

SHORT COMMUNICATION

Performance of Different Herbicides for Weed Control in Sugarcane Field

M. S. Hossain, M. J. Alam, A. K. M. R. Islam, M. K. Rahman and M. A. T. Sohel

Bangladesh Sugarcane Research Institute
Ishurdi, Pabna, Bangladesh

Key words: Sugarcane, weed management, herbicide, yield

Weed means a plant persists in growing where it is not wanted or any plant that is found out of its place. These unwanted plant interfered with agricultural operations, increase cost and compete for light, space, nutrient and moisture and thus reduce crop yield. They also harbour insects, pests and micro-organisms. Sugarcane crop gets heavily infested with weeds mainly because of its slow germination and initial growth, slow lateral spread, long crop duration, heavy fertilization and frequent irrigation through the crop season. Regarding cane yield declining due to weed, many works stated in different ways. The loss in cane production due to weed infestation was estimated upto 75 % (Singh and Moolani, 1975). Uncontrolled growth of weeds in sugarcane may cause yield loss upto 40 % (Verma *et al.*, 1983). During early stage, due to wider spacing and slow growth of sugarcane luxuriant growth of weeds takes place which results into substantial reduction in sugarcane yield by 38 % (Chauhan and Singh, 1993). Keeping the sugarcane field weed free upto 135 days after transplanting (DAT) is the most significant for obtaining maximum cane yield (BSRI, 1998-99). Although, conventional method of weed control (manual hoeing and weeding) in sugarcane is effective but it is labour intensive, cumbersome, expensive and subject to the availability of labourers. Chemical weed control has been found suitable under labour constraint condition and in plantation crops like sugarcane (Parker and Frayer, 1975). Use of herbicides holds promise for effective and economic management of weed in sugarcane as reported by Kumar and Shrivastava (1994), Shankraiah *et al.*, (1995) but very limited works regarding weed control using herbicides were done in Bangladesh. Therefore, this study was aimed to find out the feasibility of using herbicides and to evaluate effective and promising herbicides for weed management in sugarcane field.

The experiment was conducted at Bangladesh Sugarcane Research Institute (BSRI) farm, located in Ishurdi, High Ganges River Floodplain soil under Agro-ecological Zone-11 of Bangladesh during 2005-2006 cropping season under irrigated condition. The soil of the experimental site is sandy loam with medium high land having pH 7.6 to 7.8. There were four treatments including one control (no weeding). The experiment was laid out in randomized complete block design (RCBD) with four replications. Single budded sugarcane seedlings of variety Isd 36 previously raised in soil bed were transplanted in mid November, 2005 and harvested at its maturity after twelve months of planting. Cane planting was done in deep furrows at row distance of 100 cm and plant to plant distance 30 cm, keeping plot size 12 m x 10 m. Treatments studied in the experiment were as follows:

- T₁ : No weeding (control)
- T₂ : Weeding by cultural practices
- T₃ : Weeding using herbicide TOPSTAR 400SC (Oxadiazyl)
- T₄ : Weeding using herbicide Neon 70 WG (Metribuzin)

The crop was fertilized with 347, 244, 184 and 222 kg ha⁻¹ as Urea, TSP, MOP and Gypsum respectively (BARC, 1997). Herbicidal spray was done @ 1.5 litre/kg ha⁻¹ in 1000 litre water with the help of knapsack sprayer. Pre-emergence spray was done immediately after cane transplanting whereas post emergence spray was done 60 days after cane transplanting (DAT). Weed sample for dry matter estimation were collected from a metre square, placed randomly at three places from each plot after 120 days crop planting. The weed control efficiency (WCE) was worked out by using the following formula:

$$WCE = \frac{DMC - DMT}{DMC} \times 100$$

Where, DMC = Dry matter weight of weeds in control plot and DMT = Dry matter weight of weeds in treated plot

Weeding was done once in every 45 days interval starting from 45 DAT for treatment T₂ upto April, 2006. To control insect pest, Furadan 5G was applied @ 40 kg ha⁻¹ as per recommendation. Intercultural operations like irrigation, gap filling, earthing-up, tying etc. were done in time. Tiller population of sugarcane was recorded at 90, 120, 150 and 180 DAT. Millable cane, cane yield and pol % cane were recorded at harvest. Economic and statistical analysis on different parameters was done following the standard procedures.

All the weed control treatments recorded significantly lower weed dry weight in comparison to no weeding (control). Among different weed control treatments three weeding by cultural practices at 30, 60, 90 DAT significantly recorded lowest weed dry weight (57.50 g/m²) than rest of the treatments. None of the herbicidal treatments could differ significantly in accumulating weed dry matter among them. Highest weed control efficiency (75.26 %) was recorded with the treatment of weeding by cultural practices followed by 54.83 % from weeding using herbicide Neon 70 WG and the lowest (47.95 %) was recorded with weeding using herbicide TOPSTAR 400 SC (Table 1).

Table 1. Effect of different herbicides on weed dry matter, number of tillers, millable canes and cane yield. BSRI, 2005-2006.

