Bull. Fac. Agric., Cairo Univ.,52 (2001): 1-26.

EFFECT OF PLANTING PATTERNS AND SOME WEED CONTROL TREATMENTS ON SUGAR BEET (*Beta vulgaris* L.)YIELDS AND ASSOCIATED WEEDS

(Received: 3.6.2000)

By
Sh. A. Shaban, M.A. Hassanin, A. A. Gaber *
and E. M. Abdelfatah*

Department of Agronomy, Faculty of Agriculture, Cairo University and Department of Agricultural Physiology and Chemistry, Sugar Crops Research Institute, Agriculture Research Center*

ABSTRACT

Two field experiments were carried out at the Agricultural Experimental Station, Faculty of Agriculture, Cairo University, Giza, Egypt, during 1995/96 and 1996/97 seasons to determine the effect of two planting patterns and some weed control treatments on growth of weeds, sugar beet yields and its components as well as its juice quality. The results showed that the best control of total annual weeds was achieved from the treatments pyrazon/TCA (1.47 kg a.i./fed) + one hoeing, pyrazon (1.63 kg a.i. /fed) + one hoeing, phenmedipham (0.34 kg a.i./fed) + one hoeing, phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing and hand hoeing at 4,8 and 12 WAS treatment when sugar beet grown on both sides of ridges spaced 100 cm apart. Herbicides mixture caused significant reduction in pigments (chlorophylls a&b and carotenoides) of sugar beet leaves as compared to their single applications. The treatments; hand hoeing, pyrazon (1.63 kg a.i./fed) + one hoeing pyrazon/TCA (1.47 kg a.i./fed) + one hoeing and phenmedipham (0.17 + 0.17 kg a.i./fad) at 4 and 6 WAS+ one hoeing each with sowing on both sides of ridges spaced 100 cm produced higher root dimensions and greater weight of roots and top in both seasons. The treatments, pyrazon (1.63 kg a.i. /fed) + one hoeing at 4 WAS and hand hoeing at 4, 8 and 12 WAS

each under sowing on both sides of ridges spaced 100 cm gave higher root, top and sugar yields during both seasons. The application of phenmedipham (0.34 kg a.i./fed) + one hoeing at 4 WAS under sowing on one side of ridges spaced 50 cm apart provided the highest values of sucrose percentage in both seasons. The greatest values of purity percentage were achieved by pyrazon /TCA (1.47 kg a.i./fed) + one hoeing under sowing on both sides of ridges spaced 100 cm.

Key words: *herbicides, sugarbeet, weeds.*

1.INTRODUCTION

Sugar beet is the second sugar crop after sugar cane, not only in Egypt but also, in the world. Sugar beet gives over 40 % of the sugar production in the world. Cultivated area in Egypt is about 103 thousand fed., with a production average of 18 t/fed (Agricultural Economics, 1998).Sugar beet plants are characterized by their slow rate of growth during the early stages from emergence to thinning time. Leaving weeds without removal from sugar beet plots caused losses in yield by about 50% (El-Hattab and Shaban, 1982 and Shiyan *et al.*, 1988). Sometimes, pre-emergence herbicides are recommended but may cause deterioration of plant stand, growth or yield components as well as chemical constituents. Moreover, climatic and edaphic factors may limit herbicidal effect on controlling weeds as well as environmental pollution. Sometimes, mechanical methods such as hoeing are used, but they may be inefficient or cost much in some locations, in addition to reducing plant stand. However, application of one light hoeing destroys the weed plants, which survive and escape from herbicides and cause good soil aeration, which encourages the growth of crop plants (Fayed *et al.* 1983). Chermyshev and Khovanskii (1982) stated that the incorporation of TCA + pyramin (6 + 4 kg/ha) before planting gave effective weed control. El-Hattab and Shaban (1982) stated that EPTC is selective for grasses, whereas pyrazon was effective against broad leaf weeds. Al Hanish (1995) reported that pyrazone/ TCA, pyrazon and EPTC at their higher doses were equivalent to hand hoeing in controlling broad leaf weeds.

Whereas, EPTC, pyrazon/TCA and TCA are selective herbicides in sugar beet for controlling the annual grassy weeds and have persistency in the soil for about 60 days. In addition Gamuev (1997) found that mixtures of pyramin FL (chloridazin) with Betanal progress at 4 + 6 litres /ha gave good results in control of annual dicotyledonous weeds. In Egypt, some farmers cultivate sugar beet either on one side of narrow ridges spaced 50, 60 or 70 cm. Other farmers use wide ridges (80,90 and 100 cm) with sowing on both sides. Narrowing the spaces of ridges or of the hills leads to an increase of density of plants and competition for water requirements and nutrients, which diminish the root size consequently reducing the total yield. Widening the spaces leads to loss of yield in spite of giving large size roots than normal, which are undesirable in manufacturing because of higher fibers and low sugar contents. The most suitable sowing distance for sugar beet is 50 cm apart between rows and 20 cm apart between hills. In this point, Kamel *et al.*, (1984) found that root yields were significantly the highest in 45-60 cm apart with 15-20 cm between hills. Mahmoud *et al.*, (1990 a &b) showed that the highest sugar yield was obtained with 40 cm distance between ridges, while 50 and 60 cm were superior regarding root and top yields /faddan, respectively. El-Kassaby *et al.*, (1991) reported that sowing sugar beet on both sides of ridges, 90 cm apart and 20 cm between hills (46,666 plants /fed) recorded the highest root and sugar yields/ fad. Meanwhile, sowing on one side of ridges 60 cm apart and 15 cm between hills (46,666 plants/fed) produced the highest sucrose percentage. Hassanin (1991) and Hassanin and Ramadan (1999) stated that 50-cm ridging spacing produced the largest roots and increased the yield of roots and sugar/fad. El-Kassaby and Leilah (1992) recommended sowing on both sides of ridges, 70 cm apart and 25 cm between hills (48,000 plants/fed) compared with other planting patterns. So, this study aimed to reach the best-integrated weed control applications in sugar beet using two planting patterns with herbicides singly or mixtures or in combinations with hoeing.

