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Original Research Article

Herbicides Effective Tool for Weed Management in Sugarcane

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A B S T R A C T

An experiment was conducted at Regional Sugarcane Research Station (R.S.R.S.), Basmathnagar, Dist. Hingoli, Maharashtra, India during the cropping season of 2013-14 in RBD design with three replications to study the effect of different herbicides on weed control and yield of seasonal sugarcane. The soil of the experimental field was clay loam to clay in texture, low in organic carbon as well as available nitrogen and phosphorus, but moderate in potash status. A promising variety of sugarcane 'Co-VSI 9805' was planted on dated 17th February, 2013 at 120 cm row spacing on leveled soil by opening ridges and furrows. The gross and net plot size were 7.2 x 6 x 1.2 m and 5 x 4 x 1.2 m, respectively. The total rainfall received during the crop season was 1154 mm in 49 rainy days. All the recommended agronomic practices were followed throughout the cropping period. The weed flora of experimental site during *kharif* season was divided with 60 per cent broad leaf weeds and 40 per cent grassy weeds. Among broad leaf weeds Viz., *Euphorbia geniculata, Parthenium hysteorphorus, Digera arvensis, Merremia emerginata, Alternanthera sessilis, Lactuca runcinata, Portulaca oleracea, Chenopodium album* were found as dominant. While, among grassy weeds Viz., *Cynodon dactylon, Brachiaria eruciformis, Cyperus rotundus* were found as dominant. The economics of the experiment was worked out on the basis of cost of cultivation and cane yield at prevailing market prices of each treatment. The results indicated that significantly highest cane and sugar yield were recorded with the treatment of Metribuzine 70% WP @1Kg a.i. ha^{-1} (PoE) + 2,4-D Sodium Salt 80% WP Tank Mixed [T_5] which was found at par with the treatment of Ametryne 80% WDG @ 2.5 Kg a.i.ha^{-1} (PoE) [T_1], as compared to rest of the treatments. Similar trend was noticed in case of single cane weight, GMR, NMR and B: C ratio. Highest weed control efficiency was also observed under these treatments.

Keywords

Cane and sugar yield, Herbicides, Economics, Seasonal sugarcane, Weed control

Introduction

Sugarcane (*Saccharum* spp. hybrid complex), a remunerative cash crop, occupies important position in Indian agriculture. Sugar industry, located in rural areas in India is the second largest agro-based industry after textiles. Maharashtra is one of the leading States in sugar and sugarcane production in India. Seasonal sugarcane occupies majority of the area in State. Highest cane yield by farmers for seasonal sugarcane is 217 t ha^{-1}, however, the average yield of State is about 85 t ha^{-1}. Thus, there is a wide gap between the average yields and potential yield. These production potential can be achieved by adopting better management practices of crop production (Anonymous, 2000). Reduction in cane yield due to weeds occurs

up to 40-67 per cent (Chauhan and Srivastava, 2002). Sugarcane being a highly fertilized crop requires frequent irrigations, so weeds grow vigorously and compete with the crop at tillering stage. Weeds in sugarcane need to be controlled at formative stage. Weed control in sugarcane can be achieved by mechanical, chemical, chemical + mechanical methods and trash mulching (Singh *et al.,* 1996). Manual hoeing and weeding are costly and labour intensive. Chemical method of weed management certainly has its merits over the existing methods. Economical weed management in sugarcane is essential for sustainable cane yield. Keeping these points in view, an experiment was thus carried out to study the influence of different herbicides on weed control and yield of seasonal sugarcane.

Materials and Methods

A field experiment was conducted at Regional Sugarcane Research Station (R.S.R.S.), Basmathnagar, Dist. Hingoli, Maharashtra, India during the cropping season of 2013-14 in RBD design with three replications to study the effectof different herbicides on weed control and yield of seasonal sugarcane. The soil of the experimental field was clay loam to clay in texture, low in organic carbon as well as available nitrogen and phosphorus, but moderate in potash status. A promising variety of sugarcane 'Co-VSI 9805' was planted on dated 17th February, 2013 at 120 cm row spacing on leveled soil by opening ridges and furrows. The gross and net plot size were 7.2 x 6 x 1.2 m and 5 x 4 x 1.2 m, respectively. The total rainfall received during the crop season was 1154 mm in 49 rainy days. All the recommended agronomic practices were followed throughout the cropping period. The weed flora of experimental site during *kharif* season was divided with 60 per cent broad leaf weeds and 40 per cent grassy weeds. Among broad leaf weeds Viz., *Euphorbia geniculata, Parthenium hysteorphorus, Digera arvensis, Merremia emerginata, Alternanthera sessilis, Lactuca runcinata, Portulaca oleracea, Chenopodium album* were found as dominant. While, among grassy weeds Viz., *Cynodondactylon, Brachiaria eruciformis, Cyperus rotundus* were found as dominant. The economics of the experiment was worked out on the basis of cost of cultivation and cane yield at prevailing market prices of each treatment.

