

Weed management in late-planted sugarcane

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ABSTRACT

An experiment conducted during 2001–2002 and 2002–2003 showed 43.4% and 43.9% reduction in cane yield due to weeds. Highest cane yield (84.6 tonnes/ha and 80.6 tonnes/ha) was recorded under weed-free conditions, which was at par with 3 hoeings (30, 60 and 90 days after planting) during both the years. Significant improvement in cane yield was reported under treatments comprising herbicide spray followed by hoeing over that of herbicide spray alone. Highest net return of Rs 31,296/ha and 27,989/ha was recorded in weed-free treatment during 2001–2002 and 2002–2003 respectively. However, highest benefit : cost ratio of 1:0.58 during 2001–2002 and of 1:0.55 during 2002–2003 was observed in 3 hoeings (30, 60 and 90 days after planting).

Key words : Herbicide, Metribuzin, Net return, Weed management, Sugarcane

Reduction in cane yield due to weeds occurs up to 40–67% (Chauhan and Srivastava, 2002). Weeds in sugarcane need to be controlled at formative stage. Among several methods, mechanical, cultural, chemical and integrated approach, were tried by Padiappan *et al.* (1999). Manual hoeing and weeding are costly and labour intensive. Thus, there is need to identify effective herbicides and also to integrate various methods of weed control for effective and economical weed management. In some of the areas, sugarcane is taken after wheat harvest. Due to high temperature in summers, frequent irrigations are required. Sugarcane being highly fertilized crop required more irrigation. Weeds grow vigorously and compete with the crops at tillering stage. Some intercropping, i.e. cowpea, greengram and maize, are also popular in late-planted cane crop. Therefore the present study was undertaken to study the influence of weed-management practices in controlling weeds, and economics of various treatments in late-planted sugarcane.

MATERIALS AND METHODS

A field experiment was conducted in randomized block design during 2001–2002 and 2002–2003 at Janta Vedic (P.G.) College, Baraut (Baghpat), Uttar Pradesh. Total 15 treatments [3 hoeing 30, 60 and 90 days after planting (DAP); Atrazine @ 2.0 kg a.i./ha + 2,4-D 1.0 kg a.i./ha 60 DAP; Metribuzin 2.0 kg/ha (PE) alone and with 1 weeding 60 DAP; Metribuzin 1.0 kg/ha as PE + 2,4-D @

1.0 kg a.i. Post-em; Ametryn (80 WP) 2.0 kg/ha PE; Ametryn 2.0 kg/ha + 1 hand-weeding 60 DAP; Ametryn 2.0 kg a.i./ha + 2,4-D @ 1.0 kg a.i./ha 60 DAP; Glyphosate 1.0 kg 20 DAP + 1 hoeing as 60 DAP; greengram, blackgram, cowpea intercrops + pendimethalin @ 1.0 kg a.i./ha + 1 hoeing after harvesting of each intercrops; trash mulching @ 10 tonnes/ha, weedy and weed (free) were replicated 3 times. Sugarcane variety 'CoS 767' was planted 60 cm apart in furrows on 7 May during 2001–2002 and on 16 April during 2002–2003. Recommended dose of fertilizer (120 kg N + 60 kg P₂O₅/ha + 40 kg K₂O/ha) was applied. The recommended package of practices were followed for raising the crop. Herbicides were applied as per treatments. Seven hoeings were given in weed-free treatment to keep field free from weeds since very beginning to 120 days stage. Soil was neutral (pH 7.4) and sandy loam in texture. Economics of the treatments was calculated by involving cost of cultivation, gross return, net return and benefit : cost ratio.

RESULTS AND DISCUSSION

Significantly higher cane yield was recorded in weed-free treatment, which was at par with 3 hoeings (30, 60 and 90 DAP) during both the years. Reduction in cane yield (43.4% and 43.9%) was recorded due to weeds during 2001–2002 and 2002–2003. Application of Atrazine, Metribuzin and Ametryn followed by 2,4-D resulted in an

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improvement in cane yield and led to mean increase of 25.79, 25.67 and 25.61% in cane yield over weedy check and integrated method as metribuzin + 1 hand-weeding (60 DAP) increased yield 30.09% over weedy check. The cane yield was reflected by less number of weeds, dry-matter accumulation by weeds ultimately produced higher number of millable cane in these treatments (Table 1). Vashishtha *et al.* (2002) also reported that pre-emergence application of Metribuzin at 1.5 kg/ha (PE) + 2,4-D 1.0 kg/ha (post-emergence) resulted in significantly higher number of tillers and cane yield than that of weedy check. Superiority of mechanical weeding and hoeing was advocated by Patil (1981) in terms of higher cane yield and higher number of millable canes.

Infested weed species included *Echinochloa colonum* Link and *Brachiaria ramosa* Stapf among grasses;

Trianthema portulacastrum L. among non-grasses. Other weeds included *Cynodon dactylon* Pers., *Dactyloctenium aegyptium* (L.) Willd. and *Eleusine indica* Gaertn. among grasses; and *Commelina benghalensis* among non-grasses in low intensity during both the years. Dagar *et al.* (1991) also reported the similar weed species. Interculture operation (hoeing at, DAP) showed an advantage in reducing weed population and dry matter of weeds and increasing cane yield, number of millable canes compared with herbicidal treatment alone. Trash mulch also reduced the weed population and dry matter during both the years, however the cane yield could not be improved and number of millable canes were also low compared to rest of the treatments in planted cane. Pandian *et al.* (1991) also reported that Atrazine + 1 hand-weeding gave higher cane yield over Atrazine alone.

