

**EFFECT OF SOME WEED CONTROL TREATMENTS ON SUGAR CANE yield (*Saccharum officinarum* L.) AND THE ASSOCIATED WEEDS.**

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**ABSTRACT :** Four field experiments were carried out at El-Mattaana Agricultural Research Station, Agricultural Research Center, Esna, Qena Governorate during 1999 / 2001 and 2000/ 2002 growing seasons. The present investigation aimed to study the effect of some herbicides either individuals (metribuzin at 300 g/fed, metosulam at 80 cc/fed, tribenuron at 8 g/fed, and glufosinate at 2L/fed) or in combinations (metribuzin plus glufosinate, metribuzin plus hand hoeing once, glufosinate plus glufosinate and glufosinate plus hand hoeing once) compared to hand hoeing at 3 and 4 times on sugar cane yields and the associated weeds. The obtained results from both seasons showed that all weed control treatments either individuals at 60 and 150 days after planting (DAP) or in combinations at 90 and 150 (DAP) gave significant effect on controlling the weeds. Hand hoeing at 4 times, hand hoeing at 3 times and metribuzin at 300 g/fed as individual treatments gave the highest reduction on the dry weight of broad-leaved weeds at 150 DAP by 93.3, 81.1 and 70.1 %, in 1<sup>st</sup> season and by 95.0, 84.8 and 72.4 %, respectively in 2<sup>nd</sup> one as compared with control treatment. Hand hoeing at 4 times, hand hoeing at 3 times, metribuzin at 300 g/fed plus hand hoeing once and metribuzin at 300 g/fed plus glufosinate at 2L/fed as combined treatments gave the highest reduction on the dry weight of broad-leaved weeds at 150 DAP by

87.9, 84.3, 72.4 and 71.6 %, in 1<sup>st</sup> season and by 90.7, 83.4, 69.9 and 68.4 %, respectively in 2<sup>nd</sup> season as compared with control treatment. Meanwhile, hand hoeing at 4 times and hand hoeing at 3 times either individuals or in combinations gave the highest reduction on dry weight of grassy weeds at 150 DAP from 75.2 to 86.3 % in both seasons as compared with control treatment. All weed control treatments gave significant effect on increasing sugar cane yields and its components in both seasons, where the hand hoeing at 4 and 3 times were superior treatments. Hand hoeing at 4 times in first two experiments gave highest value of cane yield and sugar yield by 43.95 and 6.13 t/fed, in 1<sup>st</sup> season, and by 42.41 and 5.97 t/fed, respectively in 2<sup>nd</sup> season. The yield of sugar cane was significantly increased from respective treatment by 43.44 % in 1<sup>st</sup> season and 38.87 % in 2<sup>nd</sup> season as compared with control treatment. Similar result was obtained from hand hoeing at 4 times in the others two experiments where it gave highest value of cane yield and sugar yield by 48.62 and 6.81 t/fed in 1<sup>st</sup> season, and by 47.35 and 6.73 t/fed in 2<sup>nd</sup> one, respectively as compared with control treatment. The yield of sugar cane was significantly increased from respective treatment by 44.1 % and 51.9 % in 1<sup>st</sup> season and 2<sup>nd</sup> season, orderly as compared with control treatment. The other treatments of either individuals or in combinations gave the highest values of stalk height (cm), stalk diameter (cm), sucrose (g/100ml), purity %, sugar cane yield (t/fed) and sugar yield (t/fed) in both seasons.

**Key words:** sugar cane, individual treatments, combined treatments and hand hoeing.

## INTRODUCTION

In Egypt, sugar cane (*Saccharum officinarum* L.) is a very important sugar crop. It is cultivated about 300000 feddans where the total production is still insufficient to cover the local consumption. Factors affecting the productivity of new sugar cane

variety G 85/37 were weeds, soil moisture, soil fertility and poor drainage. Kakde 1985 stated that the development and maintenance of new higher yielding crop variety is generally done under condition of minimal weeds, insect and disease interference.

