

Performance of Different Herbicides in Controlling *Borreria laevis* and Other Weeds in Sugarcane Field

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ABSTRACT

A field experiment was conducted during 2001-02 at Sreepur, Gazipur to find out the herbicide with optimum dose for effective control of *Borreria laevis* weed and other weeds in sugarcane field. The herbicides namely Authority 480 SC, Krismat 75 WG and Glycel 41% SL were used for controlling *Borreria laevis* weed. Each herbicide was used in different doses. Among different doses of herbicides Glycel 41% SL and hand weeding (3 times) controlled *B. laevis* and other weeds above 80% at 25 days after herbicides application. On the other hand, after 40 days of first herbicides application Glycel 41% SL (@ 4.00 L ha⁻¹ and @ 5.00 L ha⁻¹), Krismat 70 WG @ 2.00 kg ha⁻¹, Authority 480 SC @ 1042 ml ha⁻¹ and only hand weeding were controlled *B. laevis* and other weeds above 80%. The herbicides Glycel 41% SL (@ 4 L ha⁻¹ and @ 5 L ha⁻¹), Authority 480 SC @ 1042 ml ha⁻¹ and Krismat 70 WG @ 2.00 kg ha⁻¹ may be recommended for controlling *B. laevis* and other weeds emerged in sugarcane field.

Key words: *Saccharum officinarum*, herbicides, *Borreria laevis*, cane yield

INTRODUCTION

Sugarcane (*Saccharum officinarum*) is an important sugar crop in world wide. It is grown as cash crop in Bangladesh. It is a long duration crop which faces competition with all types of weed flora throughout the year. Use of herbicides holds promise for effective and economic management of weeds in sugarcane as separated by earlier research workers (Kumer and Srivastava, 1994; Shankraih *et al.*, 1995). Chauhan *et al.* (1990) reported that uncontrolled growth of weeds reduced sugarcane yield by 42% in comparison to manual weeding (three hoeings). Mani (1968) listed a number of limitations with widely adopted mechanical method for controlling of sugarcane weed, whereas chemical methods have not been found as effective as mechanical method (Srivastava, 1981; Aggarwal *et al.*, 1986). Yield reduction due to weeds in spring planted sugarcane has been reported to the extent of 10-70% (Lall, 1977). Similarly, Chauhan and Singh (1993) carried out an experiment at Indian Institute of Sugarcane Research, Lucknow and they reported that sugarcane yield reduced by 38% due to weed competition. Also Verma *et al.* (1983) reported that uncontrolled growth of weeds in sugarcane field may cause yield loss upto 40%. Oworu (1981) found that Simazine (2-chloro-4-6bi (ethylamine)-s-triazine) 80WP applied pre-emergence of weeds at 6.0 kg a.i. ha⁻¹ gave the best weed control and increased sugarcane tonnage in both plant and ratoon crops. The same author (1988) working on weed control of sugarcane with various herbicides combinations found that pendimethaline + atrazine applied at the rate 3.5 + 6.0 Kg a.i. ha⁻¹ gave the best weed

control and increased tonnage at the Bacita Sugar Estate. Hand weeding is still an important feature of weed control in small sugarcane holding in our country although large area under plantation system are being needed to control weed with herbicides. This experiment was undertaken to find out the efficacy and effective dose of different herbicides and to recommend the suitable herbicide which is more effective and economic for controlling weeds.

MATERIALS AND METHODS

The experiment was comprised of eight treatments namely, T_1 = Authority 480 SC @ 833 ml ha⁻¹, T_2 = Authority 480 SC @ 1042 ml ha⁻¹, T_3 = Krismat 75WG @ 1.00 kg ha⁻¹, T_4 = Krismat 75WG @ 2.00 kg ha⁻¹, T_5 = Glycel 41% SL @ 4.00 L ha⁻¹, T_6 = Glycel 41% SL @ 5.00 L ha⁻¹, T_7 = Hand weeding (3 times) and T_8 = Control (No chem. no weeding). It was designed with RCB and each treatment was replicated four times. The experiment was conducted in farmers' field of Sreepur, Gazipur during 2001-02 planting season. The unit plot size was 8m x 6m. Three herbicides namely Authority 480 SC, Krismat 75 WG and Glycel 41% SL were applied in two different doses. Sugarcane was transplanted in trenches in January 3, 2002. The weed *Borreria laevis* is emerged as soon as monsoon starts and the herbicides was applied after monsoon i.e. on April 15, 2002. Herbicides were applied by using a protector in the Spray machine at the delivery area over the nozzle. The target weed and other weeds were counted before application of herbicides. Data on fresh and dry biomasses of collected weeds were taken at 25 and 40 days after herbicide application. Hand weeding was done thrice at 30 days intervals up to June 2002. All the herbicides were applied as post emergence.

