

Integrated weed management studies on sugarcane ratoon

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ABSTRACT

A field experiment was conducted during 2002-03 and 2003-04 to study the effect of integrated weed management in sugarcane ratoon. *Echinochloa* spp., *Cyperus rotundus* and *Digitaria sanguinalis* were the dominating weeds associated with the crop and constituted 17.17, 61.34 and 9.50% of total weed population, respectively. Three hoeings at 30, 60 and 90 days after harvesting (DAH) produced maximum cane yield with the minimum weed dry matter among all treatments, which were at par to pre-emergence application of atrazine at 2.0 or 1.5 kg/ha, supplemented with hoeings at 60 and 90 DAH. Pre-emergence application of atrazine 2.0 kg/ha did not prove efficient to control the weeds.

Key words : Integrated weed management, Sugarcane ratoon

Sugarcane ratoon occupies about 50% of total sugarcane area, though its productivity is 45 t/ha against 70 t/ha productivity of main planted crop. This low productivity is mainly due to heavy weed infestation (Srivastava *et al.* 2002). Sugarcane being a widely spaced crop with slow lateral spread and long duration provides suitable environment to weeds for their growth and development. Mechanical weed management is the most effective measures to control weeds, however owing to labour shortage and soil wetness make it problematic to adopt by the farmers. Application of herbicides alone is not proved as much effective against weeds as mechanical methods. Integration of chemical and mechanical measures as well as chemical and trash mulch had been found encouraging (Chauhan *et al.* 1994). Considering all these facts, an attempt was made in the present investigation to study the effective integrated weed management practices for sugarcane ratoon.

MATERIALS AND METHODS

A field experiment was conducted during 2002-2003 and 2003-04 at G.B. Pant University of Agriculture and Technology, Pantnagar, Uttarakhand. The soil of the experimental field was clay loam in texture, medium in organic carbon (0.68%), available phosphorus (18.4 kg/ha) and potassium (240.0 kg/ha) with pH 7.2. Ten treatments were taken comprising of trash mulching at 5 t/ha at 3 days after harvesting (DAH) of the main crop, atrazine 1.0 kg/ha at 3 DAH followed by trash mulch at 5 t/ha, atrazine 2.0 kg/ha at 3 DAH, atrazine 2.0 kg/ha at 3 DAH followed by manual hoeing at 60 DAH, atrazine 2.0 and 1.5 kg/ha 3 DAH followed by manual hoeings at 60 and 90 DAH, respectively, atrazine at 2.0 kg/ha at 3 DAH followed by 2,4-D 0.5 kg/ha at 70 DAH, atrazine at 2.0 kg/ha followed by metsulfuron methyl (MSM) 4 g/ha at 70

DAH, hoeings at 30, 60 and 90 DAH, respectively. These combinations were tested in randomized block design. The main crop of sugarcane variety *Co Pant 90223* was harvested on March 25, 2003 and March 8, 2004, respectively. Herbicides were applied as spray with a spray volume of 600 litres/ha. All other recommended package of practices were adopted to raise the ratoon crop of sugarcane. Pooling of data was done over the year as the data qualified the homogeneity test.

RESULTS AND DISCUSSIONS

The major weeds of the experimental field were *Echinochloa* spp. (17.17%), *Cyperus rotundus* (61.34%) and *Digitaria sanguinalis* (9.50%), which constituted 88% of the total weed population. The other weeds with very low density (12%) were *Brachiaria mutica*, *Cannabis sativa*, *Cucumis trigonus*, *Eleusine indica*, *Dactyloctenium aegyptium*, *Euphorbia hirta*, *Ipomoea* spp., *Cleome viscosa* and *Trianthema monogyna*.

All the weed control measures caused significant reduction in the density of *Echinochloa* spp., *C. rotundus*, *D. sanguinalis*, as well as density and dry weight of total weeds over weedy check except density and dry weight of *Echinochloa* spp., in trash mulch alone. Significantly lower density of *Echinochloa* spp. was recorded with three hoeings at 30, 60 and 90 DAH than all other treatments, which was at par with pre-emergence application of atrazine at 1.5kg/ha and 2.0kg/ha, respectively supplemented with hoeings at 60 and 90 DAH. Significant reduction in the population of *Cyperus rotundus* was recorded with pre-emergence application of atrazine at 2.0 kg/ha, supplemented with hoeings at 60 and 90 DAH, which was at par with three hoeings at 30, 60 and 90 DAH. In case of *D. sanguinalis*, the lowest density was noticed under three hoeings at 30, 60 and 90 DAH (Table 1).