Weeds directly compete with sugar cane plants for

environmental resources (space, sun light, water and nutrients) causing a serious reduction in yield. Yield losses is greater than 50% at uncontrolled high weed infestation level(Nour and Allam 1988, Abd El-Latif 1990, Abd El-Latif et al. 1994, Attalla et al. 1995 and Thakur et al. 1995). All types of weeds in sugar cane are needed to be controlled (Obien and Baltazar 1979 and Kakde 1985). Weed control treatments i.e. hand hoeing or herbicides increase the yield of sugar cane. Broad leaved weeds and grasses that can be controlled effectively by triazine derivatives such as ametryne, atrazine and ametryne plus atrazine (Salunkhe et al. 1990, Attalla et al. 1995, Marion 1996 and Richard 1997). Herbicides are effective and fast on controlling weeds in sugar cane crop, but the public opinion in Egypt is strongly to prevent the using of these dangerous herbicides. Therefore, some herbicides become available in this situation, they are effective in controlling weeds in other crops and did not previously use to control the weeds in sugar cane i.e. metribuzin, metosulam, tribenuron and glufosinate (Bassiouny et al. 1993, Abd El-Latif et al. 1994, Mahadevaswamy et al. 1994 and Kholosy et al. 1998).

So, the present work was conducted to study the effect of some herbicides applied either individuals or combined to each others or with hand hoeing once on controlling weeds and new sugar cane yield variety G 85/37.

## MATERIALS AND METHODS

Four field experiments were carried out at El- Mattaana Agricultural Research Station, Agricultural Research Center, Esna, Qena Governorate during 1999/2001 and 2000/2002 seasons, to study the effect of weed control treatments i.e. hand hoeing and herbicides applied either individuals or in combinations on weeds and sugar cane yield. The soil texture of the experiment fields is clay loam in the two seasons. Each experiment was laid out in complete randomized block design with 4 replicates. The plot size was 35m<sup>2</sup> (5X7m) contained 5 rows one meter apart. New sugar cane cultivar G 85/37 was planted on November, 18<sup>th</sup> and November, 22<sup>nd</sup> of 1999 and 2000 seasons, respectively. The dry method of sugar cane planting was used. Twenty five from three budded sets of cuttings were planted in each row. The other normal cultural

practices were carried out according to the local region as usual. Phosphorus (15.5%) was applied at rate 60 kg(P<sub>2</sub>O<sub>5</sub>)/fed at Soil preparation (before planting). Nitrogen was added as urea (46 %) at rate 210 kg N/fed and divided into two equal doses. Potassium (48 %) was applied at the rate 48 kg (K<sub>2</sub>O)/fed with 2<sup>nd</sup> nitrogen addition before 2<sup>nd</sup> irrigation.

**1-Two experiments included the individual herbicides : each experiment Contained seven treatments as follows:**

- 1-Metribuzin :[4 - amino-6 - (1,1 - dimethylethyl)-3-(methylthio) -1,2,4- triazin - 5 - (4H) one], known commercially as (Sencor 70 %WP) at 300 g/fed, applied at 30 days after planting (DAP).
- 2- Metosulam:N-(2,6 - dichloro-m-tolyl)- 5,7 dimethoxy (1,2,4) triazolo(1,5 - 9) pyrimidine - 2 sulfonamide. known commercially as (Sinal 10 % SC) at 80 cc/fed, applied at 25 DAP (before 1<sup>st</sup> irrigation by 24 hrs).
- 3-Tribenuron:Methyl 2-[[[N 4-(methoxy - 6 - methyl 1,2,3 triazin 2 - yl) methyl amino] carbonyl] amino] sulfonyl] benzoate. known commercially as (Granstar 75 %DF)at 8g/fed,

applied at 30 DAP.

- 4-Glufosinate: Ammonium-DL - homalanin- 4-yl-(methyl phosphinate), known commercially as (Basta 20 % EC) at 2L/fed, applied at 30 DAP.
- 5-Hand hoeing 3 times at 45, 75 and 105 DAP.
- 6- Hand hoeing 4 times at 45, 75, 105 and 140 DAP.
- 7- Untreated (control).

**II - Two experiments included th combined herbicides : each experiment Contained nine treatments as follows:**

- 1-Metribuzin at 300 g/fed, applied at 30 DAP.
- 2-Metribuzin at 300 g/fed + Glufosinate at 2L/fed, applied at 30 + 60 DAP.
- 3-Metribuzin at 300 g/fed + hand hoeing once, applied at 30 + 60 DAP.
- 4-Glufosinate at 2L/fed, applied at 30 DAP.
- 5-Glufosinate + Glufosinate at 2L + 2L/fed, applied at 30 + 60 DAP.
- 6-Glufosinate + hand hoeing once applied at 30 + 60 DAP.
- 7-Hand hoeing 3 times at 45, 75 and 105 DAP.
- 8- Hand hoeing 4 times at 45, 75, 105 and 140 DAP.
- 9- Untreated (control).