RESULTS AND DISCUSSION

The results presented in Table 2 showed the performance of different herbicides in controlling weeds of sugarcane particularly *Borreria laevis* in field. Among the tested herbicides Glycel 41 % SL @ 4.00 L ha⁻¹ and 5.00 L ha⁻¹ showed 80.59% and 82.13% efficacy in controlling *B. laevis* respectively when applied 25 days after first appearance of monsoon. At the same time hand weeding (3 times) also showed 83.08% efficacy in controlling the target weed. Glycel 41 % SL (@ 4.00 L ha⁻¹ and @5.00 L ha⁻¹) and hand weeding controlled other weeds showing 80.36- 83.77% efficacy. The herbicides both Authority and Krismat at two doses controlled other weeds but the efficacy was below 80% which is not accepted. It was observed that dormant seeds of *B. laevis* emerged after a month of first herbicide application. Hence, second application was needed and the herbicides were applied at 40 days after first application. It was found that all the treatments except Authority 480 SC @ 833 ml ha⁻¹ and Krismat 75WG @ 1.00 kg ha⁻¹ showed higher efficacy ranging from 83.40- 87.34%, while only hand weeding showed as high as 93.39% efficacy in controlling *B. laevis*. Similar trend was observed in case of controlling other weeds in sugarcane field.

Data on growth and yield parameters were presented in Table 3. Hand weeding produced the highest number of tillers (230.71X 10⁻³ha⁻¹) and it was statistically different

from other treatments. But in respect of millable cane production the herbicide Krismat 75WG @ 2.00 kg ha⁻¹ produced the highest number of millable cane (67.97X 10⁻³ha⁻¹) which was followed by Glycel 41 % SL @ 5.00 Lha⁻¹. On the other hand the treatment Krismat 75WG @ 1.00 kg ha⁻¹ produced the lowest number of millable cane (59.82X10⁻³ha⁻¹). All the treatments showed better result over control. In case of cane yield hand weeded plots produced higher cane yield (133.07 TCH) and it was statistically different from Authority 480 SC @ 1042 ml ha⁻¹. Krismat 75WG @ 2.00 kg ha⁻¹ Glycel 41% SL @ 4.00 L ha⁻¹ and Glycel 41% SL @ 5.00 L ha⁻¹. Meanwhile Authority 480 SC @ 833ml ha⁻¹ treated plots gave lowest cane yield (104.71 TCH) followed by Krismat 75WG @ 1.00 kg ha⁻¹ (105.89 TCH). Though the canes of Authority 480 SC @ 1042 ml ha⁻¹ treated plots showed highest brix % (20.0) but there were no significant differences among the treatments regarding brix %.

Economic analysis of different treatments were calculated and presented in Table 4. The highest BCR (4.27) was found in Glycel 41% SL 4.00 L ha⁻¹ followed by Glycel 41% SL 5.00 L ha⁻¹ where the lowest one was found in control plot (1.67). The BCR value of hand weeding was lower (2.69) than other herbicides. Effect of hand weeding in controlling the target weed and other weeds of sugarcane was satisfactory. But considering the BCR value Glycel 41% SL 4.00 L ha⁻¹ was the best for controlling *B. laevis* and other weeds of sugarcane field.

Therefore, considering the growth, yield parameters and BCR, three herbicides namely- Glycel 41% SL (@ 4 L ha⁻¹ and @ 5 L ha⁻¹), Authority 480 SC @ 1042 ml ha⁻¹ and Krismat 70 WG @ 2.00 kg ha⁻¹ may be recommended for controlling *B. laevis* and other weeds emerged in sugarcane field. However, Glycel 41% SL @ 4 L ha⁻¹ or Glycel 41% SL @ 5 L ha⁻¹ may be recommended for application in the sugarcane field with protector. Because if come in contact Glycel 41% SL at any doses may burn sugarcane plants or leaves.

Table 1: Status of *B. laevis* and other weeds before applying herbicides during cropping season 2001-02

Treatments	Weed /m ² (no)		Dry mater (gram)	
	<i>B. laevis</i>	Other weeds	<i>B. laevis</i>	Other weeds
T ₁ = Authority 480 SC @ 833 ml ha ⁻¹	70.75	166.25	48.67	52.14
T ₂ = Authority 480 SC @ 1042 ml ha ⁻¹	75.50	173.50	37.42	68.10
T ₃ = Krismat 75WG @ 1.00 kg ha ⁻¹	68.25	169.00	52.05	56.16
T ₄ = Krismat 75WG @ 2.00 kg ha ⁻¹	64.75	127.75	41.26	58.14
T ₅ = Glycel 41% SL @ 4.00 L ha ⁻¹	72.00	167.00	42.10	38.73
T ₆ = Glycel 41% SL @ 5.00 L ha ⁻¹	71.50	152.00	39.18	49.24
T ₇ = Hand weeding (3 times)	76.00	170.50	37.84	52.12
T ₈ = Control (No chem.. no weeding)	75.50	131.00	34.52	48.75

Table 2: Performance of different herbicides in controlling *B. laevis* and other weeds in sugarcane field 2001-02