Table 1. Effect of treatments on density and dry weight of weeds at 105 days after harvesting (DAH) and cane yield

Treatment	Application stage (DAH)	Dose	Weed Population/m ²				Weed dry weight (g/m ²)	Cane yield (t/ha)
			<i>Echinochloa</i> spp.	<i>Cyperus rotundus</i>	<i>Digitaria sanguinalis</i>	Total		
Trash mulch	3	5 t /ha	3.5 (34)	5.0 (142)	3.0 (21)	5.4 (220)	5.26 (194.9)	48.4
Atrazine <i>fb</i> trash mulch	3 <i>fb</i> 3	1.0 kg /ha <i>fb</i> 5 t /ha	2.9 (19)	4.9 (135)	2.5 (12)	5.2 (182)	4.72 (113.2)	62.8
Atrazine	3	2.0 kg /ha	3.3 (26)	5.2 (186)	2.7 (15)	5.5 (247)	5.09 (163.6)	52.5
Atrazine <i>fb</i> hoeing	3 <i>fb</i> 60	2.0 kg /ha	2.6 (13)	4.3 (76)	2.2 (9)	4.7 (108)	4.12 (62.0)	76.4
Atrazine <i>fb</i> hoeing	3 <i>fb</i> 60 and 90	2.0 kg /ha	1.0 (3)	3.1 (23)	1.1 (3)	3.5 (32)	2.37 (10.8)	85.4
Atrazine <i>fb</i> hoeing	3 <i>fb</i> 60 and 90	1.5 kg /ha	1.0 (3)	3.6 (35)	1.1 (3)	3.8 (46)	3.17 (23.9)	85.2
Atrazine <i>fb</i> 2,4-D	3 <i>fb</i> 70	2.0 kg /ha <i>fb</i> 0.5 kg /ha	3.3 (27)	5.1 (167)	2.8 (16)	5.4 (220)	4.91 (136.2)	58.7
Atrazine <i>fb</i> MSM	3 <i>fb</i> 70	1.0 kg /ha <i>fb</i> 0.004 kg /ha	3.3 (28)	5.1 (161)	2.6 (14)	5.4 (211)	4.92 (137.5)	58.8
Hoeings	30, 60 and 90	-	0.7 (2)	3.2 (24)	0.7 (2)	3.3 (28)	2.63 (13.9)	87.2
Weedy	-	-	4.0 (56)	5.3 (200)	3.5 (31)	5.8 (326)	5.18 (178.4)	33.2
LSD (P=0.05)			0.6	0.2	0.4	0.2	0.3	8.2

Figures in parenthesis indicate original values which were transformed to log, (x+1) DAH - Days after harvesting of the main crop, MSM - Metsulfuronmethyl, *fb* - followed by

Among the treatments, the lowest values of *D. Sanguinalis* was observed with pre-emergence application of atrazine at 1.5 kg or 2.0 kg /ha followed by hoeings at 60 and 90 DAH.

Uncontrolled weeds on an average caused 61.92% reduction in the cane yield, when compared with three hoeings alone at 30, 60 and 90 DAH (Table 1). Cane yield significantly increased when any of the weed control measures was adopted as compared to weedy check. The highest cane yield of ratoon was recorded with three hoeings at 30, 60 and 90 DAH, which was closely followed by pre-emergence application of atrazine at 1.5 or 2.0 kg/ha, respectively supplemented with hoeings at 60 and 90 DAH. Atrazine 1.0 kg/ha as pre-emergence

application followed by trash mulching at 5 t/ha caused significant increase in cane yield over trash mulch alone and pre-emergence application of atrazine 2.0 kg/ha. This treatment produced cane yield almost similar to pre-emergence application of atrazine at 2.0 kg/ha supplemented with MSM 4 g/ha applied at 70 DAH.

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