The herbicides were applied by knapsack sprayer equipped with one nozzle boom and water volume was 200 L/fed. Weeds were hand pulled from 1 m<sup>2</sup>, chosen at random from each plot at 60 and 150 DAP for two experiments of the individual treatments and at 90 and 150 DAP for other two experiments of combined treatments. Weeds were classified into broad-leaved weeds and grasses. Dry weight (g/m<sup>2</sup>) of each group and the total weeds were determined.

Sugar cane yield was harvested on February, 20<sup>th</sup> and February, 25<sup>th</sup> of 2001 and 2002 seasons, respectively. Samples of 20 stalks were chosen at random from 2 inner rows of each plot to study the following characters:

- 1-Stalk height(cm): was measured from land level till dewlap.
- 2-Stalk diameter (cm): measured at middle part of the stalk.
- 3-cane yield (t/fed): cane stalks of the three guarded rows were harvested, topped, cleaned, weighed and cane yield (t/fed) was calculated.
- 4- Sugar yield ( t / fed ) : was estimated according to the following equation :

Raw sugar production =

Cane yield (t/fed) X Recovery %

- 5- Sucrose % : was determined

by using sacharemeter as g/100 cm<sup>3</sup> of juice according to AOAC (1995).

- 6- Total Soluble Solid % (TSS % or Brix %) : was determined by using hand refractometer from the 6<sup>th</sup> internode.

- 7- Purity % : was calculated by the following equation :

Purity % =

Sucrose % X (100 / Brix %).

Data were statistically analyzed according to Snedecor and Cochran (1982) and LSD at 5 % level was used for the comparisons between the treatment means.

## RESULTS AND DISCUSSION

In this study, the presented broad-leaved weeds were *Amaranthus viridis* L., *Beta vulgaris* L., *Chenopodium album* L., *Convolvulus arvensis* L., *Hibiscus trionum* L., *Melilotus indicus* L., *Portulaca oleracea* L. and *Sida alba* L. The presented grassy weeds were *Avena* sp., *Cynodon dactylon* L., *Cyperus rotundus* L., *Lolium* sp., *Phalaris* sp. and *Sorghum* Sp.

### 1- Effect of individual treatments on weeds :

**Table (1):** Effect of weed control treatments (individual) on dry weight ( $\text{g/m}^2$ ) of grassy, broad-leaved and total weeds at 60 and 150 DAP during 1999/2001 season.

Treatments	Rate/ fed	1 <sup>st</sup> survey at 60 DAP			2 <sup>nd</sup> survey at 150 DAP		
		Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )	Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )
Metribuzin	300 g	4.28	19.34	23.62	127.9	92.0	219.9
Metosulam	80 cc	18.45	64.92	83.37	145.5	150.0	295.5
Tribenuron	8 g	9.27	68.26	77.53	129.2	165.0	294.2
Glufosinate	2L	10.23	23.40	33.63	165.4	123.0	288.4
Hand hoeing*	3 times	—	—	—	80.7	35.0	115.7
Hand hoeing*	4 times	—	—	—	28.8	21.6	50.4
Control		122.48	64.68	187.16	428.0	142.0	570.0
LSD (5%)		17.8	14.3	25.0	51.3	13.8	62.1

\* Hand hoeing at 3 and 4 times are still not completed during 1<sup>st</sup> survey.

**Table (2):** Effect of weed control treatments (individual) on dry weight ( $\text{g/m}^2$ ) of grassy, broad-leaved and total weeds at 60 and 150 DAP during 2000/2002 season.

Treatments	Rate/ fed	1 <sup>st</sup> survey at 60 DAP			2 <sup>nd</sup> survey at 150 DAP		
		Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )	Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )
Metribuzin	300 g	5.35	30.47	35.82	184.3	146.4	330.7
Metosulam	80 cc	15.82	109.82	125.64	218.8	249.0	467.8
Tribenuron	8 g	12.40	119.60	132.0	217.4	243.0	460.4
Glufosinate	2L	17.76	35.88	53.64	255.2	213.0	468.2
Hand hoeing*	3 times	—	—	—	101.5	54.0	155.5
Hand hoeing*	4 times	—	—	—	33.4	33.0	66.4
Control		187.30	108.00	295.3	667.6	241.0	908.6
LSD (5%)		27.6	20.6	34.4	66.2	19.5	75.7

\* Hand hoeing at 3 and 4 times are still not completed during 1<sup>st</sup> survey.

