

Integrated weed management in ratooned sugarcane

M. MAHADEVASWAMY AND G. JAMES MARTIN

Department of Agronomy, Tamil Nadu Agricultural University, Coimbatore 641 003

Received: December 2001

ABSTRACT

A field experiment was conducted during the main season of 1999-2001 at Tamil Nadu Agricultural University, Coimbatore, to find out the economical and effective integrated weed-management practice to control the weeds in ratooned ('Co 86032') sugarcane. The use of pre-emergence herbicides did not have any adverse effects on the ratoon sproutings. Various integrated weed-management practices were compared with chemical and cultural methods of weed control. All the integrated weed-control practices proved effective in controlling the weed growth and increasing the cane and sugar yields compared with use of herbicides alone, and were found on par with conventional method of 2 hand-weedings at 30 and 60 days after ratoon initiation. Pre-emergence application of atrazine at 2.00 kg a.i./ha combined with 1 hand-weeding at 45 days or conventional method of 2 hand-weedings at 30 and 60 days were found more effective and economical. None of the weed-control treatments affected the juice quality significantly.

Key words : Sugarcane, Ratoon, Integrated weed management

Sugarcane, being a slow-growing and long-duration crop, often encounters the problem of severe weed infestation, especially during the early stages of the crop growth. Weeds cause 12-72% reduction in cane yield depending on the flora, intensity and stages of weed competition (Johari and Singh, 1991). The problem of weeds is serious in the ratoon crop also. As the harvesting of the plant crop extends over several days and the ratoon crop receives very little preparatory cultivation, the

weeds that had established well in the plant crop tend to grow faster and smother the ratoon sproutings. As the sprouting is affected, it results in considerable gaps in the field, which cause further infestation of weeds. Apart from adverse effect on sprouting, the growth of the competitive weeds causes shade at lower portions of emerging shoots, affecting tillering as well as the early growth, resulting in lower yield. The present study was conducted to determine the effect of different pre-emergence herbi-

Present address : ¹Agronomy, Sugarcane Breeding Institute, Coimbatore Tamil Nadu 641 007

cides and integration of herbicides with cultural methods on weed control, growth and yield of ratooned sugarcane.

MATERIALS AND METHOD

The field experiment was conducted on clay-loam soil at Eastern Block Farm, Tamil Nadu Agricultural University, Coimbatore during 1999–2001 in randomized blocks design with 3 replications. Soil was low in available N (230 kg/ha), high in available P_2O_5 (25 kg/ha) and K_2O (780 kg/ha). During the first year (1999–2000), sugarcane ('Co 86032') was planted in February at a row spacing of 80 cm using recommended seed rate (75,000 two-budded setts/ha) and fertilizer application (275 kg N, 75 kg P_2O_5 and 120 kg K_2O /ha). Atrazine, as pre-emergence herbicide (2.00 kg/ha) was applied uniformly to the entire field and the crop was raised with normal cultural practices. The crop was harvested at the age of 12 months. After harvesting of the plant crop the ratoon-management practices like stubble shaving and off barring were carried out immediately and the first dose of fertilizer application was made and the crop was irrigated. Then the plot was divided into individual plots of 6.4 m × 6.0 m each and the different weed-management treatments were imposed (Table 1). The application of pre-emergence herbicides was done on the third day after carrying out the ratooning operations. The observations on ratoon sproutings, weed dry-matter production, tiller production, yield parameters and cane and sugar yields were recorded. The benefit : cost ratio of the weed-control treatments was worked out based on the current market price of the

herbicides [Atrataf (50% wp) @ Rs 272/kg; Stomp (30% EC) @ Rs 410/litre; Sencor (70% WP) @ Rs 2,017/kg].

RESULTS AND DISCUSSION

The major weed flora of the experimental field consisted of *Trianthema portulacastrum*, *Amaranthus viridis*, *Parthenium hysterophorus*, *Ageratum conyzoides* and *Convolvulus arvensis*. The application of various pre-emergence herbicides did not affect the ratoon sproutings significantly (Table 1). The different weed-control treatments markedly influenced the weed dry-matter production (DMP). Significantly lower dry-matter production of weeds was recorded in the treatment involving 2 hand weedings at 30 and 60 days (hand-weeded check, T_7) compared with the control plot (unweeded check, T_8) and also all the other treatments at 45 days after ratooning. However, the weed dry matter was significantly lower in all the herbicide-applied treatments compared with the unweeded check. But at 90 days, the hand-weeded check (T_7) recorded the lowest weed dry matter compared with unweeded check and herbicides alone applied treatments, but was on a par with the integrated weed-control treatments involving pre-emergence application of herbicides followed by 1 manual weeding at 45 days (T_2 , T_4 and T_6). The herbicide alone-applied treatments were not effective in controlling the weeds at latter stage compared with the integrated weed-management practices. Balusamy *et al.* (1991) reported that pre-emergence application of atrazine (2.00 kg/ha) with 2 hand-weedings at 55 and 85 days drastically

reduced the weed population and weed dry matter. However, all the weed-control treatments significantly reduced the weed dry matter compared with unweeded control. The tiller production by sugarcane at 90 days did not vary significantly among the various weed-control treatments. But the same was significantly lower in unwee-

ded control with 41–49 % reduction compared with other weed-control treatments. The reduction in tiller to the tune of 32 % in weedy plot was reported by Verma *et al.* (1985).

