International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
IJCS 2019; 7(5): 2555-2557
© 2019 IJCS
Received: 16-07-2019
Accepted: 18-08-2019

KC Ombase
Central Sugarcane Research Station, Padegaon, Tal. Phaltan, Satara, Maharashtra, India

PM Chaudhari
Central Sugarcane Research Station, Padegaon, Tal. Phaltan, Satara, Maharashtra, India

SK Ghodke
Central Sugarcane Research Station, Padegaon, Tal. Phaltan, Satara, Maharashtra, India

RM Dixit
Central Sugarcane Research Station, Padegaon, Tal. Phaltan, Satara, Maharashtra, India

Corresponding Author:
KC Ombase
Central Sugarcane Research Station, Padegaon, Tal. Phaltan, Satara, Maharashtra, India

Effect of weed management practices on weed dynamics, growth, yield and economics spring sugarcane (*Saccharum officinarum* L.)

KC Ombase, PM Chaudhari, SK Ghodke and RM Dixit

Abstract
A field experiment was conducted to assess the performance of different weed management practices in spring sugarcane var. Co 86032 during year 2008-09 to 2010-11 at Central Sugarcane Research Station, Padegaon. In spring planted sugarcane application of Metribuzine @1 kg a.i. ha^{-1} as PE +2, 4-D @ 1 kg a.i. ha^{-1} spray at 60 DAP + hoeing at 90 DAP found superior for control of weed in sugarcane with the highest weed control efficiency (80.80) at 120 DAP and also recorded significantly highest cane and CCS yield (115.52 and 17.33 t ha^{-1} respectively), Net profit (₹ 54628 ha^{-1}) and benefit cost ratio (1.72). Application of Atrazine @ 2 kg a.i. ha^{-1} as PE +2, 4-D @ 1kg a.i. ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP was found the next best treatment for weed control in sugarcane.

Keywords: Sugarcane, metribuzine, integrated weed management

Introduction
Adoption of improved technology based on seed nutrient and plant protection has enable the attainment of self sufficiency of food in India. However, there is a fear that it may short-lived, as a gap between food demand and supply is increasing due to high population growth rate. In this situation the urgency lies in increasing agricultural productivity with technologies that lead to remunerative, sustainable and eco-friendly agricultural system.

Sugarcane is the most important cash crop of Maharashtra. Sugar industry plays a pivotal role in the socio-economic and educational development in rural areas of Maharashtra. Many production factors are responsible for poor productivity of sugarcane *viz*. pure seed, nutrient and water management, aftercare operations in which weed management in a crucial one. Weeds are among the most under estimated pest, especially in India, where they cause average crop losses of 33 percent and more. Low productivity is mainly due to heavy weed infestation. (Srivastava *et al.*, 2002) [6] It is more appropriate that weeds, unlike insect and diseases often cause hidden symptoms of damage prior to harvest of sugarcane, and possibly also because of fatalistic attitude that weeds will always be present. Labour shortage is always there with sugarcane production (Ghosh *et al.*, 2013) [1]. Therefore, the investigation was planned with objective to find out economical and effective weed management system in spring sugarcane.