Treatments	Dry wt. of weeds (g/m ²)	Weed control efficiency (%)	Tiller (x 10 ³ ha ⁻¹)	Millable cane (x 10 ³ ha ⁻¹)	Cane yield (t ha ⁻¹)
T ₁ : No weeding (control)	232.50	-	83.76	71.63	52.02
T ₂ :Weeding by cultural practices	57.50	75.26	136.80	114.33	84.38
T ₃ :Weeding using herbicide TOPSTAR 400 SC	121.00	47.95	127.92	108.27	68.73
T ₄ :Weeding using herbicide Neon 70 WG	105.00	54.83	133.57	112.56	76.08
LSD (5%)	9.41	-	8.09	3.94	2.57

Data (Table 1) indicated that weeding by cultural practices produced significantly highest number of millable canes ($114.33 \times 10^3 \text{ ha}^{-1}$) over other treatments. All the herbicidal treatments produced significantly higher number of millable canes than no weeding (control) but did not differ with each other. Similar trend was also observed by Shiv Kumar and Srivastava (1994) on sugarcane ratoon as regards the effect of weeds on sugarcane yield. Uncontrolled growth of weeds (no weeding) reduced the cane yield by 38.35 % as compared to weeding by cultural practices. Conventional method of weed control (weeding by cultural practices) produced significantly highest cane yield (84.38 t ha^{-1}) than rest of the treatments. This may be attributed to the fact that weeding by cultural practices not only suppressed the weeds but also improved the soil physical condition which helped in tiller production and growth of cane. All the herbicidal treatments produced significantly higher cane yields than no weeding (control) but did not differ significantly with each other. In case of quality of sugarcane juice, pol % cane was not affected by any of the treatments. The highest pol % cane of 14.32 was obtained from treatment T_2 followed by treatment T_4 and the lowest pol % cane of 13.65 was recorded from treatment T_1 (Fig. 1).

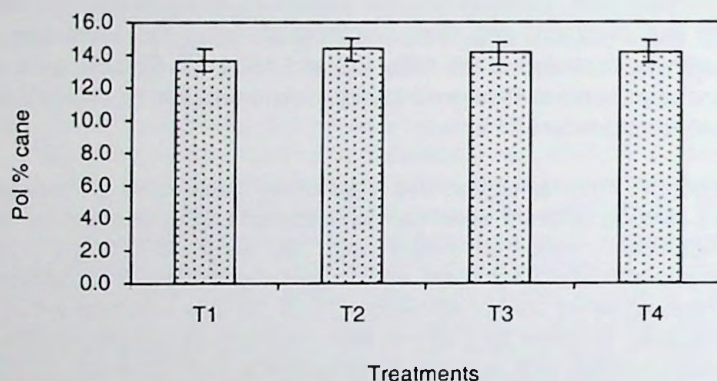


Fig. 1. Pol % cane was affected by different weed management practices

From economic analysis of different treatments the highest total production cost of Tk. 46,500 was for treatment T_2 (Weeding by cultural practices) followed by Tk. 45,500 for T_4 and the lowest of Tk. 42,000 for treatment T_1 (no weeding). The maximum gross return of Tk. 1,08,512.68 was recorded from T_2 followed by Tk. 97,838.88 from T_4 and the lowest was from T_1 of Tk. 66,897.72. The highest gross margin of Tk. 62,012.68 was obtained from T_2 followed by T_4 (Tk. 52,338.88) while the lowest of Tk. 24,897.72 was recorded from T_1 . The highest benefit cost ration (BCR) of 2.33 was recorded from T_2 followed by T_4 and the lowest BCR was from T_1 .

Table 2. Economics and benefit cost ration (BCR) as influenced by different weed control practices. BSRI, 2005-2006.

Treatments	Total production cost (Tk. ha ⁻¹)	Gross return (Tk. ha ⁻¹)	Gross margin (Tk. ha ⁻¹)	BCR
T ₁ : No weeding (control)	42,000	66,897.72	24,897.72	1.59
T ₂ : Weeding by cultural practices	46,500	1,08,512.68	62,012.68	2.33
T ₃ : Weeding using herbicide TOPSTAR 400 SC	44,000	88,386.78	44,386.78	2.00
T ₄ : Weeding using herbicide Neon 70 WG	45,500	97,838.88	52,338.88	2.15

Price of-

Sugarcane: 1286.00 Tk/ton

TOPSTAR 400 SC: 1000 Tk./litre

Neon 70 WG: 1200 Tk./kg

The overall results suggested that application of Neon 70 WG @ 1.5 kg ha⁻¹ found superior to TOPSTAR 400 SC @ 1.5 litre ha⁻¹. Though best management of weeds has been observed by adopting of weeding by cultural practices but the availability of labour required for conducting these cultural operations may be a constrain to pursue the operation in time. The efficiency of pre and post emergence application of Neon 70 WG @ 1.5 kg ha⁻¹ and TOPSTAR 400 SC @ 1.5 litre ha⁻¹ in managing weed population have been proved effective and may be adopted as a means of weed management in commercial cane cultivation.

REFERENCES

- BSRI, 1999. BSRI Annual Report, 1999. Bangladesh Sugarcane Research Institute. Ishurdi, Pabna, Annual Report, 1999. p. 40-42.
- Chauhan, R.S. and Singh, G.B. 1993. Chemical weed control in spring planted sugarcane. *Indian J. Weed Sci.*, 25(1&2): 47-50.
- Kumar, S and Shrivasta, S.N.L. 1994. Herbicidal and non-conventional method of weed management in sugarcane ratoon. *Indian J. Sugarcane Technol.*, 9(2): 123-126.
- Parker, C. and Frayer, J.W. 1975. Weed problems causing major reduction in food supplies. FAO Plant Protection Bulletin.
- Singh, N. and Moolani, M.K. 1975. Areview of chemical weed control in sugarcane. Proc. Third All India weed control Seminar, Hissar p. 41-42.
- Verma, R.S., Chuhan, R.S. and Singh, R.N. 1983. Chemical control of weeds in spring planted sugarcane. *Indian Sugar*, 32(12): 883-887.