Results in Tables (1 & 2) showed that all weed control treatments caused significantly reduction in dry weight ( $\text{g/m}^2$ ) of grassy, broad-leaved and total weeds at 60 and 150 DAP as compared with control in both seasons.

#### 1-1- *Broad leaved weeds:*

Metribuzin at 300 g/fed, metosulam at 80 cc/fed, tribenuron at 8 g/fed, and glufosinate at 2L/fed reduced dry weight of broad-leaved weeds at 60 DAP by 96.5, 84.9, 92.4 and 91.6 %, in 1<sup>st</sup> season and by 97.1, 91.6, 93.4 and 90.5%, respectively in 2<sup>nd</sup> season as compared with control treatment. Meanwhile, hand hoeing at 4 times, hand hoeing at 3 times and metribuzin at 300 g/fed gave the highest reduction on the dry weight of broad-leaved weeds at 150 DAP by 93.3, 81.1 and 70.1 %, in 1<sup>st</sup> season and by 95.0, 84.8 and 72.4 %, respectively in 2<sup>nd</sup> season as compared with control treatment.

#### 1-2- *Grassy weeds :*

Metribuzin at 300 g/fed, and glufosinate at 2L/fed reduced dry weight of grassy weeds at 60 DAP by 70.1 and 63.8 %, in 1<sup>st</sup> season and by 71.8 and 66.8 %, respectively in 2<sup>nd</sup> season as

compared with control treatment. Meanwhile, hand hoeing at 4 times and hand hoeing at 3 times gave the highest reduction on dry weight of grassy weeds at 150 DAP by 84.8 and 75.4 %, in 1<sup>st</sup> season and by 86.3 and 77.6 %, respectively in 2<sup>nd</sup> season as compared with control treatment.

#### 1-3- *Total of broad leaved and grassy weeds :*

Metribuzin at 300 g/fed, and glufosinate at 2L/fed reduced dry weight of total weeds at 60 DAP by 87.3 and 82.0 %, in 1<sup>st</sup> season and by 87.7 and 81.8 %, respectively in 2<sup>nd</sup> season as compared with control treatment. Meanwhile, hand hoeing at 4 times, hand hoeing at 3 times and metribuzin at 300 g/fed gave the highest reduction on the dry weight of the total weeds at 150 DAP by 91.2, 79.2 and 61.4 %, in 1<sup>st</sup> season and by 92.7, 82.9 and 63.6 %, respectively in 2<sup>nd</sup> season as compared with control treatment. Hand hoeing at 4 times is the best weed control treatments for controlling the broad leaved and grassy weeds followed by hand hoeing at 3 times and metribuzin at 300 g/fed in both seasons. These results are in agreement with those obtained by Salunkhe et al. (1990), Bassiouny et al. (1993), Attalla et

al. (1995), Marion (1996), Kholosy et al. (1998), Richard (1997) and Attalla (2002).

## **2 - Effect of individual treatments on sugar cane productivity :**

The results in Tables (3&4) showed that all weed control treatments caused significant increasing in stalk height (cm), stalk diameter (cm), sucrose %, purity %, sugar cane yield (t/fed) and sugar yield (t/fed) as compared with control treatment in both seasons. The highest value of the previous respective characters were obtained from hand hoeing at 4 times by 250.8, 2.89, 19.64, 92.9 43.95 and 6.13, in 1<sup>st</sup> season and by 251.8, 2.85, 19.29, 94.74, 42.41 and 5.97, respectively in 2<sup>nd</sup> one as compared with control treatment. Sugar cane yield and sugar yield were increased from previous respective treatment by 43.44 and 54.0 % in 1<sup>st</sup> season and by 38.87 and 59.2 %, respectively in 2<sup>nd</sup> season as compared with control treatment. This result may be due to decrease the (weed - crop competition) where it reflected increasing of sugar cane yield. These results are in agreement with those obtained

by Santo (1989), Abd El-Latif et al. (1994) , Mahadevaswamy et al. (1994), Attalla et al. (1995) and Thakur et al. (1995).

## **3- Effect of combined treatments on weeds :**

The results in Tables (5&6) showed that all weed control treatments caused significant reduction in dry weight ( $\text{g/m}^2$ ) of grassy, broad-leaved and total weeds at 90 and 150 DAP as compared with control treatment in both seasons.

