

## Weed Management Studies on Sugarcane Ratoon

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### ABSTRACT

*Parthenium hysterophorus*, *Cyperus rotundus*, *Brachiaria ramosa*, others as well as total weed density and total weed dry weight were lowest under atrazine at 2.0 kg ha<sup>-1</sup> which was closely followed by two hoeings done at 50 and 80 days after harvesting of main crop and metribuzin at 1.0 kg ha<sup>-1</sup>. Uncontrolled weeds caused 63.6% reduction in the cane yield when compared with weed-free treatment. Atrazine at 1.0 and 2.0 kg ha<sup>-1</sup> or metribuzin at 1.0 kg ha<sup>-1</sup> applied just after hoeing and two hoeings at 50 and 80 days after harvesting of main crop produced cane yield at par with weed-free treatment.

### INTRODUCTION

Sugarcane ratoon occupies about 50% of total sugarcane acreage, though its productivity is only 45 t ha<sup>-1</sup> against 79 t ha<sup>-1</sup> productivity of plant crop and this is mainly because of the heavy weed infestation due to negligence of farmers (Srivastava *et al.*, 2002). Therefore, priority should be given towards weed management in sugarcane ratoon. Among the various methods, mechanical weed

management is the most effective measure (Agrawal *et al.*, 1997), but from economic aspect herbicidal measures are most suitable for the farmer (Narwal and Malik, 1980). Integrated application of chemical and mechanical methods as well as chemical and trash mulch had been found encouraging (Chauhan *et al.*, 1994). Keeping the above facts in view, the present investigation was undertaken to study the effect of different integrated approaches of weed management in sugarcane ratoon.

Table 1. Effect of different treatments on weed density in sugarcane ratoon

Treatment	Weed density (No. m <sup>-2</sup> ) at 105 days after harvest of main crop					
	<i>P. hysterophorus</i>	<i>C. dactylon</i>	<i>C. rotundus</i>	<i>B. ramosa</i>	Others	Total
Trash mulch <i>in situ</i>	5.19 (179)	3.53 (33)	4.80 (121)	3.37 (28)	2.56 (12)	5.92 (372)
Double rate of trash mulch	4.92 (136)	2.77 (15)	4.67 (106)	2.71 (14)	2.08 (7)	5.63 (277)
Trash mulch <i>in situ</i> +2, 4-D 0.5 kg ha <sup>-1</sup> at 75 days	4.49 (88)	2.64 (13)	4.48 (87)	3.22 (24)	2.30 (9)	5.40 (220)
Trash mulch <i>in situ</i> +MSM 6.0 g ha <sup>-1</sup> at 75 days	4.44 (84)	2.71 (14)	4.42 (82)	3.14 (22)	2.30 (9)	5.36 (211)
*Metribuzin 1.0 kg ha <sup>-1</sup>	2.40 (10)	2.20 (8)	3.50 (33)	1.95 (6)	1.79 (5)	4.13 (61)
*Atrazine 1.5 kg ha <sup>-1</sup>	2.40 (10)	2.56 (12)	3.83 (45)	2.20 (8)	2.08 (7)	4.41 (81)
*Atrazine 2.0 kg ha <sup>-1</sup>	1.79 (5)	2.20 (8)	3.22 (24)	1.61 (4)	1.39 (3)	3.81 (44)
First irrigation fb paraquat 0.5 kg ha <sup>-1</sup>	4.28 (71)	3.14 (22)	4.78 (118)	3.56 (34)	2.71 (14)	5.55 (247)
*Paraquat 0.5 kg ha <sup>-1</sup> at emergence of weeds	2.94 (18)	2.08 (7)	3.76 (42)	2.83 (16)	2.20 (8)	4.52 (91)
Two hoeings at 50 and 80 days	2.30 (9)	2.20 (8)	3.47 (31)	1.95 (6)	1.61 (4)	4.04 (56)
Weed-free	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)	0.00 (0)
Weedy	5.78 (324)	4.08 (58)	5.08 (159)	3.93 (50)	3.04 (20)	6.42 (6.15)
LSD (P=0.05)	0.26	0.22	0.24	0.21	0.17	0.28

Figures in parentheses indicate original values which were transformed to log<sub>e</sub>(X+1).

\*Applied after first irrigation followed by hoeing. MSM=Metsulfuron methyl, fb=followed by.

## MATERIALS AND METHODS

Field experiment was conducted during 1998-99 and 1999-2000 at Crop Research Centre of G. B. Pant University of Agriculture & Technology, Pantnagar, Uttarakhand. The soil of the experimental field was silty clay loam, medium in organic carbon (0.66%), available phosphorus (15 kg P ha<sup>-1</sup>) and potassium (240 kg K ha<sup>-1</sup>) with pH 7.2. Twelve treatments (Table 1) were laid out in a randomized block design with three replications. The main crop of sugarcane variety CoS-767 was harvested on February 15, 1998 and February 6, 1999, respectively. The amount of trash *in situ* was 4.4 t ha<sup>-1</sup>. First irrigation to the crop was provided on March 17 and 9, 1998 and 1999, respectively. Metribuzin at 1.0 and atrazine at 1.5 and 2.0 kg ha<sup>-1</sup> were applied at 36 days after cutting of plant crop (DACP) as pre-emergence immediately after hoeing which was given after first irrigation. However, paraquat at 0.5 kg ha<sup>-1</sup> was applied as post-emergence spray after the first irrigation and hoeing of crop at 50 DACP. 2, 4-D at 0.5 kg and metsulfuron methyl (MSM) at 6.0 g ha<sup>-1</sup> were applied at 75 DACP in the trash mulch treated plots. Herbicides were applied as spray using 600 litres of water ha<sup>-1</sup>. All other recommended package of practices was followed to raise the ratoon of sugarcane.