Table 1. Effect of weed management practices on cane yield and benefit : cost ratio, total weeds and weed dry matter (g/m²) at 60 days after planting in late-planted cane

| Treatment | No. of millable canes | | Cane yield (tonnes/ha) | | Total weeds/ (m ²) | | Weed dry matter (g/m ²) | | Benefit : cost ratio | |
|----------------------------------------------------------------|-----------------------|-----------|------------------------|-----------|--------------------------------|-----------------|-------------------------------------|-----------------|----------------------|-----------|
| | 2001-2002 | 2002-2003 | 2001-2002 | 2002-2003 | 2001-2002 | 2002-2003 | 2001-2002 | 2002-2003 | 2001-2002 | 2002-2003 |
| Weedy | 47.3 | 45.6 | 47.9 | 42.3 | 24.2 (588.4) | 20.7 (426.2) | 12.5 (157.9) | 11.4 (130.5) | 1:0.13 | 1:0.02 |
| Weed free | 77.6 | 74.8 | 84.6 | 80.6 | 0.7 (0.0) | 0.7 (0.0) | 0.7 (0.0) | 0.7 (0.0) | 1:0.58 | 1:0.52 |
| Three hoeings at 30,60 and 90 DAS | 69.9 | 67.5 | 77.0 | 75.3 | 4.8 (22.1) | 4.2 (20.9) | 4.9 (23.6) | 4.8 (22.6) | 1:0.58 | 1:0.55 |
| Atrazine 2.0 kg as PE + 2,4-D 1.0 kg 60 DAP | 65.4 | 63.1 | 65.4 | 62.3 | 7.8 (60.1) | 6.2 (37.5) | 7.5 (55.5) | 6.6 (43.4) | 1:0.39 | 1:0.36 |
| Metribuzin 1.0 kg as PE | 64.4 | 62.2 | 60.3 | 58.2 | 13.0 (179.4) | 9.9 (101.1) | 8.4 (70.3) | 7.8 (6.05) | 1:0.29 | 1:0.25 |
| Metri. 1.0 kg as PE + one-hand weeding at 60 DAP | 69.0 | 66.6 | 68.8 | 66.8 | 8.5 (43.3) | 6.1 (37.1) | 7.7 (59.1) | 7.1 (50.5) | 1:0.40 | 1:0.37 |
| Metri. 1.0 kg as PE + 2,4-D 1.0 kg as post emergence | 67.2 | 64.9 | 64.4 | 62.2 | 13.4 (76.9) | 8.0 (67.6) | 5.0 (24.8) | 4.6 (20.5) | 1:0.34 | 1:0.31 |
| Ametryn 2.0 kg as PE | 65.1 | 62.8 | 59.1 | 57.0 | 6.1 (200.8) | 10.8 (125.6) | 7.2 (51.0) | 6.7 (43.8) | 1:0.25 | 1:0.22 |
| Ametryn 2.0 kg PE + one hand weeding at 60 DAP | 68.9 | 66.5 | 63.4 | 62.2 | 6.4 (37.9) | 6.0 (36.3) | 7.2 (51.9) | 6.0 (35.0) | 1:0.32 | 1:0.30 |
| Ametryn 2.0 kg as 20 DAP + 2,4-D 1.0 kg at 60 DAP | 66.6 | 64.3 | 64.4 | 62.1 | 5.4 (40.7) | 6.3 (38.9) | 7.2 (51.5) | 6.5 (41.3) | 1:0.34 | 1:0.30 |
| Glyphosate 1.0 kg as PE + one hand weeding at 60 DAP | 57.6 | 55.6 | 57.1 | 55.1 | 7.2 (30.0) | 5.3 (28.7) | 6.6 (42.4) | 5.9 (33.9) | 1:0.25 | 1:0.22 |
| Black gram + Pendi 1.0 + one hoeing after harvest of blackgram | 63.3 | 61.1 | 59.3 | 57.2 | 6.7 (56.9) | 7.4 (54.5) | 6.0 (35.1) | 5.2 (27.2) | 1:0.23 | 1:0.20 |
| Cowpea + Pendi 1.0 + one hoeing after harvest cowpea | 58.8 | 56.8 | 55.9 | 54.3 | 6.7 (44.6) | 6.5 (42.7) | 5.8 (32.7) | 3.8 (14.5) | 1:0.17 | 1:0.15 |
| Trash mulching | 52.9 | 51.1 | 52.2 | 50.7 | 3.3 (44.8) | 6.5 (42.9) | 5.4 (29.1) | 3.9 (15.2) | 1:0.21 | 1:0.19 |
| CD (P=0.05) | 3.6 | 3.6 | 8.8 | 8.7 | 3.3 | 2.4 | 0.8 | 0.8 | | |

DAP, Days after planting; PE, Pre-emergence

Data was transformed, $\sqrt{x+1}$; Original values are under Parenthesis

The highest benefit : cost ratio was recorded 3 hoeings treatment, being slightly higher than that obtained with weed free treatment. Though higher gross return was obtained from weed-free treatment, net return decreased under this treatment due to higher cost of production (about 5 hoeings more) compared to 3 hoeings. Additional costs occurred due to weed-control treatments or due to raising intercrops in the treatments resulted in decreased net return.

Metribuzin 1.0 kg/ha with hand-weeding at 60 days gave higher net return and benefit : cost ratio. Singh *et al.* (1996) also suggested that in case of shortage of labours, Metribuzin 1.0 kg/ha or Atrazine 2.0 kg/ha with 1 hoeing at 60 DAP gave higher return and benefit : cost.

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