Results and Discussion

The weed count, dry weed weight, weed control efficiency, yield contributing characters, cane yield and economics as influenced by different treatments are discussed herewith (Table 1 and 2). Perusal of the data (Table 1) revealed that significantly lowest weed count of grassy weed was recorded in T_6 treatment *i.e.* hand weeding which was found at par with T_5treatment *i.e.* Metribuzine 70% WP @ 1 kg a.i.ha^{-1} (PoE) + 2, 4-D Sodium Salt 80% WP Tank Mixed and T_1 treatment *i.e.* Ametryne 80% WDG @ 2.5 kg a.i.ha^{-1} (PoE), as compared to others. While, in case of broad leaf weed, T_5 treatment was comparable with T_1 and recorded significantly lowest values of them than rest of the treatments. Similarly, significantly lowest dry weed weight of grassy and broad leaf weeds were recorded in treatment T_5 which was on par with T_1 and both of them found superior over others. The decrease in dry weight of weeds may be because of use of these herbicides in the early stages of crop growth that reflected in low density of weeds under these treatments. On the other hand, weed control efficiency, as an index to reduction in weed dry matter at different growth stages, was highest under treatment T_5followed by T_1. It might have happened

due to improved crop growth under better physical condition of soil created by reduced weed competition, better aeration and root growth. Singh *et al.*, (2008) reported weed control efficiency from 56 to 69.9 % from ten different weed control strategies in sugarcane crop. Similarly, with regards to yield attributes Viz., CCS yield and single cane weight and cane yield (Table 1 and 2), treatment T_5wason par with T_1 and recorded significantly higher values of them, as compared to rest of the treatments. Except that, effect of different treatments on CCS per cent and NMC was not found to be significant. Thus, higher cane yield under treatment $T_5$and T_1 attributed to higher number of millable canes with more weight. Profuse tiller production and low shoot mortality might have helped in realizing higher number of millable canes by virtue of reduced competition of weeds for nutrient, moisture and light. Likewise, treatment T_5 which being on par with T_1 also recorded significantly higher values of GMR, NMR and B: C ratio. This might be due to less cost incurred on herbicide application under these treatments, as compared to other weed control means and the significant differences in cane yield observed there in. These results are consistent with findings of Chauhan and Srivastava (2002) and Srivastava and Chauhan (2006).

Post-emergence application of either Metribuzine 70 per cent WP @ 1kg a.i. ha^{-1} along with 2, 4-D Sodium Salt 80 per cent WP Tank Mixed or Ametryne 80 per cent WDG @ 2.5 kg a.i. ha^{-1}found to be superior in controlling weeds and improving yield attributes, yield and economic returns of seasonal sugarcane in the vertisols of Marathwada region of Maharashtra State (India).

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Table.1 Cane yield, weed count, dry weed weight and weed control efficiency as influenced by different treatments

Treatments	**Cane yield (t ha^{-1})**	**Weed count at 60 DAP**		**Dry weed weight at 60 DAP (gm m^{-2})**		**Weed control efficiency at 60 DAP (%)**	
		Grassy	**BL**	**Grassy**	**BL**	**Grassy**	**BL**
T_1- Ametryne 80 % WDG @ 2.5 kg a.i. ha^{-1} (PoE)	143.60	6.73	6.88	7.40	11.19	78	74
T_2- 2, 4-D Dimethyl Amine Salt 58% SL (PoE)	105.67	20.56	7.18	21.60	8.71	55	77
T_3- Atrazine 50% WP@ 1kg a.i. ha^{-1} (PE)	95.64	18.33	18.28	16.24	22.64	54	67
T_4- Metribuzine 70% WP @1kg a.i. ha^{-1} (PoE)	127.30	13.14	15.39	15.50	20.22	60	71
T_5- Metribuzine 70% WP @ 1kg a.i. ha^{-1} (PoE) + 2, 4-D Sodium Salt 80 % WP Tank Mixed	155.35	6.18	5.6	7.15	6.10	79	81
T_6 -Hand Weeding	119.00	6.11	8.5	8.90	11.94	75	70
T_7- Control	88.68	27.94	31.03	32.23	38.10	--	--
SEm+	4.98	0.44	0.51	0.59	0.40	----	----
CD (P=0.05)	15.36	1.36	1.56	1.69	1.19	----	----
CV %	7.23	5.42	6.63	6.36	4.07	----	----

Table.2 CCS yield, CCS per cent, NMC, Single cane wt., GMR, NMR and B: C ratio as influenced by different treatments

Treatments	**CCS yield (t ha^{-1})**	**CCS (%)**	**NMC (000 h^{a-1})**	**Single cane wt. (kg plant^{-1})**	**Gross Monetory Returns (Rs.ha^{-1})**	**Net Monetory Returns (Rs.ha^{-1})**	**B:C ratio**
T_1- Ametryne 80 % WDG@ 2.5 kg a.i. ha^{-1} (PoE)	18.51	12.55	69.18	1.93	258600	147857	2.34
T_2- 2, 4-D Dimethyl Amine Salt 58% SL (PoE)	13.90	12.87	68.33	1.62	190200	87317	1.85
T_3- Atrazine 50% WP@ 1kg a.i. ha^{-1} (PE)	11.14	12.39	66.82	1.73	172200	74490	1.70
T_4- Metribuzine 70% WP @1kg a.i.ha^{-1} (PoE)	15.43	12.61	70.10	1.84	229194	121873	2.13
T_5- Metribuzine 70% WP @ 1kg a.i. ha^{-1} (PoE) + 2, 4-D Sodium Salt 80 % WP Tank Mixed	19.50	12.82	71.34	2.00	279600	166467	2.47
T_6-Hand Weeding	11.46	12.81	69.25	1.52	214200	99765	1.87
T_7- Control	10.23	12.21	68.36	1.45	159600	61151	1.62
SEm±	0.74	0.17	1.69	0.05	8970.91	9297.7	0.08
CD (P=0.05)	2.20	NS	NS	0.16	27641.85	28648.49	0.26
CV %	9.78	2.32	4.23	5.59	7.23	14.85	7.22

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