2.MATERIALS AND METHODS

Two field experiments were carried out in clay loamy soil during 1995/96 and 1996 / 97 seasons at the Agricultural Experimental Station, Faculty of Agriculture, Cairo University, Giza,

Egypt. These experiments were conducted to determine the effect of two planting patterns, some weed control treatments and its interaction (integrated weed control treatments) on sugar beet yields and juice quality of sugar beet (*Beta vulgaris* L.) as well as growth of associated weeds.

A split-plot design with four replications was used in both seasons. The main plots were devoted at random to two planting patterns. The first one was sowing sugar beet on one side of ridges spaced 50 cm and in hills spaced 20 cm. The second one was sowing sugar beet on both sides of ridges, 100 cm apart and 20 cm between hills. Ten herbicidal treatments, hoeing and unweeded treatments were randomly assigned to the sub-plots. Each sub plot consisted of 8 rows, 5 m long (20 m^2).

During land preparation, 100 kg of calcium super phosphate (15.5% P_2O_5) was added. Seeds of a commercial sugar beet variety viz "Kaweterma" were sown on November 10 and 15 in 1995/96 and 1996/97 seasons, respectively. At 45 days after sowing (DAS), emerged seedlings were thinned to secure one plant per hill. The recommended dose of nitrogen fertilizer (70 kg N/fed.) was applied in two split doses, the 1^{st} was at thinning and the 2^{nd} four weeks later.

Weed control treatments were done for every experimental unit according to the tested treatment. Other cultural practices were done in a similar manner whenever possible according to the recommendations for sugar beet cultivation.

Common, trade and chemical names of applied herbicides are shown in Table 1. A Knapsack sprayer with a spray volume 200 liters/fad was used. The tested weed control treatments are presented in Table 2.

Data recorded

At 50 days after sowing (DAS), chlorophylls a& b and carotenoides were determined in sugar beet leaves according to Wettstien (1957). At 100 DAS, weeds were identified and classified in annual broad-leaves and annual grasses, then number/ m^2 of each group was estimated and oven dried at 70° C for 48 hr.

At harvest, after 200 days from sowing, a sample of five guarded plants was randomly taken from each sub-plot to determine

length and diameter of root and root/top ratio. Also, plants of four guarded rows from each treatment were uprooted and topped to determine root, top and sugar yields /fad in tons. Total soluble solids percentage (T.S.S. %) was determined by using "Hand refractometer". Sucrose percentage was determined as described by Le Docte (1927). Purity percentage was calculated according to the following equation: Purity % = Sucrose % x 100/TSS%.

The standard analysis of variance for split-plot design as described by Snedecor and Cochran (1967) was applied for analyzing the data from each season. Differences between treatment means were detected by using the least significant difference (LSD) at 5% level of probability for each season according to Steel and Torrie (1989).

3. RESULTS AND DISCUSSION

3.1.Weed growth

The major annual grassy weeds observed during 1995/96 and 1996/97 seasons are *Avena fatua* L., *Lolium multiflorum,* L and *Phalaris spp.* While the major annual broad leaves weeds are *Ammi majus* L., *Brasica kaber*, L.; *Chenopodium album*, L., *Cichorium endivia*, L.; *Eme spinosus*, L.; *Medicago polymorpha*, L.; *Melilotus indica*, L.; *Rumex dentatus*, L.; *Sisymbrium irio*, L.; *Sonchus oleraceus*, L. and *Xanthium spinosum*, L. Herbicidal treatments in addition to one hoeing at 4 weeks after sowing produced further reductions in the number and dry weight of total annual weeds in both seasons (Table 3).

Excellent efficiency values of controlling annual weeds were achieved from hand hoeing treatment in the first season and pyrazon/TCA (1.47 kg. a.i./ fed) + one hoeing in the second season. These treatments reduced the annual weeds by 94.66% and 90.96%, orderly (Table 4).

Meanwhile, pyrazon (1.63 kg a.i./ fed)+ one hoeing was in the second rank in both seasons which gave suppression of annual weeds by 93.90% in 1995/96 and 87.86% in 1996/97, followed by pyrazon/ TCA at 1.47 kg a.i/fed + one hoeing and phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing (93.28 and 93.15% respectively) in the first season, and phenmedipham (0.17 + 0.17 kg –

a.i./fed) at 4 and 6 WAS + one hoeing and hand hoeing treatment (83.59 and 80.68%, respectively), in the second season.

In both seasons, the best control of annual weeds was achieved from the herbicidal treatments combined with one hoeing: pyrazon/TCA(1.47 kg a.i./fed), pyrazon (1.63 kg a.i./fed), phenmedipham (0.34 a.i./fed), phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS; each with one hoeing as well as the hand hoeing treatment.

The results in Table (5) showed that the number of total annual weeds and dry weight of annual weeds increased by sowing on one side of the ridges spaced 50 cm compared to sowing on both sides of the ridges spaced 100 cm in both seasons.

