 DAS recorded the least weed counts of individual species viz., *Echinochloa* sp., *Cynodon dactylon* and *Trianthema portulacastrum*, weed population, dry matter production and weed control index favoring to higher seed cotton yield of 1280.45 kg/ha). Basta 15 SL @ 375 g.a.i/ha and Basta 15 SL @ 300 g.a.i/ha, was next in order. Gramoxone 24SL (Paraquat dichloride 24% SL) @ 600 g.a.i/ha, was on par with hand weeding. No phytotoxicity was observed in the treatments including the recommended dose of Basta 15 SL (glufosinate ammonium) @ 450, 375 and 300 g.a.i/ha in respect of leaf chlorosis, tip burning, leaf necrosis, leaf epinasty, hyponasty, vein clearing, wilting and resetting.

Keywords: Cotton, Bio-efficacy, Phytotoxicity, Basta 15 SL, Gramoxone 24 SL

INTRODUCTION

Cotton (*Gossypium* sp.) is one of the most important fiber and cash crop of India and plays a dominant role in the industrial and agricultural economy of the country. It provides the basic raw material (cotton fiber) to cotton textile industry. Cotton is susceptible to weed competition from sowing to about 70 days when the canopy covers the inter-spaces. Cotton yields are reduced by 50-85% if weed growth is unchecked. Fluchloralin or pendimethalin @ 1 kg ai/ha. As pre-plant incorporation with one hand weeding and crosswise hoeing has been recommended for satisfactory weed control. Deep rooted perennial weeds are removed by summer ploughing [1].

Weeds compete in several ways with crop plants for space, nutrients, water, sunlight and many other basic requirements. These are the host and provide shelter for many insect/pests diseases. These can reduce average yield 33.26-50% or even result in complete crop failure [2]. Weeding by cultural practices is laborious, tedious, time consuming and expensive in contrast chemical weed control method is easy, time saving and effective [3]. The bio-efficacy of Basta 15 SL (Glufosinate Ammonium 15% SL) in cotton indicate that the weed control treatments exerted significant influence over the grassy weeds and broad leaved weed populations, their biomass and cotton kapas yield.

MATERIALS AND METHODS

Experiments were conducted farmers field at Usilampatti, Madurai district, Tamil Nadu, during 2017, the experimental

field located at 9°58'N Latitude 79°48'E longitude at an altitude +250 m above mean sea level. The soils of the experimental site red loamy soil with a pH of 7.8 and EC of 0.46 M.mhos/cm⁻¹, low in available nitrogen (210 kg ha⁻¹), medium in available phosphorus (17.96 kg ha⁻¹) and high in available potassium (320.8 kg ha⁻¹). Six different treatments (**Table 1**) compared and were laid out in randomized block design with four replications. The sowing of cotton MCU 5 variety was done at 60 × 45 cm spacing. All other agronomic practices were uniform and normal for all the treatments. The weed control, yield and yield component parameters investigated were number of weeds (m⁻²), fresh weed biomass (g m⁻²), dry weed biomass (g m⁻²), no. of bolls plant⁻¹, boll weight (g), final plant height (cm) and seed cotton yield (kg ha⁻¹). The recommended dose of 160 kg N, 50 kg P₂O₅ and 50 kg K₂O was applied along with farmyard manure (FYM) at 12.5 t ha⁻¹. The whole quantity of P₂O₅, FYM and half dose of nitrogen and potassium were applied at the time of field preparation. Remaining half dose of N and K₂O was applied at 30 and 45 DAS. The herbicides

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were sprayed 15, 30 and 45 DAS of post emergence by volume of 375 l/ha as per the treatments. using knapsack sprayer fitted with flood jet nozzle spray

Table 1. Effect of herbicide treatments on weed count/m² at 15, 35 and 45 DAS.