Methodology
The field experiment was conducted to assess the performance of different weed management practices in spring sugarcane var. Co 86032 during year 2008-09 to 2010-11 at Central Sugarcane Research Station, Padegaon. The twelve treatments consisting of weedy check (T_1), Two HW at 30 and 60 DAP + 1 hoeing at 90 DAP (T_2), Atrazine @ 2 kg a.i.ha^{-1} as PE +2,4-D @ 1 kg a.i. ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP (T_3), Metribuzine @ 1 kg a.i.ha^{-1} as PE + 2,4-D @ 1 kg a.i.ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP (T_4), Metribuzine @ 1 kg a.i.ha^{-1} as PoE at 15-18 DAP + hoeing at 90 DAP (T_5), Atrazine @ 2 kg a.i.ha^{-1} as PE + Atrazine @ 2 kg a.i.ha^{-1} as PoE at 45 DAP (T_6), Metribuzine @ 1 kg a.i.ha^{-1} as PoE at 15-18 DAP + Metribuzine @ 1 kga.i.ha^{-1} as PoE at 45 DAP (T_7), Atrazine @ 2 kg a.i.ha^{-1} as PE + Tractor drown cultivator at 60 DAP (T_8), Atrazine @ 2 kg a.i.ha^{-1} as PE + Tractor drown cultivator at 90 DAP (T_9), Atrazine @ 2 kg a.i.ha^{-1} as PE +2,4-D @1 kg a.i.ha^{-1} spray at 15-18 DAP as PoE + hoeing at 90 DAP (T_{10}), Atrazine @ 2 kg a.i.ha^{-1} as PE + 2,4-D @ 1 kg a.i.ha^{-1} PoE at 15-18 DAP + Atrazine @ 2 kg a.i.ha^{-1} as PE + 2,4-D @ 1 kg a.i.ha^{-1} as PoE at 45 DAP (T_{11}) and Metribuzine @ 1 kg a.i.ha^{-1} PoE at 15-18 DAP + power tiller with rotavator at 90 DAP (T_{12})

replicated thrice in randomised block design. The sugarcane var. Co 86032 was planted in spring season with 120 cm row spacing in gross and net plot size 10 m x 7.20 m and 8 m x4.80 m, respectively. The crop was fertilized with 300:140:140 kg ha^{-1} N, P_2O_5 and K_2 O. The soil of experimental plot was medium black.

Results

Weed studies: Weed flora

The major monocot weed flora observed in experimental plot was *viz. Cynadon dactylon, Panicum isachami, Commelin abenghalensis, Bracherea spp, Convol vulusarvensis,* and dicot *viz. Parthenium hysterophorus, Portulaca olererecea, Ameranthu sviridis, Digeria arvensis, Ipomea aquitica, Ecllipta spp., Xanthium strumarium and Euphorbia spp. Cyperus rotundous* was observed under sedges.

Weed Dynamics

The data on effect of different weed management treatments on weed intensity, dry weight of weeds and weed control efficiency (WCE) are presented in Table 1.

At 30 DAP application of Atrazine @ 2 kg a.i.ha^{-1} as PE +2,4-D @ 1 kg a.i. ha^{-1} as PoE at 15-18 DAP + hoeing at 90 DAP (T_{10}) significantly reduced the weed intensity which was found at par with Metribuzine @ 1 kg a.i.ha^{-1} as PoE at 15-18 DAP + power tiller with rotator at 90 DAP (T_{12}), Atrazine @ 2 kg a.i.ha^{-1} as PE + 2,4-D @ 1kg a.i.ha^{-1} as PoE at 15-18 DAP+ Atrazine @ 2 kg a.i.ha^{-1},+2,4-D @ 1 kg a.i.ha^{-1} as PoE at 45 DAP (T_{11}), Metribuzine @ 1 kg a.i.ha^{-1} spray at 15-18 DAP + Metribuzine @ 1 kg a.i. ha^{-1} as PoE at 45 DAP (T_7) and Metribuzine @ 1 kg a.i. ha^{-1} as PoE spray at 15-18 DAP + hoeing at 90 DAP (T_5). The dry weight of weeds at 30 DAP was significantly lower in application of Atrazine @ 2 kg a.i. ha^{-1} as PE + 2,4-D @ 1 kg a.i.ha^{-1}as PoE at 15-18 DAP + Atrazine @ 2 kg a.i. ha^{-1}, + 2,4-D @ 1 kg a.i.ha^{-1} as PoE at 45 DAP (T_{11}) which was found at par with T_{12}, T_{10},T_7, T_5 and T_4. While weed control efficiency was higher in T_{11} and T_{12}. (Table 1). At 60 DAP, application of Metribuzine @ 1 kg a.i.ha^{-1} spray at 15-18 DAP + Metribuzine @ 1 kg a.i.ha^{-1} as PoE at 45 DAP (T_7) was found most significant in reduction of weed intensity and dry weight of weed, which is followed by T_{11} with respect to weed intensity and T_6, T_{11}, T_{12}, T_5, $T_2$and T_4 were found at par with T_7 with respect to dry weight of weed. Application of Metribuzine @ 1 kg a.i. ha^{-1} spray at 15-18 DAP + Metribuzine @1 kg a.i.ha^{-1} as PoE at 45 DAP (T_7) recorded higher WCE at 60 DAP. The results are confirmative to Ghosh *et al.*, 2012 [2].