Concerning the integrated weed control treatment effect, in both seasons the best control of total annual weeds was achieved from the hand hoeing treatment under sowing on ridges spaced 50 cm as well as pyrazon/TCA (1.47 kg a.i./fed), pyrazon (1.63 kg a.i./fed), phenmedipham (0.34 a.i./fed), phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS; each with one hoeing. These results are generally in agreement with those obtained by Chernyshev and Khovanskii (1982), El-Hattab and Shaban (1982), Al Hanish (1995) and Gamuev (1997)

3.2. Pigments content

As shown in Table (6), chlorophyll a & b, and carotenoides contents were significantly affected by sugar beet herbicides in both seasons, except in 1996/97 season, the differences in Chlorophyll b did not reach the level of significance. The treatments pyrazon + phenmedipham(1.63+0.34kg a.i./fed), pyrazon/TCA + phenmedipham (1.47 + 0.34 kg a.i./fed) and phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS significantly decreased chlorophyll a, b and carotenoide content in both seasons. While, in the first season, chlorophyll b content significantly decreased by sugar beet herbicides.

The results in Table (7) indicated that Chlorophyll a, & b and carotenoides significantly decreased with sowing on ridges spaced 50 cm in comparison with sowing on both sides of ridges spaced 100 cm in both seasons.

Concerning the interaction between weed control treatments and planting patterns, Chlorophyll a decreased by phenmedipham

(0.17 + 0.17 kg a.i./fad) at 4 and 6 WAS under sowing on ridges spaced 50 cm. In addition, pyrazon + phenmedipham (1.63 + 0.34 kg a.i./fad) under both planting patterns. Application of pyrazon/TCA + phenmedipham (1.47 + 0.34 kg a.i./fed) under sowing on one side of ridges spaced 50 cm came in the second rank in both seasons.

Carotenoide content decreased by phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS, pyrazon+ phenmedipham at 1.63 + 0.34 kg a.i./fed under 50 cm between rows and, phenmedipham (4 + 6 WAS) at (0.17 + 0.17 kg a.i./fed) + one hoeing under sowing on both sides of ridges, 100 cm apart. Also, the treatments, pyrazon + phenmedipham (1.63 + 0.34 a.i./fed), phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS under sowing on one side of ridges spaced 50 cm and phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing combined with sowing on both sides of ridges, 100 cm apart, significantly decreased carotenoide content (Table 7).

Generally, the interaction effect between planting patterns and weed control treatments on chlorophyll,b was insignificant in both seasons. However, phenmedipham (0.34-kg a.i./ fed) at 4 WAS and hand hoeing treatment provided the highest values of Chlorophyll a under sowing on one side of ridges, 50 cm apart or on both sides of ridges, 100 cm apart, in both seasons.

It is evident from the previous results that mixtures of sugar beet herbicides caused a significant reduction in pigments (Chlorophyll a, b and carotenoides) in sugar beet leaves as compared to their single applications. These results agreed with those obtained by Sheptnev (1982) who reported that EPTC, pyrazon and TCA at higher doses were toxic to the crop. Moreover, Jordan and Jordan (1983) showed that the pre-emergence treatment of pyrazon (1 lb/a), caused definite chlorosis and slight stunting. They added that pyrazon at (2 lb/a) resulted in a very severe chlorosis, or marginal burner stunting and 70 to 90% sugar beet loss. Meanwhile, at its highest rate (4 lb/a) all plants died. Also, El-Hattab *et al.* (1996) stated that EPTC, pyrazon, TCA, and Pyrazon/TCA when applied more than the recommended doses, caused significant reductions in germination and pigments (Chlorophyll a, b and carotenoides) in sugar beet leaves.

Table 1: Common, trade, chemical names and group of the applied herbicides.

comm on name	Trade name & Active ingredients (a.i.)	Chemical name	Chemical group
Pyrazon	Pyramin (65% a.i)	Samino-4 chloro-2 phenyul -3 (2H)-pyridazinone	Pyridazines
Pyrazon /TCA	Pyradur(58.6% a.i.)	Pyrazon+TCA 37.2:21.4) (Trichloro acetic aicd)	Pyridazines/ Aliphatic
Phenme dipham	Betanal (17.1% a.i)	Methyl m-hydroxy carbanilate m-methylcarbanilate	Carbamates

Table (2): Herbicidal rates and their application methods.

Treatments	Rate (a.i.kg/fad)	Application
Unweeded	-	Left without weed removal
Hand hoeing (3 times)	-	At 4,8,12 WAS*
Pyrazon	1.63	Pre-emergence in to the soil
Pyrazon/TCA	1.47	Pre-emergence in to the soil
Phenmedipham	0.34	At 4 WAS
Pyrazon + one hoeing	1.63	Pre-em + 4 WAS
Pyrazon/TCA + one hoeing	1.47	Pre-em + 4 WAS
Phenmadipham + one hoeing	0.34	At 4 WAS + 6 WAS
Pyrazon + phenmedipham	1.63+0.34	Pre-em. + 4 WAS
Pyrazon/TCA + phenmedipham	1.47+0.34	Pre-em. + 4 WAS
Phenmedipham + phenmedipham	0.17+0.17	At 4 + 6 WAS
Phenmedipham + phenmedipham + one hoeing	0.17+0.17	At (4+6 WAS) + 8 WAS

*: Weeks after sowing

Table 3: Effect of some weed control treatments on growth of weeds grown in sugar beet in 1995/96 and 1996/97 seasons.

