

Effect of different weed management practices on yield of sugarcane ratoon

M M MISHRA, S S MISHRA, K N MISHRA and P K NAYAK¹

AICRP on Weed Control, Orissa University of Agriculture and Technology, Bhubaneswar, Orissa-751003

ABSTRACT

A field experiment on different weed management practices in sugarcane ratoon was conducted at Sugarcane Research Station of OUAT located at Nayagarh for consecutive years i.e. 2008-09 and 2009-10 in the same layout plan. The soil of the experimental field was loam in texture, slightly acidic (pH 5.6) with available nitrogen 176 kg/ha, phosphorus 10.6 kg/ha and potassium 168 kg/ha. The experiment was laid out in randomized block design with four replications and 6 treatments. The results revealed that integration of metribuzine 0.88 kg a.i./ha (2 DAI) with HW (45 DAI) and 2,4-D (90 DAP) recorded significantly higher cane yield (97.3 t/ha), number of millable canes (92,350/ha) and WCE (63.25%). This was at par with the treatment, HW thrice (96.4 t/ha, 89,500/ha) and (60.5 %). Highest net return of Rs. 1,03,700/ha was obtained from integration of metribuzine 0.88 kg a.i./ha with HW (45 DAI) and POE application of 2,4-D. Next in order was PE application of atrazine along with POE application of 2,4-D (Rs.1,02,580/ha).

Keywords: Sugarcane ratoon, Weed management

Sugarcane being a long duration widely spaced crop allows weeds to grow in the vacant space right from planting to harvesting which pose tough competition causing more economic loss in sugarcane. Weed infestation reduces sugarcane tonnage in the field and sugar recovery in the mills. The extent of loss in cane yield caused by weeds varies from 10 % to total crop failure depending upon composition and diversity of weeds (Srivastava and Chauhan 2002). The predominant weeds affecting sugarcane are *Cynodon dactylon*, *Cyperus rotundus*, *Echinochloa spp*, *Panicum repens* among narrow leaved and *Ageratum conyzoides*, *Cleome viscosa*, *Ludwigia parviflora*, *Chrozoffera rottleri*, *Celosia argentea* among broad leaved weeds. Research results indicated that more crop weed competition occurs during early phase of sugarcane growth. The critical period of crop-weed competition has been recorded between 60-120 days after planting in spring cane and upto 150 days in autumn cane. Hand weeding is not much effective against perennials like *Cyperus rotundus* particularly in sugarcane ratoon. Problems and difficulties associated with cultural and mechanical weed control methods led to the use of chemicals for weed control in sugarcane crop. As such the adoption of chemical weed control is time saving, economical, easier and can be taken up timely, where scarcity of agricultural labour exists at appropriate stage of weeding. Accordingly pre- and post-emergence application of some herbicides was thought to be one of the alternatives in sugarcane plant as well as in its ratoon crop. Keeping this in view, the present study was undertaken to find out effective weed control methods in sugarcane ratoon for higher yield.

MATERIALS AND METHODS

A field experiment on weed management in sugarcane ratoon was carried out at Sugarcane Research Station of OUAT located at Nayagarh for two consecutive years i.e. 2008-09 and 2009 – 10 in the same plan of layout i.e. I and II ratoon of same crop. The objective of the study was to find out effective weed control methods in sugarcane ratoon for higher production. The soil of experimental field was loam in texture, slightly acidic (pH 5.6) and analysed low in available nitrogen (176 kg/ha), medium in available phosphorus (10.6 kg/ha) and exchangeable potassium (168 kg/ha). The experiment was laid out in randomized block design with four replications six treatments evaluated included T₁: Atrazine 2.0 kg ai /ha as pre-emergence (PE) 3 DAI, T₂: Atrazine 2.0 kg/ha as PE 3 DAI + 2,4-D 0.5 kg a i /ha as POE 75-90 DAI, T₃: 2,4-D 0.5 kg a i /ha as POE on 75-90 DAI, T₄: Metribuzine 0.88 kg a i /ha as PE fb one HW at 45 DAI fb 2,4-D Na salt 0.5 kg a i /ha at 90 DAI, T₅: Hand weeding at 30, 60 and 90 DAI and T₆: Weedy check. The test variety was 'Co 86032'. The net plot size was 6.0 x 4.8 m² with 6 crop rows/plot at 80 cm row spacing. The fertilizers and manures were applied as per the recommended dose i.e. 250 – 100- 60 kg/N, P₂ O₅ and K₂O/ha and 10 t FYM/ha. The crop was grown as per the standard package of practices spacing. The ratoon crop was managed after harvest of previous crop on 26.12.08 and 20.12.2009 and harvested on 15.12.2009 and 10.12.2010 during first and second year respectively. The observations on number of weed/m² and weed dry weight/ m² were taken 120 days after planting and at harvesting.