### **3-1- Broad leaved weeds:**

Metribuzin at 300 g/fed plus glufosinate at 2L/fed, metribuzin plus hand hoeing once, glufosinate plus glufosinate plus hand hoeing once, glufosinate alone and metribuzin alone reduced dry weight of broad-leaved weeds at 90 DAP by 78.3, 82.4, 81.2, 83.3, 73.7 and 75.7 %, in 1<sup>st</sup> season and by 73.5, 80.7, 79.4, 80.3, 75.3 and 70.3 %, in 2<sup>nd</sup> one respectively as compared with control treatment. Meanwhile, hand hoeing at 4 times, hand hoeing at 3 times, metribuzin plus glufosinate and metribuzin plus hand hoeing once gave the highest reduction on the dry weight of broad-leaved weeds at 150 DAP by 87.9, 84.3, 71.6 and

**Table (3):**Effect of individual treatments on sugar cane yield and juice quality during 1999/2001 season.

Treatments	Rate/ fed	Stalk height (cm)	Stalk diameter (cm)	Cane yield (t/fed)	Sugar yield (t/fed)	Sucrose %	Brix %	Purity %
Metribuzin	300g	245.9	2.85	41.48	5.56	19.23	22.37	85.96
Metosulam	80cc	234.7	2.78	41.15	5.45	18.86	22.51	83.78
Tribenuron	8g	228.1	2.81	40.51	5.54	19.13	22.19	86.21
Glufosinate	2L	206.4	2.75	38.12	5.14	19.42	21.48	90.41
Hand hoeing	3 times	249.3	2.87	41.9	5.77	18.89	20.51	92.10
Hand hoeing	4 times	250.8	2.89	43.95	6.13	19.64	21.14	92.90
control		180.7	2.48	30.64	3.98	18.64	26.16	71.25
LSD (5%)		22.76	0.08	1.75	0.3	0.2	1.1	1.59

**Table (4):** Effect of individual treatments on sugar cane yield and juice quality during 2000/2002 season.

Treatments	Rate/ fed	Stalk height (cm)	Stalk diameter (cm)	Cane yield (t/fed)	Sugar yield (t/fed)	Sucrose %	Brix %	Purity %
Metribuzin	300g	249.8	2.81	39.95	5.54	18.34	21.18	86.59
Metosulam	80cc	242.1	2.75	39.12	5.34	18.11	21.72	83.38
Tribenuron	8g	232.7	2.78	38.22	5.22	19.08	21.89	87.16
Glufosinate	2L	218.6	2.70	37.35	5.19	18.13	20.36	89.05
Hand hoeing	3 times	250.2	2.82	40.20	5.61	19.17	20.81	92.12
Hand hoeing	4 times	251.8	2.85	42.41	5.97	19.29	20.36	94.74
control		192.4	2.22	30.54	3.75	18.9	24.94	75.78
LSD (5%)		18.5	0.2	2.1	0.35	0.3	0.45	5.0

72.4 %, in 1<sup>st</sup> season and by 90.7, 83.4, 68.4 and 69.9 %, respectively in 2<sup>nd</sup> season as compared with control treatment.

### **3-2- Grassy weeds :**

Metribuzin plus glufosinate, metribuzin plus hand hoeing once, glufosinate plus hand hoeing once and metribuzin reduced dry weight of grassy weeds at 90 DAP by 75.4, 80.7, 74.6 and 70.2%, in 1<sup>st</sup> season and by 74.6, 77.7, 69.2 and 68.3 %, respectively in 2<sup>nd</sup> season as compared with control treatment. Meanwhile, hand hoeing at 4 times and hand hoeing at 3 times gave the highest reduction on dry weight of grassy weeds at 150 DAP by 83.5 and 75.2 %, in 1<sup>st</sup> season and by 84.4 and 76.4 %, respectively in 2<sup>nd</sup> season as compared with control treatment.

### **3-3- Total of broad leaved and grassy weeds :**

Metribuzin plus glufosinate, metribuzin plus hand hoeing once, glufosinate plus glufosinate and glufosinate plus hand hoeing once reduced dry weight of total weeds at 90 DAP by 77.6, 81.9, 77.2 and 81.1%, in 1<sup>st</sup> season and by 73.8, 79.8, 75.6 and 77.1 %, respectively in 2<sup>nd</sup> season as compared with control treatment. Meanwhile, hand hoeing at 4 times and hand

hoeing at 3 times gave the highest reduction on dry weight of the total weeds at 150 DAP by 86.6 and 81.6 % in 1<sup>st</sup> season and by 88.8 and 81.4 %, respectively in 2<sup>nd</sup> season as compared with control treatment. These results may be attributed to the integration of herbicide with hand hoeing or herbicide was better than herbicide alone on the weeds. Therefore, the application of herbicide is effective only during the early stage and hand hoeing or herbicide is necessary to be taken up later stages to avoid weed competition. Hence, integrated methods of weed control by using hand hoeing 4 times as well as herbicide with hand hoeing or herbicide are best for sugar cane crop because they stay in the land more than one year. These results are in agreement with those obtained by Ahmed et al. (1989), Santo (1989), Salunkhe et al. (1990), Mason (1991), Abd El-Latif et al. (1994), Thakur et al. (1995) and Marion (1996).