Some weed control treatments		Growth of weeds			
Treatments	Rate (a.i.kg /fed)	weeds/m2 (no)		Weed/m2(gm)	
		1995/96	1996/97	1995/96	1996/97
Unweeded	--	19.67	99.83	176.26	168.08
Hoeing at 4,8 and 12 WAS *	--	2.17	39.67	6.21	44.15
Pyrazon **	1.63	14.34	47.50	78.25	56.61
Pyrazon/TCA**	1.47	11.84	69.00	73.92	101.21
Phenmedipham at 4 WAS	0.34	11.83	73.50	85.87	103.40
Pyrazon * *+ 1 hoeing at 4 WAS	1.63	4.00	26.17	10.88	31.07
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	4.50	33.00	9.90	27.71
Phenmedipham + 1 hoeing at 4 WAS	0.34	4.17	40.83	13.83	47.51
Pyrazon * *+ phenmedipham at 4 WAS	1.63+0.34	8.67	35.85	53.61	47.11
Pyrazon/TCA**+ phenmedipham at 4 WAS	1.47+0.34	6.67	51.00	49.88	81.93
Phenmedipham at 4 and 6 WAS	0.17+0.17	10.34	70.00	84.29	82.72
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	6.17	33.00	13.41	36.23
$LSD_{0.05}$		1.75	4.54	9.27	5.08

*: weeks after sowing

: Pre -emergence in soil application

Table (4): Efficiency percentages of weed control treatments in sugar beet at 100 days after sowing in 1995/96 and 1996/97growing seasons.

Weed control treatments (AxB)		1995/96			1996/97		
Treatments	Rate (a.i.kg /fad)	Broad leaves	Grasses	Total weeds	Broad leaves	Grasses	Total weeds
Unweeded	--	00.00	00.0	00.0	00.00	00.0	00.0
Hoeing at 4,8 and 12 WAS*	--	93.57	100.0	94.7	82.96	71.3	80.7
Pyrazon **	1.63	50.89	36.7	48.5	70.24	51.3	66.5
Pyrazon/TCA**	1.47	53.25	56.3	53.8	44.93	29.6	42.0
Phenmedipham at 4 WAS	0.34	48.94	47.2	48.6	33.70	45.7	36.1
Pyrazon ** + 1 hoeing at 4 WAS	1.63	94.96	88.7	93.9	89.52	81.1	87.9
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	92.07	99.2	93.3	90.10	94.5	91.0
Phenmedipham + 1 hoeing at 4 WAS	0.34	85.99	100.0	88.4	77.43	87.9	79.5
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	67.52	65.8	67.2	81.54	62.6	77.8
Pyrazon/TCA**+ phenmedipham at 4 WAS	1.47+0.34	65.61	69.4	66.3	52.94	44.1	51.2
Phenmedipham at 4 and 6 WAS	0.17+0.17	65.25	23.7	58.2	52.02	34.5	48.6
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	94.16	88.2	93.2	83.66	83.3	83.6

*: Weeks after sowing, **: Pre -emergence in soil application

Table 5: Effect of two planting patterns and some weed control treatments on growth of weeds grown in sugar beet in1995/96 and 1996/97 seasons.

Weed control treatments (AxB)		Growth traits			
Treatments	Rate (a.i.kg /fed)	Weeds/m^2 (no)		Weeds/m^2(gm)	
		1995/96	1996/97	1995/96	1996/97
Sowing on one side of ridges spaced 50 cm					
Unweeded	--	23.00	128.00	230.81	173.83
Hoeing at 4,8 and 12 WAS*	--	3.33	59.33	7.13	60.04
Pyrazon **	1.63	17.00	53.33	95.82	68.12
Pyrazon/TCA**	1.47	18.67	95.00	103.73	112.85
Phenmedipham at 4 WAS	0.34	13.33	101.00	120.53	126.08
Pyrazon ** + 1 hoeing at 4 WAS	1.63	6.00	29.33	16.72	38.27
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	7.00	47.00	15.29	34.31
Phenmedipham + 1 hoeing at 4 WAS	0.34	5.33	50.33	20.65	68.41
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	10.67	47.33	75.41	58.64
Pyrazon/TCA*+ phenmedipham at 4 WAS	1.47+0.34	10.67	75.00	64.38	97.42
Phenmedipham at 4 and 6 WAS	0.17+0.17	10.67	96.67	122.47	94.35
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	8.00	40.67	17.61	47.05
Mean		11.14	68.58	74.21	81.62
Sowing on both sides of ridges spaced 100cm					
Unweeded	--	16.33	71.67	121.70	162.33
Hoeing at 4,8 and 12 WAS	--	1.00	20.00	5.28	28.27
Pyrazon **	1.63	1.67	41.67	60.68	45.10
Pyrazon/TCA**	1.47	5.00	43.00	44.11	89.56
Phenmedipham at 4 WAS	0.34	10.33	46.00	51.22	80.72
Pyrazon ** + 1 hoeing at 4 WAS	1.63	2.00	23.00	5.05	23.86
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	2.00	19.00	4.50	21.11
Phenmedipham + 1 hoeing at 4 WAS	0.34	3.00	31.33	7.00	26.60
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	6.67	25.33	31.82	35.57
Pyrazon/TCA**+ phenmedipham at 4 WAS	1.47+0.34	2.67	27.00	35.37	66.43
Phenmedipham at 4 and 6 WAS	0.17+0.17	10.00	43.33	46.12	71.10
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	4.33	24.33	9.20	25.40
Mean		6.25	34.64	35.17	56.34
L.S.D.$_{0.05}$ for planting patterns (A)		0.71	1.85	3.78	2.07
L.S.D.$_{0.05}$ for (A x B)		2.47	6.42	13.11	7.19

* weeks after sowing ,** Pre -emergence in soil application,

Table 6: Effect of some weed control treatments on chlorophylls and carotenoids (mg/g fresh weight of leaves) in sugar beet at 50 days after sowing in 1995/96 and 1996/97 seasons.