CD (P=0.05)	S.ED	Hand weeded check	Gramoxone 24 SL @ 600 g a.i./ha	Basta 15 SL @ 450 g a.i./ha	Basta 15 SL @ 375 g a.i./ha	Basta 15 SL @ 300 g a.i./ha	Unweeded control	Weed populations									Weed dry matter production (g)								
								<i>Echinochloa colonum</i>			<i>Trianthema Portulacastrum</i>			<i>Cyanodon dactylon</i>			<i>Echinochloa colonum</i>			<i>Trianthema Portulacastrum</i>			<i>Cyanodon dactylon</i>		
								15DAS	30DAS	45DAS	15DAS	30DAS	45DAS	15DAS	30DAS	45DAS	15DAS	35DAS	45DAS	15DAS	35DAS	45DAS	15DAS	35DAS	45DAS
0.83	0.41	(5) 2.34	(3) 1.87	(0) 0.70	(2) 1.58	(3) 1.87	(14) 3.08	(14) 3.08	(17) 4.18	(20) 4.52	(17) 4.18	(18) 4.30	(22) 4.74	(13) 3.67	(13) 3.67	(20) 4.52	6.70	11.30	15.78	8.15	12.37	16.37	5.30	7.71	12.04
0.26	0.13	(8) 2.91	(5) 2.34	(1) 1.22	(3) 1.87	(4) 2.12	(4) 2.12	(4) 2.12	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.21	0.11	(13) 3.67	(6) 2.54	(3) 1.87	(4) 2.12	(4) 2.12	(20) 4.52	(20) 4.52	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.32	0.15	(6) 2.73	(3) 1.87	(1) 1.22	(2) 1.58	(2) 1.87	(17) 4.18	(17) 4.18	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.23	0.12	(10) 3.24	(4) 2.12	(2) 1.58	(3) 1.87	(4) 2.12	(18) 4.30	(18) 4.30	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.19	0.08	(12) 3.53	(7) 2.73	(4) 2.12	(5) 2.34	(4) 2.12	(22) 4.74	(22) 4.74	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.49	0.23	(7) 2.73	(1) 1.22	(0) 0.70	(1) 1.22	(1) 1.22	(13) 3.67	(13) 3.67	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.25	0.13	(13) 3.67	(3) 1.87	(1) 1.22	(2) 1.58	(2) 1.87	(13) 3.67	(13) 3.67	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.21	0.10	(13) 3.67	(5) 2.34	(2) 1.58	(3) 1.87	(4) 2.12	(20) 4.52	(20) 4.52	(7) 2.73	(7) 2.73	(3) 1.87	(5) 2.34	(8) 2.91	(2) 1.58	(3) 1.87	(7) 2.73	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.61	0.29	3.13	1.20	0	0.81	0	6.70	6.70	8.15	12.37	16.37	5.30	7.71	12.04	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
1.08	0.54	8.07	6.15	1.68	2.76	1.68	11.30	11.30	15.78	8.15	12.37	16.37	5.30	7.71	12.04	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
3.97	1.41	9.21	9.21	1.79	6.18	1.79	15.78	15.78	8.15	12.37	16.37	5.30	7.71	12.04	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.25	0.14	4.25	1.50	1.02	1.30	1.02	8.15	8.15	12.37	16.37	5.30	7.71	12.04	6.21	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
1.14	0.57	8.43	4.31	1.31	3.17	1.31	12.37	12.37	16.37	5.30	7.71	12.04	6.21	6.21	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
3.19	1.53	11.80	7.16	2.71	6.29	2.71	16.37	16.37	5.30	7.71	12.04	6.21	6.21	6.21	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.41	0.20	2.20	1.25	0	0.71	0	5.30	5.30	7.71	12.04	6.21	6.21	6.21	6.21	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
0.83	0.41	5.31	2.51	1.10	1.93	1.10	7.71	7.71	12.04	6.21	6.21	6.21	6.21	6.21	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21
1.30	0.65	8.21	3.70	1.79	3.09	1.79	12.04	12.04	6.21	6.21	6.21	6.21	6.21	6.21	6.21	6.21	2.12	4.71	7.71	3.10	4.31	6.51	1.50	2.15	6.21

Figures in parenthesis are original values before square root transformation $\sqrt{(X+0.5)}$

RESULTS AND DISCUSSION

The results of the field experiment on evaluation of the bio-efficacy of Basta 15 SL (Glufosinate Ammonium 15% SL) in cotton. Indicate that the weed control treatments exerted significant influence over the grassy weeds and broad leaved weed populations, their biomass and cotton kapas yield.

Effect on weeds

The bio-efficacy of Basta 15 SL (Glufosinate Ammonium 15% SL) in cotton indicate that the weed control treatments exerted significant influence over the grassy weeds and broad leaved weed populations, their biomass and cotton kapas yield. The predominant grassy and broad leaves weeds were observed *Echinochloa* sp., *C. dactylon* and *T. portulacastrum*.