At 90 DAP the weed intensity was significantly reduced due to application of Atrazine @ 2 kg a.i.ha^{-1} as PE + Tractor drown cultivator at 60 DAP (T_8) which was found at par with treatment T_4, T_3, T_2 and T_7. Significantly lowest dry weight of weeds was observed in two weeding at 30 and 60 DAP + 1 hoeing at 90 DAP (T_2) and application of Atrazine @ 2 kg a.i.ha^{-1} as PE + Tractor drown cultivator at 60 DAP (T_8) which was found at par with all the treatment except T_9 and control. The highest weed control efficiency at 90 DAP was observed in application of Atrazine @ 2 kg a.i.ha^{-1}as PE + Tractor drown cultivator at 60 DAP (T_8). At 120 DAP, significantly the lowest weed intensity and dry weight of weeds was recorded due to application of Metribuzine @1 kg a.i. ha^{-1} as PE + 2, 4-D @ 1 kg a.i. ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP (T_4) which was found at par with treatment T_3,T_2, T_5 and T_{10} with respect to weed intensity and T_2,T_3,T_6 T_7, T_8 and T_{11} with respect to dry weight of weeds. Also the highest weed control efficiency was observed with the application of Metribuzine @1 kg a.i.ha^{-1} as PE + 2,4-D @ 1 kg a.i.ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP (T_4) at 120 DAP. The results are inconformity with Raskar (2004) [3] and Tej Pratap *et al.* (2013) [7].

Growth, cane and ccs yield

The data presented in Table 1 revealed that, application of Metribuzine @ 1 kg a.i. ha^{-1} as PE spray + 2, 4-D @ 1 kg a.i. ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP observed significantly the highest millable height (239 cm) and millable canes (98093 ha^{-1}) and cane yield (115.52 t ha^{-1}) and CCS yield (17.23 t ha^{-1}) than other treatments. While the cane yield was found at par with application of Atrazine @ 2 kg a.i. ha^{-1} as as PE + 2,4-D @ 1 kg a.i. ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP (111.80 t ha^{-1}). Similar results have been reported by Sokolova (2010) [4], Srivastava (2005) [5] and Tomar (2003) [8].

Table 1: Weed dynamics, sugarcane growth, yield and economics as affected by various weed management treatments (Three years pooled mean)