Some weed control treatments		Pigments content							
Treatments	Rate (a.i.kg /fed)	Chlorophyll A		Chlorophyll B		Carotenoids		Total	
		1995/96	1996/97	1995/96	1996/97	1995/96	1996/97	1995/96	1996/97
Unweeded	--	4.49	4.38	2.91	2.80	1.25	1.14	8.64	8.32
Hoeing at 4,8 and 12 WAS *	--	5.24	5.42	3.58	3.48	1.67	1.56	10.49	10.45
Pyrazon **	1.63	4.68	4.59	2.69	2.58	1.48	1.35	8.83	8.52
Pyrazon/TCA**	1.47	4.60	4.49	2.83	2.72	1.44	1.33	8.86	8.54
Phenmedipham at 4 WAS	0.34	5.08	5.29	3.39	3.28	1.60	1.47	10.51	10.04
Pyrazon ** + 1 hoeing at 4 WAS	1.63	4.97	4.88	3.11	3.00	1.40	1.29	9.47	9.17
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	4.67	4.58	3.08	2.83	1.41	1.31	9.17	8.72
Phenmedipham + 1 hoeing at 4 WAS	0.34	4.78	4.67	2.94	2.84	1.63	1.55	9.36	9.06
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	4.04	3.95	2.23	2.12	1.29	1.16	7.56	7.24
Pyrazon/TCA**+ phenmedipham at 4 WAS	1.47+0.34	4.36	4.25	2.30	2.24	1.35	1.25	8.01	7.74
Phenmedipham at 4 and 6 WAS	0.17+0.17	4.27	4.18	2.56	2.50	1.29	1.20	8.12	7.88
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	4.36	4.49	2.40	2.28	1.40	1.34	8.14	8.11
$LSD_{0.05}$		0.53	0.51	0.73	ns	0.18	0.18	1.28	1.25

*: weeks after sowing, **: Pre -emergence in soil application

Table (7) : **Effect of two planting patterns and some weed control treatments on chlorophyll and carotenoides (mg/g fresh weight of leaves) in sugar beet at 50 days after sowing in 1995/96 and 1996/97seasons.**

Weed control treatments (AxB) Treatments	Rate (a.i.kg /fad)	Pigments content: Chlorophyll A 1995/96	Chlorophyll A 1996/97	Chlorophyll B 1995/96	Chlorophyll B 1996/97	Carotenoids 1995/96	Carotenoids 1996/97	Total 1995/96	Total 1996/97
Sowing on one side of ridges spaced 50 cm									
Unweeded	--	4.24	4.13	2.42	2.31	1.18	1.08	7.84	7.52
Hoeing at 4,8 and 12 WAS *	--	5.15	5.64	3.31	3.21	1.69	1.59	10.15	10.44
Pyrazon **	1.63	4.42	4.31	2.44	2.33	1.30	1.19	8.16	7.83
Pyrazon/TCA**	1.47	4.46	4.36	2.34	2.23	1.43	1.32	8.23	7.91
Phenmedipham at 4 WAS	0.34	6.02	5.63	3.31	3.20	1.68	1.57	11.00	10.40
Pyrazon * *+ 1 hoeing at 4 WAS	1.63	4.66	4.58	2.42	2.31	1.41	1.30	8.48	8.19
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	4.50	4.40	2.49	2.59	1.40	1.29	8.39	8.28
Phenmedipham + 1 hoeing at 4 WAS	0.34	5.10	4.99	2.78	2.67	1.63	1.58	9.51	9.25
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	4.03	3.92	2.31	2.20	1.23	1.09	7.57	7.12
Pyrazon/TCA** + phenmedipham at 4 WAS	1.47+0.34	4.08	3.98	2.18	2.14	1.33	1.22	7.59	7.33
Phenmedipham at 4 and 6 WAS	0.17+0.17	3.73	3.66	2.05	2.03	1.17	1.10	6.96	6.78
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	4.47	4.87	2.65	2.55	1.57	1.54	8.70	8.95
Mean		4.57	4.54	2.56	2.48	1.42	1.32	8.55	8.34
Sowing on both sides of ridges spaced 100 cm									
Unweeded	--	4.73	4.62	3.40	3.29	1.31	120	9.44	9.11
Hoeing at 4,8 and 12 WAS *	--	5.33	5.19	3.85	3.74	1.65	153	10.83	10.46
Pyrazon **	1.63	4.95	4.87	2.94	2.83	1.62	151	9.51	9.21
Pyrazon/TCA**	1.47	4.74	4.63	3.31	3.20	1.45	134	9.50	9.17
Phenmedipham at 4 WAS	0.34	5.01	4.94	3.48	3.37	1.52	137	10.02	9.68
Pyrazon ** + 1 hoeing at 4 WAS	1.63	5.27	5.17	3.80	3.70	1.39	128	10.46	10.14
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	4.84	4.77	3.67	3.06	1.43	132	9.95	9.16
Phenmedipham + 1 hoeing at 4 WAS	0.34	4.46	4.35	3.11	3.00	1.63	152	9.20	8.87
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	4.06	3.98	2.14	2.04	1.35	124	7.55	7.27
Pyrazon/TCA** + phenmedipham at 4 WAS	1.47+0.34	4.64	4.53	2.42	2.34	1.37	128	8.42	8.14
Phenmedipham at 4 and 6 WAS	0.17+0.17	4.81	4.70	3.06	2.96	1.41	130	9.29	8.97
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	4.23	4.12	2.14	2.01	1.22	115	7.59	7.27
Mean		4.76	4.65	3.11	2.96	1.45	1.34	9.31	8.95
L.S.D.$_{0.05}$ for planting patterns (A)		0.22	0.20	0.29	0.28	Ns	N.S.	0.52	0.51
L.S.D.$_{0.05}$ for (A x B)		0.73	0.72	ns	ns	0.25	0.26	1.82	1.76