### **4- Effect of combined treatments on sugar cane productivity :**

The results in Tables(7&8) showed that stalk height (cm), stalk diameter(cm), sucrose %, brix %, purity %, sugar cane yield (t/fed) and sugar yield (t/fed) significantly

Table (5) : Effect of combined treatments on dry weight ( $\text{g/m}^2$ ) of grassy, broad-leaved and total weeds at 90 and 150 DAP during 1999/2001 season.

Treatments	Rate/ fed	1 <sup>st</sup> survey at 90 DAP			2 <sup>nd</sup> survey at 150 DAP		
		Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )	Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )
Metribuzin	300g	89.8	37.2	127.0	194.8	168.5	363.3
Metribuzin+Glufosinate	300g+2L	79.9	30.7	110.6	166.4	161.3	327.7
Metribuzin+Hand hoeing	300g+ 1	65.1	24.1	89.2	161.7	162.1	323.8
Glufosinate	2L	97.2	59.5	156.7	225.7	215.2	440.9
Glufosinate+ Glufosinate	2L+ 2L	69.4	43.3	112.7	209.2	212.2	421.4
Glufosinate+Hand hoeing	2L+ 1	61.7	31.8	93.5	199.6	209.2	408.8
Hand hoeing *	3 times	-----	-----	-----	91.7	60.9	152.6
Hand hoeing *	4 times	-----	-----	-----	70.5	40.6	111.1
Control		369.0	125.0	494	585.0	246.0	831.0
LSD (5%)		20.3	9.9	9.1	37.4	23.7	40.5

\* Hand hoeing at 3 and 4 times are still not completed during 1st survey

Table (6) : Effect of combined treatments on dry weight ( $\text{g/m}^2$ ) of grassy, broad-leaved and total weeds at 90 and 150 DAP during 2000/2002 season.

Treatments	Rate/ fed	1 <sup>st</sup> survey at 90 DAP			2 <sup>nd</sup> survey at 150 DAP		
		Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )	Broad Leaved wt. ( $\text{g/m}^2$ )	Grassy weeds wt. ( $\text{g/m}^2$ )	Total weeds wt. ( $\text{g/m}^2$ )
Metribuzin	300g	155.1	69.2	224.3	281.6	201.5	483.1
Metribuzin+Glufosinate	300g+2L	138.5	55.3	193.8	236.3	192.7	429.0
Metribuzin+Hand hoeing	300g+ 1	101.0	48.6	149.6	225.4	196.1	421.5
Glufosinate	2L	129.1	112.3	241.4	303.5	273.0	576.5
Glufosinate+ Glufosinate	2L+ 2L	107.6	73.5	181.1	281.9	263.4	545.3
Glufosinate+Hand hoeing	2L+ 1	102.8	67.1	169.9	277.2	259.2	536.4
Hand hoeing *	3 times	-----	-----	-----	124.0	73.6	197.6
Hand hoeing *	4 times	-----	-----	-----	69.5	48.8	118.3
Control		523.0	218.0	741.0	748.0	312.0	1060
LSD (5%)		25.0	29.6	56.5	51.1	24.7	79.5

\* Hand hoeing at 3 and 4 times are still not completed during 1<sup>st</sup> survey.

increased with weed control treatments as compared with control in both seasons. The highest stalk height, stalk diameter, sucrose, sugar cane yield and sugar yield were obtained from hand hoeing at 4 times by 256.6, 2.91, 19.86, 48.62 and 6.81, in 1<sup>st</sup> season and by 252.4, 2.86, 19.76, 47.35 and 6.73, respectively in 2<sup>nd</sup> season followed by hand hoeing at 3 times, metribuzin plus hand hoeing once, glufosinate plus hand hoeing once as compared with control treatment in both seasons. Hand hoeing at 4 times increased sugar cane yield and sugar yield by 44.1 and 40.4 % in 1<sup>st</sup> season and by 51.9 and 64.6 %, respectively in 2<sup>nd</sup> season as compared with control. These increases may be attributed to the increase in dry matter accumulation in plant, stalk height and diameter as well as decreasing the period of (weed - crop competition) for space, sun light, water and nutrients. These results are in agreement with those obtained by Ahmed et al. (1989), Santo (1989), Salunkhe et al. (1990), Mason (1991), Abd El-Latif et al. (1994), Thakur et al. (1995) and Marion (1996).