## RESULTS AND DISCUSSION

### Effect on Weeds

The major weeds observed in the weedy plots were *Parthenium hysterophorus* (52.4%), *Cyperus rotundus* (26.0%), *Cynodon dactylon* (9.5%) and *Brachiaria ramosa* (8.1%). Other weeds (8.1%) recorded were *Digitaria sanguinalis*, *Echinochloa colona*, *Dactyloctenium aegyptium*, *Euphorbia hirta*, *Sorghum halepense* and *Canabis sativa*. All the weed control measures reduced the density of *P. hysterophorus*, *C. rotundus*, *C. dactylon*, *B. ramosa*, others and total weeds as well as total weeds dry weight (Table 2). *C. rotundus*, *B. ramosa*, other weeds density and total weeds dry weight recorded were lowest under atrazine at 2.0 kg ha<sup>-1</sup> applied after first irrigation followed by hoeing which was closely followed by two hoeings at 50 and 80 days and metribuzin at 1.0 kg ha<sup>-1</sup> applied after first irrigation followed by hoeing. In case of *P. hysterophorus* and total weeds, again the lowest density was noticed under atrazine at 2.0 kg ha<sup>-1</sup> which was also followed closely by two hoeings at 50 and 80 days, metribuzin at 1.0 kg ha<sup>-1</sup> and atrazine at 1.5 kg ha<sup>-1</sup>. *C. dactylon* density was found lowest under paraquat at 0.5 kg ha<sup>-1</sup> applied after first irrigation followed by hoeing at emergence of weeds

Table 2. Effect of different treatments on weed dry matter production and cane yield

Treatment	Weed dry matter (g m <sup>-2</sup> ) at 105 days after harvest of main crop	Cane yield (t ha <sup>-1</sup> )
Trash mulch <i>in situ</i>	5.43 (227.2)	43.9
Double rate of trash mulch	5.12 (166.0)	49.6
Trash mulch <i>in situ</i> +2, 4-D 0.5 kg ha <sup>-1</sup> at 75 days	4.64 (102.7)	61.0
Trash mulch <i>in situ</i> +MSM 6.0 g ha <sup>-1</sup> at 75 days	4.64 (102.7)	60.4
*Metribuzin 1.0 kg ha <sup>-1</sup>	3.73 (40.9)	74.8
*Atrazine 1.5 kg ha <sup>-1</sup>	3.91 (49.3)	71.6
*Atrazine 2.0 kg ha <sup>-1</sup>	3.52 (32.7)	76.7
First irrigation fb paraquat 0.5 kg ha <sup>-1</sup>	5.03 (152.0)	52.6
*Paraquat 0.5 kg ha <sup>-1</sup> at emergence of weeds	4.30 (72.6)	65.5
Two hoeings at 50 and 80 days	3.64 (37.0)	78.5
Weed-free	0.00 (0.0)	82.3
Weedy	5.88 (355.5)	29.9
LSD (P=0.05)	0.32	10.8

Figures in parentheses indicate original values which were transformed to log<sub>e</sub> (X+1).

\*Applied after first irrigation followed by hoeing. MSM=Metsulfuron methyl, fb=followed by.

and that was at par with two hoeings at 50 and 80 days, metribuzin at 1.0 kg ha<sup>-1</sup> and atrazine at 2.0 kg ha<sup>-1</sup>, 2, 4-D at 0.5 kg and MSM at 6.0 g ha<sup>-1</sup> in trash mulch treated plots controlled *P. hysterophorus* effectively. However, some effect of these herbicidal treatments was also observed on *C. rotundus* and *C. dactylon*, respectively.

#### Effect on Crop

Uncontrolled weeds caused 63.6% reduction in the cane yield when compared with weed-free treatment (Table 2). Cane yield was significantly increased due to all the weed control measures over weedy check. Application of 2, 4-D at 0.5 kg ha<sup>-1</sup> or metsulfuron methyl applied at 75 days after cutting of plant cane at 6.0 g ha<sup>-1</sup> in trash mulch *in situ* treatment caused significant increase in cane yield over trash mulch *in situ* alone and two times of trash mulch *in situ* except trash mulch *in situ* alongwith MSM at 6.0 g ha<sup>-1</sup> which was at par with two times of trash mulch *in situ*. Paraquat at 0.5 kg ha<sup>-1</sup> directed

spray after first irrigation followed by hoeing at the emergence of weeds produced significantly higher cane yield than its application as directed spray at 0.5 kg ha<sup>-1</sup> after first irrigation. Atrazine at 1.5 or 2.0 kg ha<sup>-1</sup> and metribuzin at 1.0 kg ha<sup>-1</sup> applied just after hoeing and two hoeings at 50 and 80 days after harvesting of main crop produced the cane yield at par with weed-free treatment.

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