*: weeks after sowing, **: Pre -emergence in soil application

3.3. Yields of sugar beet and some agronomic traits

3.3.1.Root dimensions

In the first season (Table 8), the tallest roots were achieved by phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing, pyrazon /TCA (1.47 kg a.i./fed) + one hoeing and pyrazon (1.63 kg/ a.i./fed) + one hoeing. The highest root diameter values in the first season (Table 8) were obtained from pyrazon /TCA (1.47 kg a.i./fed) + one hoeing, hand hoeing treatment and pyrazon (1.63 kg a.i./fed) + one hoeing. Whereas, phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing and pyrazon /TCA + phenmedipham (1.47 + 0.34 kg a.i./fed), were in the second rank. On the other hand, the lower root length and diameter were obtained with pyrazon/TCA (1.47 kg a.i./fed).

In the second season, the highest root length values were recorded by hand hoeing, phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing and pyrazon /TCA (1.47 kg a.i./fed) + one hoeing. Hand hoeing and pyrazon (1.63 kg a.i./fed) + one hoeing provided the highest root diameter values. The lowest root lengths and diameters were achieved by phenmedipham(0.34 kg a.i./fed)at 4 WAS,phenmedipham(0.17+0.17 kg a.i./fed) at 4 and 6 WAS(Table 8).

Concerning planting patterns, the results indicated that length and diameter of roots increased with sowing sugar beet plants on both sides of ridges, 100 cm apart during the two seasons compared with sowing on one side of ridges spaced 50 cm (Table 9). These results are in agreement with those obtained by Kamel *et al.*, (1984), El-Kassaby *et al.*, (1991) and El-Kassaby and Leilah (1992).

Concerning the effect of interaction between weed control treatments and planting patterns on root length ; in the first season, pyrazon/TCA (1.47 kg a.i./fed) + one hoeing and phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing each combined with sowing on both sides of ridges, 100 cm apart provided the highest root length values (Table 8). Whereas, in the second season, the high root length was attained by phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing and the hand hoeing treatment each under sowing on both sides of ridges, 100 cm apart.

The highest root diameter values in the first season were obtained from pyrazon/TCA (1.47 kg a. i./fed) + one hoeing. On the other hand, the lower root diameter means were produced by pyrazon/ TCA (1.47-kg a.i./fed). In the second season, data indicated that hand

hoeing under the two planting patterns and pyrazon at 1.63 kg a.i./fed + one hoeing under sowing on both sides of ridges spaced 100 cm, produced the highest root diameter values (9.94, 9.93 and 9.28 cm, respectively).

3.3.2.Root/top ratio

The results presented in Table (8) indicated significant differences in root/top ratio at harvest between the various treatments of weed control during both seasons. In the first season, the differences between the two planting patterns and the interaction effect between weed control treatments and planting patterns were insignificant.

Superiority of hand hoeing, pyrazon (1.63 kg a.i./fad) + one hoeing, pyrazon/TCA (1.47 kg a.i./fed) + one hoeing and phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing each combined with sowing on both sides of ridges, 100 cm apart in both seasons, by producing higher root dimensions might be due to a lower weed competition. These results are in agreement with those obtained by Kamel *et al.*,(1981), El-Hattab and Shaban (1982) and Mahmoud *et al.* (1990 a&b).

3.3.3. Root and top yields

Results presented in Table (8) show significant differences in root and top yields/fad at harvest detected between the different weed control treatments, in both seasons. In the first season, comparative results between weed control treatments indicate that the highest increases in root yield were outyielded from pyrazon /TCA (1.47 kg a.i./fed) + one hoeing. Whereas, pyrazon (1.63 kg a.i./fed) + one hoeing, hand hoeing treatment and pyrazon + phenmedipham (1.63 + 0.34 kg a.i./fed) were in the second rank.The highest top yield(15.32 t/fad) was recorded by hand hoeing treatment.

In the second season, the highest root yield was recorded by pyrazon (1.63 kg a.i./fed) + one hoeing and hand hoeing treatments. While, the highest top yield resulted from pyrazon/TCA (1.47 kg a.i./ fed)+ one hoeing and hand hoeing treatments. On the other hand, the lowest root and top yield t/fed were obtained from phenmedipham

at (0.34 kg a.i/ fed) at 4 WAS and phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS during the two seasons.

Concerning planting patterns, sowing on both sides of ridges spaced 100 cm produced the highest root and top yield than sowing on one side of ridges, 50 cm apart during both seasons (Table 9). These results are in agreement with those obtained by Kamel *et al.*, (1984), El-Kassaby *et al.*, (1991) and El-Kassaby and Leilah (1992).