Among the herbicides compared application of Basta 15 SL @ 450 g a.i./ha had performed superior with the least weed population of 0.70, 1.58 and 2.12 m² of *E. colonum* 1.22, 1.87 and 2.34 m² of *T. portulacastrum* and 0.70, 1.58 and

2.12 m² of *C. dactylon* at 15, 30 and 45 DAA, respectively. Basta 15 SL @ 375 g a.i./ha and Basta 15 SL @ 300 g a.i./ha came next in order. All the three doses of basta 15 SL were superior to Gramoxone 24 SL which was on par with hand weeding twice. These results are supported by Ali et al. [2]; Untreated control recorded the highest weed population.

Significant difference was observed among the treatments in influencing the weed dry matter. The least weed dry matter was recorded in Basta 15SL @ 450 g a.i./ha which was significantly superior than the rest of the treatments due to lesser weed counts of individual weed species. Basta 15 SL @ 375 g a.i./ha and Basta 15 SL @ 300 g a.i./ha were next in order. Gramoxone 24SL @ 600 g a.i./ha was on par with hand weeding. These results are in line with those of Chaudhary et al. [4] and Johnson et al. [5]. Unweeded control recorded the highest weed dry matter production due to no weed control options (**Table 2**).

Table 2. Effect of herbicide treatments weed control index/m² at 15, 35 and 45DAS and kapas yield kg/ha.

Treatment	<i>Echinochloa colonum</i>			<i>Trianthema portulacastrum</i>			<i>Cyanodon dactylon</i>			Kapas Yield (Kg/ha)
	15DAS	35DAS	45DAS	15DAS	35DAS	45DAS	15DAS	35DAS	45DAS	
Unweeded control	-	-	-	-	-	-	-	-	-	50.91
Basta 15 SL @ 300 g a.i./ha	(68.35)	(58.31)	(51.14)	(61.96)	(65.15)	(60.23)	(71.69)	(72.91)	(48.42)	801.51
	61.37	50.31	48.15	49.70	52.75	54.29	62.15	64.35	38.17	
Basta 15 SL @ 375 g a.i./ha	(87.91)	(75.57)	(60.83)	(84.04)	(74.37)	(61.57)	(86.60)	(74.96)	(74.33)	1033.17
	79.15	64.74	49.80	71.31	61.39	53.31	71.75	59.75	61.45	
Basta 15 SL @ 450 g a.i./ha	(100.00)	(85.13)	(88.65)	(87.48)69.70	(89.40)	(83.44)	(100.00)	(85.73)	(85.13)	1230.45
	90.60	68.21	71.31		73.15	74.20	90.00	68.71	69.30	
Gramoxone 24 SL @ 600 g a.i./ha	(82.08)	(45.57)	(41.63)	(81.59)	(65.15)	(56.26)	(76.41)	(67.44)	(69.26)	879.15
	71.02	40.37	36.91	71.72	54.30	49.43	66.75	58.73	59.37	
Hand weeded check	(53.28)	(28.58)	(41.64)	(47.85)	(31.85)	(27.91)	(58.49)	(31.25)	(31.81)	613.19
	47.37	25.21	39.52	41.70	27.62	23.82	45.20	26.29	28.21	
S.ED	5.16	1.70	8.75	0.80	5.85	6.42	9.30	4.47	3.91	103.35
CD (P=0.05)	10.32	3.40	17.51	1.60	11.75	12.85	18.71	8.95	7.83	211.69

Figures in parenthesis are original values before angular transformation

Effect on crop

The highest kapas yield of 1280.45 KG/ha was observed in Basta15SL @ 450 g a.i./ha. This could be due to better weed control options at correct stages. Basta 15 SL @ 375 g a.i./ha and Basta15 SL @ 300 g a.i./ha came next in order with yield of 1230.45, 1033.17 and 801.51 kg/ha. Gramoxone 24 SL @ 600 g a.i./ha it was on par with hand weeding. These three treatments were significantly superior to the untreated control that recorded the least seed cotton yield of 50.91 kg/ha. It was occurred due to better growth of cotton plants as a result of minimum competition with weeds for moisture, nutrients, space etc., which attributed to yield of cotton. These results are in line with those of Ali et al. [2], Chaudhary et al. [4], Johnson et al. [5] and Holloway et al. [6].

The higher seed cotton yields in herbicide treatments could be attributed to efficient control of weeds throughout the critical periods of crop growth. These results are in conforming to those of controls annual grasses and broadleaf weeds, seedling Johnson grass; large-seeded broadleaf weeds by Marshall [7].

The better performance of Basta 15 SL @ 450 g a.i./ha offered significantly higher is attributed to efficient and safe weed control over the weeds in cotton compared to other treatments, with an ultimate increase in seed cotton yield, that was significantly the highest, without causing any phytotoxic injury at the tested dosages.

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