Weed mass after herbicide application at 25 days after starting mosoon (First application)							Weed mass after herbicide application at 40 days after first application (Second application)					
Treat	Weed /m ² (no)		Dry matter (gr)		Weed control efficiency		Weed /m ² (no)		Dry matter (gr)		Weed control efficiency	
ment	<i>B. laevis</i>	Other weeds	<i>B. laevis</i>	Other weeds	<i>B. laevis</i>	Other weeds	<i>B. laevis</i>	Other weeds	<i>B. laevis</i>	Other weeds	<i>B. laevis</i>	Other weeds
T ₁	52.75bc	41.25c	21.64b	17.62bc	66.38	67.72	57.25bc	50.75bcd	15.58b	12.93b	73.95	74.94
T ₂	51.00bc	50.75bc	16.51c	15.42c	74.35	71.75	54.00c	61.50bc	09.82c	09.10c	83.58	82.36
T ₃	52.75bc	58.25bc	23.94b	18.53b	62.80	66.06	48.25c	40.75d	14.09b	12.72b	76.44	75.34
T ₄	50.00bc	59.00b	19.28c	17.21bc	70.04	68.47	47.50c	47.75cd	09.93c	8.44c	83.40	83.60
T ₅	47.50bc	46.25bc	12.49d	10.72d	80.59	80.36	53.25c	46.50d	09.73cd	8.40cd	83.73	83.72
T ₆	43.75c	51.75bc	11.50d	10.36d	82.13	81.02	67.00b	53.50bcd	07.57d	06.48d	87.34	87.44
T ₇	59.00b	62.75b	10.89d	8.86d	83.08	83.77	59.50bc	63.75b	03.95e	04.34e	93.39	91.58
T ₈	156.25a	136.00a	64.37a	54.60a	-	-	128.50a	137.50a	59.82a	51.60a	-	-
LSD At 5%	13.19	17.75	2.83	2.94	-	-	12.09	14.33	2.24	1.92	-	-
CV %	13.98	19.08	7.75	9.61	-	-	12.77	15.53	9.34	9.19	-	-

T₁=Authority 480 SC @ 833 ml ha⁻¹T₃=Krismat 75WG @ 1.00 kg ha⁻¹T₅=Glycel 41% SL @ 4.00 L ha⁻¹T₇=Hand weeding (3 times)WCE= $\frac{\text{DMC}-\text{DMT}}{\text{DMC}} \times 100$

WCE= Weed Control Efficiency

DMC= Dry Matter of Control plot

DMT= Dry Matter of Treated plot

T₂=Authority 480 SC @ 1042 ml ha⁻¹T₄=Krismat 75WG @ 2.00 kg ha⁻¹T₆=Glycel 41% SL @ 5.00 L ha⁻¹T₈=Control (No chem. no weeding)

Table 3: Effects of herbicides application on growth and yield parameters of sugarcane in controlling of *B. laevis* in cropping season 2001-02

Treatments	Tiller ($\times 10^{-3} \text{ ha}^{-1}$)	Millable cane ($\times 10^{-3} \text{ ha}^{-1}$)	Yield (TCH)	Brix (%)
T ₁ =Authority 480 SC @ 833 ml ha ⁻¹	202.08 b	65.11 a	104.71 c	19.79
T ₂ =Authority 480 SC @ 1042 ml ha ⁻¹	197.43 b	66.72 a	117.41 b	20.00
T ₃ =Krismat 75WG @ 1.00 kg ha ⁻¹	197.08 b	59.82 b	105.89 c	19.67
T ₄ =Krismat 75WG @ 2.00 kg ha ⁻¹	205.11 b	67.97 a	118.95 b	19.86
T ₅ =Glycel 41% SL @ 4.00 L ha ⁻¹	197.68 b	66.42 a	120.24 b	19.96
T ₆ =Glycel 41% SL @ 5.00 L ha ⁻¹	198.03 b	66.90 a	124.07 b	19.80
T ₇ =Hand weeding (3 times)	230.71 a	66.54 a	133.07 a	19.88
T ₈ =Control (No chem.. no weeding)	169.28 c	43.33 c	44.46 d	19.80
LSD at 5%	13.71	3.82	8.59	0.51
CV%	4.70	4.10	5.40	1.8

Table 4: Economic analysis of different treatments for controlling *B. laevis*

Treatments	Total production cost (Tk ha ⁻¹)	Gross income (Tk ha ⁻¹)	BCR
T ₁ =Authority 480 SC @ 833 ml ha ⁻¹	31435	116751	3.71
T ₂ =Authority 480 SC @ 1042 ml ha ⁻¹	31529	130912	4.15
T ₃ =Krismat 75WG @ 1.00 kg ha ⁻¹	31880	118067	3.70
T ₄ =Krismat 75WG @ 2.00 kg ha ⁻¹	32280	132629	4.10
T ₅ =Glycel 41% SL @ 4.00 L ha ⁻¹	31360	134067	4.27
T ₆ =Glycel 41% SL @ 5.00 L ha ⁻¹	32560	138338	4.24
T ₇ =Hand weeding (3 times)	55000	148373	2.69
T ₈ =Control (No chem.. no weeding)	30010	49572	1.67

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