With regard to the interaction between weed control treatments and planting patterns, the highest root yield values were achieved by hand hoeing treatment and pyrazon (1.63 kg a.i./fed) + one hoeing each under sowing on both sides of ridges, 100 cm apart. Observed results reveal that the influence of such treatment on top yield took the same trend of the root yield in both seasons.

3.4. Juice quality

3.4.1. Total soluble solids

Total soluble solids (TSS %) was significantly affected by weed control treatments (Table 10). In the first season, the highest value of TSS % was achieved from pyrazon/TCA (1.47 kg a.i./fed) under sowing on one side of ridges, 50 cm apart. Whereas, in the second season, the best value of total soluble solids was obtained from phenmedipham (0.34 kg a.i./fed) + one hoeing.

The results in Table (11) showed that T.S.S. %. and sucrose percentages are decreasing with sowing sugar beet on both sides of ridges, 100 cm, in comparison with sowing on one side of ridges, 50 cm in both seasons of study. Concerning the interaction between weed control treatment and planting patterns, the results in (Table 11) showed that the highest value of T.S.S.% was achieved from pyrazon/TCA at kg a.i./fed under sowing on one side of ridges, 50 cm apart. Whereas, in the second season, the highest value of total soluble solids was obtained from phenmedipham (0.34 kg a.i./fed) + one hoeing under sowing on one side of ridges,50 cm apart. These results are in agreement with those obtained by Kamel *et al.*, (1984), El-Kassaby *et al.*, (1991) and El-Kassaby and Leilah (1992).

3.4.2. Sucrose percentage

The treatments, phenmedipham (0.34 a.i./fed) + one hoeing phenmedipham (0.17 + 0.17 kg a.i./fed) at 4 and 6 WAS + one hoeing pyrazon/TCA (1.47 kg a.i./fed)+one hoeing pyrazon + phenmedipham (1.63 + 0.34 kg a.i./fed) gave higher sucrose content (Table 10). Sucrose percentage in roots of sugar beet grown on one side of ridges, 50cm apart was more than those obtained by sowing on both sides of ridges ,100 cm apart (Table 11).

Concerning the interaction, the results in Table (11) indicated that the highest values of sucrose percentage were obtained by phenmedipham (0.34 kg a.i./fed) + one hoeing and pyrazon /TCA (1.47 kg a.i./fed) + one hoeing each under sowing on one side of ridges ,50 cm apart.

3.4.3. Purity percentage

Concerning weed control treatments, in the first season (Table10), the best values of purity percentage were achieved from pyrazon/TCA(1.47 kig a.i./fed)+ one hoeing pyrazon+ phynmedipham (1.63 + 0.34 kg a.i./fed), phenmedipham (0.34 kg a.i./fed) + one hoeing and hand hoeing treatment. In the second season, (Table10), the highest values of purity % were produced by hand hoeing treatment and pyrazon (1.63 kg a.i./fed) + one hoeing.

The present results showed that, purity percentage increased with sowing on both sides of ridges, 100cm apart in both seasons of study (Table 11). These results are in agreement with those obtained by Kamel *et al.,* (1984), El-kassaby *et al.,* (1991) and El-Kassaby and Leilah (1992).

Concerning the interacfion between weed control and planting pattern treatments, the greatest values of purity % were achieved by pyrazon/TCA (1.47 kg a.i./fed) + one hoeing and hand hoeing treatment each under sowing on one side of ridges, 50 cm apart in 1995/96. While, in 1996/97 the treatments; pyrazon (1.63 kg a.i.) + one hoeing under sowing on one side of ridges spaced 50 cm with hand hoeing treatment provided the greatest value of purity percentage.

Table (8) : **Effect of some weed control treatments on yields of sugar beet and some agronomic traits of sugar beet at harvest in 1995/96 and1996/97 seasons.**

Some weed control treatments		Yields of sugar beet and some agronomic traits									
Treatments	Rate (a.i.kg /fed)	Root length (cm)		Root diameter (cm)		Root/Top ratio		Root yield/fad (tons)		Top yield/ fad (tons)	
		95/96	96/97	95/96	96/97	95/96	96/97	95/96	96/97	95/96	96/97
Unweeded	--	19.89	18.28	7.14	4.83	1.76	1.66	7.50	6.30	4.51	2.94
Hoeing at 4,8 and 12 WAS*	--	22.83	26.66	11.15	9.61	2.03	1.86	28.41	27.02	15.32	10.41
Pyrazon **	1.63	24.51	21.94	8.98	6.57	2.20	1.68	21.37	18.45	12.42	6.67
Pyrazon/TCA**	1.47	22.38	22.39	7.88	6.09	1.55	1.56	17.97	16.07	10.51	6.61
Phenmedipham at 4 WAS	0.34	21.39	19.39	8.76	5.41	1.13	1.89	8.93	6.59	4.63	4.11
Pyrazon ** + 1 hoeing at 4 WAS	1.63	27.14	24.27	10.72	9.04	1.80	1.70	28.47	27.24	14.72	9.89
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	27.72	24.39	11.25	7.95	1.99	2.02	28.75	25.83	15.07	11.22
Phenmedipham + 1 hoeing at 4 WAS	0.34	24.52	24.05	9.99	7.58	2.06	1.99	18.42	15.61	9.85	6.12
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	26.11	22.72	9.87	8.16	2.09	2.22	27.65	24.59	13.29	7.79
Pyrazon/TCA**+ phenmedipham at 4 WAS	1.47+0.34	24.82	23.50	10.12	7.19	1.93	1.76	22.24	20.14	12.30	10.67
Phenmedipham at 4 and 6 WAS	0.17+0.17	22.59	21.89	9.32	5.86	1.54	1.85	11.79	8.86	5.86	4.59
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	28.19	25.72	10.51	8.52	1.82	1.46	21.07	18.18	10.92	7.30
$LSD_{0.05}$		0.80	0.64	0.49	0.50	0.25	0.21	1.09	1.06	0.64	0.88