In general, it is clear that hand hoeing at 4 times gave the best weed control treatment in

decreasing the dry weight of weeds (broad-leaved and grasses) either individual or combined treatments and it gave the highest yield of sugar cane in both seasons. Metribuzin, metosulam, tribenuron, and glufosinate as individual treatments reduced dry weight of broad-leaved weeds at 60 DAP, meanwhile metribuzin and glufosinate reduced dry weight of grasses and total weeds at 60 DAP in both seasons. Hand hoeing at 4 times reduced the dry weight of broad-leaved, grasses and total weeds at 150 DAP followed by hand hoeing at 3 times and metribuzin in both seasons. Hand hoeing at 4 times gave the highest sugar cane and sugar yields followed by hand hoeing at 3 times and metribuzin in both seasons. Metribuzin plus glufosinate, metribuzin plus hand hoeing once, glufosinate plus glufosinate and glufosinate plus hand hoeing once as combined treatments reduced the dry weight of broad-leaved, grasses and total weeds at 90 DAP in both season. Hand hoeing at 4 times, hand hoeing at 3 times, metribuzin plus glufosinate and metribuzin plus hand hoeing once reduced dry weight of broad-leaved weeds at 150 DAP meanwhile, hand hoeing at 4 times and hand hoeing at 3 times reduced

**Table (7):** Effect of combined treatments on sugar cane yield and its juice quality during 1999/2001 season.

Treatments	Rate/ fed	Stalk height (cm)	Stalk diameter (cm)	Cane yield (t/fed)	Sugar yield (t/fed)	Sucrose %	Brix %	Purity %
Metribuzin	300g	234.8	2.78	41.48	5.56	18.47	20.8	88.80
Metribuzin+Glufosinate	300g+2L	236.3	2.80	43.74	6.21	18.89	21.8	86.65
Metribuzin+Hand hoeing	300g+ 1	239.5	2.85	45.47	6.37	19.23	21.95	87.61
Glufosinate	2L	206.4	2.75	38.12	5.43	18.28	20.91	87.42
Glufosinate+Glufosinate	2L+ 2L	228.6	2.81	42.10	5.91	18.86	22.85	82.54
Glufosinate+Hand hoeing	2L+ 1	241.8	2.86	44.95	6.11	19.14	22.38	85.52
Hand hoeing	3 times	255.3	2.88	46.44	6.50	19.64	21.88	89.76
Hand hoeing	4 times	256.6	2.91	48.62	6.81	19.86	21.69	91.56
Control		190.8	2.59	33.75	4.85	15.04	20.49	73.4
LSD (5%)		10.0	0.09	1.9	0.3	0.72	0.9	3.9

**Table (8):** Effect of combined treatments on sugar cane yield and its juice quality during 2000/2002 season.

Treatments	Rate/ fed	Stalk height (cm)	Stalk diameter (cm)	Cane yield (t/fed)	Sugar yield (t/fed)	Sucrose %	Brix %	Purity %
Metribuzin	300g	219.6	2.75	39.95	5.25	17.89	20.62	86.76
Metribuzin+Glufosinate	300g+2L	238.4	2.76	42.98	5.85	18.55	21.67	85.60
Metribuzin+Hand hoeing	300g+ 1	242.8	2.81	43.42	5.94	18.69	21.18	88.24
Glufosinate	2L	218.6	2.70	37.35	5.10	17.80	20.36	87.43
Glufosinate+Glufosinate	2L+ 2L	220.5	2.73	39.56	5.38	18.43	21.10	87.35
Glufosinate+Hand hoeing	2L+ 1	242.1	2.79	43.83	5.96	18.34	20.79	88.22
Hand hoeing	3 times	248.5	2.83	45.21	6.21	19.10	21.40	89.25
Hand hoeing	4 times	252.4	2.86	47.35	6.73	19.76	21.74	90.89
Control		186.3	2.42	31.18	4.09	16.32	21.93	74.42
LSD (5%)		10.3	0.12	2.1	0.5	1.1	1.1	2.5

dry weight of grassy weeds at 150 DAP in both seasons. Hand hoeing 4 times gave the highest sugar cane and sugar yields followed by hand hoeing 3 times, metribuzin plus hand hoeing once, glufosinate plus hand hoeing once in both seasons. The integration of herbicide with hand hoeing or herbicide were better than herbicide alone for controlling the prevailing weeds. From this study, it can be considered that hand hoeing at 4 times is the best effective treatment in controlling the studied weeds and gave the highest sugar cane and sugar yields/fed.