¹Sugarcane Breeder, SRS (OUAT), Nayagarh

RESULT AND DISCUSSION

Weed flora

The floristic composition of the experimental site was dominated with grasses like *Digitaria ciliaris*, *Cynodon dactylon*, *Echinochloa colona*, *Panicum repens*, *Sporobolus diander*, *Dactyloctenium aegyptium* and broad leaf weeds like *Ageratum conyzoides*, *Cleome viscosa*, *Ludwigia parviflora*, *Chrozoffera rottleri*, *Celosia argentea*. The dominant sedge spp was *Cyperus rotundus*. Other weeds observed in relatively low density were *Alternanthera sessilis*, *Eclipta alba*, *Fymbristylis miliaceae* and *Cyperus iria*.

Weed density

The pooled data (Table 1) indicated that pre-emergence application of metribuzine 0.88 kg a i /ha with one HW at 45 DAI and application of 2,4-D Na salt 0.5 kg a i /ha at 90 DAI (T_4) recorded significantly the lowest weed density both at 120 DAI (21.55 m^{-2}) and at harvest (51.1 m^{-2}). Hand weeding thrice (T_5) also effectively reduced the weed density at both the growth stages ($40.75/\text{m}^2$, $64.8/\text{m}^2$). The weed density values in PE application of atrazine (T_1) and POE application of 2,4-D (T_3) were at par at both the growth stages. But the combination of PE application of atrazine and POE application

of 2,4-D (T_2) reduced weed density significantly over their sole application and the reduction was to the tune of 18.58% and 21.74% at 120 DAI and at harvest, respectively.

Weed biomass

The pooled data revealed that integration of metribuzine (2 DAI) with HW (45 DAI) and 2,4-D (90 DAI) recorded significantly the lowest weed biomass at 120 DAS ($23.4 \text{ g}/\text{m}^2$) and at harvest ($64.3 \text{ g}/\text{m}^2$). Hand weeding thrice also effectively reduced the weed biomass at different growth stages (35.7 gm^{-2} , $69.2 \text{ g}/\text{m}^2$). The weed biomass values in PE application of atrazine and POE application of 2,4-D were at par at both the crop growth stages. But the combined application of atrazine and 2,4-D reduced the weed biomass to the tune of 20.8% at 120 DAI and 9.4% at harvest over their sole application. Efficacy of metribuzin in sugarcane has also been reported by Sundara (2000) and Singh *et al.* (2001).

Cane yield, weed control efficiency and economics

The pooled data (Table 1) revealed that integration of metribuzine (2 DAI) with HW (45 DAI) and 2,4-D (90 DAI) recorded significantly higher cane yield (97.3 t/ha), number of millable canes ($92,350/\text{ha}$) and weed control efficiency (WCE) (63.25%) which were at par with the treatment of HW thrice (96.4 t/ha , $89,500/\text{ha}$ and 60.5%). Similar finding was

Table 1 Effect of various weed control treatments on cane yield, no. of millable canes, weed control efficiency (WCE), net return and B:C ratio (pooled over 2008-09 and 2009-10)

Treatments	Yield (t/ha)			No. of Millable canes (000/ha)	WCE (%)	Net return (Rs/ha)	B: C ratio	Weed density m^{-2}		Weed dry weight (g/m^2)	
	2009	2010	pooled					120 DAP	At harvest	120 DAP	At harvest
T_1 Atrazine 2.0 kg ai/ha as pre-emergence (PE) on 3 DAI	84	80.6	82.3	86.95	40.85	80200	2.05	67.25	94.3	71.3	103.4
T_2 Atrazine 2.0 kg ai /ha PE 3 DAI + 2,4-D 0.5 kg ai /ha as POE 90 DAI	96.7	92.8	94.75	87.05	46.4	102580	2.33	54.75	73.8	56.5	93.7
T_3 2,4-D 0.5 kg ai /ha as POE on 75-90 DAI	79.6	76.2	77.9	84.05	40.25	74840	2.03	66.25	91.6	70.5	104.5
T_4 Metribuzine 0.88 kg ai /ha as PE fb one HW at 45 DAI fb 2,4-D Na salt 0.5 kg ai /ha at 90 DAI	99	95.6	97.3	92.35	63.25	103700	2.28	21.55	51.1	23.4	64.3
T_5 Hand weeding on 30,60 and 90 DAI	98.1	94.7	96.4	89.5	60.5	94490	2.07	40.75	64.8	35.7	69.2
T_6 Weedy check	79.5	76.1	77.8	77.75	-	72900	1.98	121.25	160.55	131.4	174.8
SEm(Ē)	1.757	1.75	1.240	0.994	-	-	-	1.481	1.450	0.961	0.827
CD (0.05)	5.29	5.3	3.592	2.87	-	-	-	4.276	4.187	2.775	2.388

also reported by Raskar (2004). PE application of atrazine with POE use of 2,4-D proved significantly superior over their sole application in terms of cane yield (15.1 to 21.6%), number of millable canes (1.81%) and WCE (13.6 to 15.3%). The yield of POE application of 2,4-D at 90 DAP (77.9 t/ha) and weedy check (77.8 t/ha) were practically same though the WCE of 40.25 % was the lowest with former one. Integration of metribuzine with HW and POE application of 2,4-D (T_4) recorded the highest net return of Rs. 1,03,700/ha followed by PE application of atrazine with POE application of 2,4-D (T_2) (Rs. 1,02,580/ha). The weedy check plot (T_6) fetched the lowest net return of Rs. 72,900/ha.

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