All the weed-management practices recorded significantly higher number of millable canes compared with unweeded

Table 1. Effect of weed-control treatments on ratoon sproutings, weed dry-matter production and tiller production of sugarcane

Treatment	Sproutings at 25 days	Weed DMP (kg/ha)		Weed - control index (%)	Tillers at 90 days (10 ³ /ha)
		At 45 days	At 90 days		
T ₁ , Atrazine 2.00 kg/ha (Pre-emergence)	129.1	902	1,420	78.3	241.6
T ₂ , Atrazine 2.00 kg/ha (Pre-emergence) + 1 HW at 45 DARI	134.1	924	800	87.8	253.0
T ₃ , Metribuzin 1.00 kg/ha (Pre-emergence)	128.5	1,380	1,550	76.4	236.6
T ₄ , Metribuzin 1.00 kg/ha (Pre-emergence) + 1 HW at 45 DARI	125.4	1,360	730	88.8	246.2
T ₅ , Pendimethalin 2.00 kg/ha (Pre-emergence)	126.3	1,042	1,710	73.8	225.7
T ₆ , Pendimethalin 2.00 kg/ha (Pre-emergence) + 1 HW at 45 DARI	127.8	1,136	830	87.3	251.9
T ₇ , Hand-weeded check (HW twice at 30-60 DARI- Conventional practice)	121.7	290	390	94.0	260.8
T ₈ , Unweeded check	110.8	5,983	6,560	-	132.2
CD (P=0.05)	NS	610.8	928.0	-	32.7

HW, Hand-weeding; DARI, days after ratoon initiation

Table 2. Effect of weed-control treatments on yield parameters, juice quality, cane and sugar yields and their economics

Treatment	Number of millable canes (10 ³ /ha)	Single cane weight (kg)	Brix (%)	Sucrose (%)	Purity (%)	Commercial cane sugar (%)	Yield (tonnes/ha)		Benefit: cost ratio
							Cane	Sugar	
T ₁	135.3	1.01	21.0	19.4	92.3	13.69	131.3	17.98	2.01
T ₂	146.1	1.02	20.8	19.3	92.7	13.64	139.6	19.05	2.04
T ₃	132.6	1.00	21.1	19.5	92.4	13.77	130.6	17.98	1.94
T ₄	143.6	1.03	20.7	19.3	93.2	13.67	138.6	18.92	1.96
T ₅	130.6	1.03	20.4	19.2	94.1	13.66	127.3	17.4	1.91
T ₆	146.3	1.03	20.9	19.4	92.8	13.70	138.6	18.99	1.96
T ₇	149.3	1.03	20.6	19.2	93.2	13.60	140.3	19.08	2.03
T ₈	72.0	0.89	19.8	18.8	94.9	13.46	64.3	8.66	1.32
CD (P=0.05)	9.9	0.107	NS	NS	NS	NS	7.2	0.94	

check (Table 2). The individual cane weight did not vary much among the treatments, but was the lowest in unweeded check plot. The juice quality was not affected by the various treatments. Srinivasan (1988) reported that cane quality was not affected by different herbicide formulations in sugarcane. Similarly, all the weed-control treatments significantly influenced the cane yield compared with the control. All the integrated weed-control treatments (T_2 , T_4 and T_6) gave higher cane yield than the use of herbicides alone (T_1 , T_3 and T_5). Pre-emergence application of herbicides at 2.0 kg/ha coupled with 1 hand-weeding at 60 days was effective in increasing the cane yield over the conventional practice of hand-weeding at 45 and 90 days (Mahadevaswamy *et al.*, 1994). As the field was kept free of weeds in the initial stages by the application of pre emergence herbicides and later by 1 hand weeding at 45 days, the initial cane growth was not affected leading to higher millable cane population and final cane yield in the integrated weed-control treatments. The treatment (T_7) involving 2 hand-weedings at 30 and 60 days, although recorded the highest cane yield, was on a par with the integrated weed-control treatments. Similar trends were noticed with sugar yield also.

The economics of the different weed-control treatments revealed that the benefit:

cost ratio was higher in all the integrated weed-management practices compared with the application of herbicides alone. The highest benefit : cost ratio was achieved in treatment involving the pre emergence application of atrazine in combination with 1 hand-weeding at 45 days (T_2), followed by the conventional practice of hand-weeding twice at 30 and 60 days (hand-weeded check). The study indicated the usefulness of integrated weed management practices to control the weeds economically and efficiently in ratooned sugarcane in situations of escalating cost of labour and non-availability of labour.

REFERENCES

- Balusamy, M., Ramamoorthy, K. and Chockalingam, S. 1991. Economic weed control in sugarcane. *Bharatiya Sugar* 16(9) : 13-16.
- Johari, D. and Singh, R.G. 1991. Weeds of sugarcane. Losses due to them and their control. *Bharatiya Sugar* 16(3) : 33-39.
- Mahadevaswamy, M., Kailasam, C. and Srinivasan, T.R. 1994. Integrated weed management in sugarcane (*Saccharum officinarum*). *Indian Journal of Agronomy* 39(1) : 83-86.
- Srinivasan, T.R. 1988. Evaluation of new herbicide formulations for their suitability in sugarcane. (In) : *Annual Report, Sugarcane Breeding Institute, Coimbatore*, pp. 54-55.
- Verma, I.D., Saxena, M.M.S. and Singh, N.D. 1975. *Cyperus rotundus* and its control in sugarcane crop. *Cooperative Sugar* 6 (10): 455-459.