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تأثير بعض طرق مقاومة الحشائش على المحصول في قصب السكر  
والحشائش المصاحبة  
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اقيمت اربعة تجارب حقلية في محطة بحوث المطاوعة الزراعية مركز البحوث  
الزراعية- اسنا- محافظة قنا خلال موسمي ١٩٩٩ / ٢٠٠١ و ٢٠٠٠ / ٢٠٠٢ على  
محصول القصب الخريفي يهدف هذا البحث دراسة تأثير بعض طرق مقاومة الحشائش  
(المبيدات المنفردة مثل مبيد مترابيزين بمعدل ٣٠٠ جم/ف - جلوفسينت بمعدل ٢ لتر/ف -  
ترايبيريون بمعدل ٨ جم/ف - ميتوسليم بمعدل ٨٠ سم/ف) او المختلطة مثل (مترابيزين -  
مترابيزين + جلوفسينت - مترابيزين + عزيق مرة واحدة - جلوفسينت - جلوفسينت  
+ عزيق مرة واحدة - جلوفسينت - جلوفسينت) مع مقارنتها بمعاملة العزيق على نبات  
قصب السكر والحشائش المصاحبة. اظهرت نتائج المبيدات المنفردة ان بعض المعاملات  
مثل العزيق ٤ والعزيق ٣ مرات و مترابيزين احدثت نقصا مغنويا في الوزن الجاف  
للحشائش العريضة بعد ١٥٠ يوم من الزراعة بمقدار ٩٣,٣ - ٨١,١ - ٧٠,١ % في  
الموسم الاول و ٩٥ - ٨٤,٨ - ٧٢,٤ % في الموسم الثاني. احدثت بعض المعاملات  
المختلطة مثل العزيق ٤ و ٣ مرات و مترابيزين + جلوفسينت و مترابيزين + عزيق مرة  
واحدة نقصا مغنويا في الوزن الجاف للحشائش العريضة بعد ١٥٠ يوم من الزراعة بمقدار  
٨٧,٩ - ٨٤,٣ - ٧١,٦ - ٧٢,٤ % في الموسم الاول و ٩٠,٧ - ٨٣,٤ - ٦٨,٤ - ٦٩,٩ %  
في الموسم الثاني. احدثت معاملات العزيق ٤ مرات والعزيق ٣ مرات سواء المنفردة  
والمختلطة نقصا مغنويا في الوزن الجاف للحشائش النجيلية بعد ١٥٠ يوم من الزراعة  
بمقدار يتراوح من ٧٥,٢ الى ٨٦,٣ % في الموسمين.

اظهرت نتائج المبيدات المنفردة تفوق معاملة العزيق ٤ مرات عن باقي  
المعاملات في انتاجية محصول قصب السكر وكان مقدار محصول قصب السكر  
ومحصول السكر هو ٤٣,٩٥ و ٦,١٣ طن/فدان في الموسم الاول و ٤٢,٤١ و ٥,٩٧  
طن/فدان في الموسم الثاني. وقد زاد محصول قصب السكر زيادة مغنوية بمقدار  
٤٣,٤٤ % في الموسم الاول و ٣٨,٨ % في الموسم الثاني.

اظهرت نتائج المبيدات المختلطة تفوق معاملة العزيق ٤ مرات عن باقي المعاملات  
في انتاجية محصول قصب السكر وكان مقدار محصول قصب السكر ومحصول السكر  
هو ٤٨,٦٢ و ٦,٨١ طن/فدان في الموسم الاول و ٤٧,٣٥ و ٦,٧٣ طن/فدان في  
الموسم الثاني. وقد زاد محصول قصب السكر زيادة مغنوية بمقدار ٤٤,١ % في  
الموسم الاول و ٥١,٨٦ % في الموسم الثاني.

من هذه الدراسة يعتبر ان معاملة العزيق ٤ مرات هي افضل معاملة لمقاومة  
الحشائش واعطاء اعلى محصول قصب السكر وبالتالي محصول السكر.