Treatments	Weed intensity (no. /m^2)				Weed dry wt. (g/m^2)				WCE (%)				Millable height (cm)	Millable Canes /ha	Cane yield (t/ha)	CCS yield (t/ha)	Net profit (₹/ha)	B: Crati o
	30 DAP	60 DAP	90 DAP	120 DAP	30 DAP	60 DAP	90 DAP	120 DAP	30 DAP	60 DAP	90 DAP	120 DAP						
T_1 : Weedy check	35.00 (6.00)	46.00 (6.84)	59.00 (7.74)	62.00 (7.65)	40.00 (6.37)	59.00 (7.72)	64.00 (8.05)	73.00 (8.05)	--	--	--	--	202	84503	72.01	9.85	10225	1.14
T_2: Two weeding at 30 and 60 DAP + 1 hoeing at 90 DAP.	33.00 (5.82)	21.00 (4.68)	18.00 (4.34)	14.00 (3.85)	38.00 (6.24)	23.00 (4.81)	17.00 (4.22)	19.00 (4.22)	5.00	61.0	70.3	73.9	232	93866	108.01	14.82	41801	1.52
T_3 : Atrazine @2 kg a.i. ha-1 as PE +2,4-D@ 1kg a.i. ha-1 as PoE at 60 DAP +hoeing at 90 DAP	17.00 (4.24)	30.00 (5.56)	18.00 (4.33)	13.00 (3.91)	20.00 (4.54)	34.00 (5.88)	20.00 (4.56)	18.00 (4.56)	50.0	42.3	68.7	75.3	230	95928	111.80	15.53	50416	1.66
T_4 : Metribuzine @1 kg a.i. ha-1 as PE +2,4-D@ 1kg a.i. ha-1 as PoE at 60 DAP +hoeing at 90 DAP	11.00 (3.45)	19.00 (4.46)	14.00 (3.85)	9.00 (3.05)	12.00 (3.57)	23.00 (4.83)	18.00 (4.35)	14.00 (4.35)	70.0	61.0	71.8	80.8	239	98093	115.52	17.33	54628	1.72
T_5 : Metribuzine @1 kg a.i. ha-1 as as PoE spray at 15-18 DAP + hoeing at 90 DAP.	8.00 (3.00)	16.00 (4.12)	27.00 (5.26)	15.00 (3.93)	11.00 (3.43)	19.00 (4.44)	33.00 (5.71)	20.00 (5.71)	72.5	67.7	48.4	72.6	230	96056	107.96	15.01	46162	1.60
T_6 : Atrazine @2 kg a.i. ha-1 as PE + Atrazine @2 kg a.i. ha-1 as PoE at 45 DAP.	17.00 (4.24)	17.00 (4.23)	29.00 (5.45)	36.00 (6.24)	21.00 (4.64)	18.00 (4.11)	29.00 (5.40)	38.00 (5.40)	47.5	69.5	54.6	47.9	236	94205	101.72	13.94	39608	1.52
T_7 : Metribuzine @1 kg a.i. ha-1 spray at 15-18 DAP +	8.00 (3.00)	6.00 (2.62)	21.00 (4.64)	26.00 (4.89)	10.00 (3.27)	9.00 (3.06)	21.00 (4.66)	29.00 (4.66)	75.0	84.7	67.1	60.2	229	95910	103.68	14.37	39832	1.51

Metribuzine @1 kg a.i. ha-1 as PoE at 45 DAP																		
T_8 : Atrazine @2 kg a.i. ha-1 as PE + Tractor drown cultivator at 60 DAP.	17.00 (4.24)	32.00 (5.73)	13.00 (3.73)	19.00 (4.46)	21.00 (4.68)	35.00 (5.96)	17.00 (4.22)	29.00 (4.22)	47.5	40.6	73.4	60.2	226	94600	100.63	13.64	38210	1.50
T_9 : Atrazine @2 kg a.i. ha-1 as PE + Tractor drown cultivator at 90 DAP.	18.00 (4.35)	31.00 (5.66)	34.00 (5.89)	19.00 (4.44)	21.00 (4.66)	35.00 (5.96)	41.00 (6.44)	24.00 (6.44)	47.5	40.6	35.9	67.0	226	94168	97.86	13.57	35014	1.46
T_{10} : Atrazine @2 kg a.i. ha-1 as PE +2,4-D@1kg a.i. ha-1 as PoE at 15-18 DAP. + hoeing at 90 DAP.	6.00 (2.64)	22.00 (4.76)	27.00 (5.27)	15.00 (3.94)	11.00 (3.41)	29.00 (5.44)	32.00 (5.71)	20.00 (5.71)	72.5	50.8	50.0	72.6	225	95585	104.85	14.46	43642	1.58
T_{11} : Atrazine @2 kg a.i. ha-1 as PE +2,4-D@1kg a.i. ha-1 as PoE at 15-18 DAP. + Atrazine @2 kg a.i./ha,+2,4-D@1kg a.i. ha-1 as PoE at 45 DAP.	8.00 (3.00)	14.00 (3.86)	24.00 (4.96)	30.00 (5.66)	9.00 (3.12)	17.00 (4.21)	25.00 (5.07)	38.00 (5.07)	77.5	71.1	60.9	47.9	226	95989	105.02	14.45	41958	1.54
T_{12} - Metribuzine @1 kg a.i. ha-1 as PoE at 15-18 DAP + power tiller with rotator at 90 DAP.	8.00 (2.99)	18.00 (4.33)	29.00 (5.46)	13.00 (3.62)	9.00 (3.14)	20.00 (4.48)	32.00 (5.65)	18.00 (5.65)	77.5	64.4	50.0	75.3	227	96272	106.66	14.64	45123	1.59
SE	0.18	0.30	0.41	0.35	0.43	0.67	0.55	0.55					2.68	0.39	1.39	0.32		
CD at 5%	0.54	0.90	1.21	1.03	1.27	1.98	1.64	1.64					7.68	1.15	4.07	0.95		

Data transformed to square root ($\sqrt{x+1}$) transformation. Figures in parentheses are transformed values.

Economics

The data presented in Table 1 showed that, the Metribuzine @1 kg a.i. ha^{-1} as PE + 2, 4-D @ 1 kg a.i. ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP realized the higher net profit (₹ 54628 ha^{-1}) and benifit: cost ratio (1.72) followed by Atrazine @ 2 kg a.i. ha^{-1} as PE + 2, 4-D @ 1 kg a.i. ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP.

Conclusion

In spring planted sugarcane application of Metribuzine @ 1 kg a.i. ha^{-1} as PE + 2, 4-D @ 1 kg a.i. ha^{-1} spray at 60 DAP + hoeing at 90 DAP found superior for control of weed in sugarcane with the highest weed control efficiency (80.80) at 120 DAP and also recorded significantly highest cane and CCS yield (115.52 and 17.33 t ha^{-1} respectively), Net profit (₹ 54628 ha^{-1}) and benefit cost ratio (1.72). Application of Atrazine @ 2 kg a.i. ha^{-1} as PE + 2, 4-D @ 1 kg a.i.ha^{-1} as PoE at 60 DAP + hoeing at 90 DAP was found the next best treatment for weed control in sugarcane.

References

1. Ghosh Ratikanta, Bera Soumen. Soil Microflora and Weed Management as Influenced by Atrazine 50% WP in Sugarcane. Universal Journal of Agricultural Research. 2013; 1(2):41-47.
2. Ghosh RK, Jana PK, Nongmaithem D, Pal D, Bera S, Mallick S *et al*. Prospects of botanical herbicides in system of crop intensification in the Gangetic Inceptisols of India. Proceedings of 6th IWSC, Hangzhou, China, 2012, 116-117.
3. Raskar BS. Evaluation of herbicides for weed control in sugarcane. Sugar Tech. 2004; 6(3):173-175.
4. Sokolova TV, Gulidova VA. Change of the biological activity of soils under the effect of herbicides. Zashchita I Karantin Rastenii. 2010; 8:46-47.
5. Srivastava TK, Chauhan RS, Menhi Lai. Weed dynamics and their management in sugarcane under different preceding crops and tillage systems. Indian Journal of Agricultural Sciences. 2005; 75:256-60.
6. Srivastava TK, Singh AK, Srivastava SN. Critical period of crop-weed competition in sugarcane ratoon. Indian Journal of Weed Science. 2002; 34:320-321.
7. Tej Pratap Rohitashav Singh, Ram Pal, Subhash Yadav. Integrated weed management studies in sugarcane ratoon Indian Journal of Weed Science. 2013; 45(4):257-259.
8. Tomer PK, Om Prakash, Singh D. Population growth of weeds and productivity of sugarcane as influenced by weed management practices. Cooperative Sugar. 2003; 35:205-10.