*: weeks after sowing, **: Pre -emergence in soil application

Table (9) : **Effect of two planting patterns and some weed control treatments on some agronomic traits of sugar beet at harvest in 1995/96 and1996/97 seasons**

Weed control treatments (AxB)		Yields of sugar beet and some agronomic traits									
Treatments	Rate of application (a.i.kg /fed)	Root length cm)		Root diameter (cm)		Root yield/fad (tons)		Top yield/fad (tons)		Sugar yield/fad (tons)	
		95/96	96/97	95/96	96/97	95/96	96/97	95/96	96/97	95/96	96/97
Sowing on one side of ridges spaced 50 cm											
Unweeded	--	18.77	17.22	6.45	4.12	6.95	5.88	3.89	1.97	1.17	1.03
Hoeing at 4,8 and 12 WAS *	--	20.00	26.11	10.68	9.28	27.17	23.94	14.45	9.19	4.70	4.24
Pyrazon **	1.63	23.47	21.00	8.29	5.45	18.85	15.96	10.13	4.57	3.08	2.61
Pyrazon/TCA**	1.47	19.75	21.55	7.47	5.87	11.37	9.45	7.59	3.69	1.81	1.54
Phenmedipham at 4 WAS	0.34	20.33	18.33	7.90	4.56	7.81	6.02	3.90	3.69	1.27	1.00
Pyrazon ** + 1 hoeing at 4 WAS	1.63	26.22	23.55	9.72	8.15	27.58	24.69	12.75	3.52	4.49	4.05
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	22.00	23.33	10.93	7.13	28.54	25.62	14.81	7.95	5.07	4.57
Phenmedipham + 1 hoeing at 4 WAS	0.34	22.16	21.22	9.21	6.91	15.25	12.32	8.92	10.79	2.72	2.21
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	24.67	21.44	8.88	7.93	26.20	23.31	10.64	5.71	4.47	4.11
Pyrazon/TCA** + phenmedipham at 4 WAS	1.47+0.34	21.41	22.55	9.44	5.97	17.59	15.28	10.72	5.75	2.78	2.44
Phenmedipham at 4 and 6 WAS	0.17+0.17	21.28	19.00	8.75	5.01	9.86	6.97	4.41	10.25	1.57	1.11
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	23.71	23.77	9.64	8.06	19.27	16.38	10.63	4.04	3.38	2.82
Mean		21.98	21.59	8.95	6.54	18.04	15.49	9.40	6.20	3.04	2.64
Sowing on both sides of ridges spaced 100 cm											
Unweeded	--	21.00	19.33	7.83	5.54	8.06	6.72	5.13	3.90	1.35	1.15
Hoeing at 4,8 and 12 WAS *	--	25.66	27.22	11.62	9.94	29.65	30.09	16.18	11.62	4.76	4.85
Pyrazon **	1.63	25.55	22.88	9.68	7.68	23.88	20.95	14.71	8.76	3.88	3.43
Pyrazon/TCA**	1.47	25.01	23.22	8.29	6.31	24.57	22.68	13.44	9.52	3.92	3.64
Phenmedipham at 4 WAS	0.34	22.45	20.44	9.29	6.27	10.05	7.17	5.37	4.71	1.65	1.20
Pyrazon ** + 1 hoeing at 4 WAS	1.63	28.06	25.00	9.63	9.93	29.35	29.78	16.69	11.84	4.95	5.17
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	33.44	25.44	11.56	8.77	28.96	26.04	15.34	11.65	4.70	4.33
Phenmedipham + 1 hoeing at 4 WAS	0.34	26.88	26.89	11.71	8.24	21.60	18.90	10.78	6.52	3.54	3.17
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	27.55	24.00	10.76	8.38	29.09	25.87	15.93	9.82	4.91	4.44
Pyrazon/TCA** + phenmedipham at 4 WAS	1.47+0.34	28.22	24.44	10.81	8.40	26.89	24.99	13.87	11.08	4.55	4.26
Phenmedipham at 4 and 6 WAS	0.17+0.17	23.90	24.77	9.89	6.71	13.72	10.75	7.30	5.15	2.34	1.86
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	32.66	27.66	11.38	8.99	22.88	19.99	11.20	7.64	3.78	3.35
Mean		26.70	24.27	10.34	7.93	22.39	20.33	12.18	8.52	3.70	3.40
L.S.D.$_{0.05}$ for planting patterns (A)		0.33	0.26	0.20	0.21	0.44	0.43	0.26	0.36	0.07	0.08
L.S.D.$_{0.05}$ for (A x B)		1.13	0.90	N.S	0.71	1.54	1.50	0.91	1.25	0.26	0.28

*: weeks after sowing, **: Pre -emergence in soil application

Table (10) : **Effect of some weed control treatments on some juice quality traits of sugar beet at harvest in 1995/96 and1996/97 seasons.**

Some weed control treatments		Juice quality						Sugar yield /fad ,tons	
Treatments		T.S.S.%		Sucrose %		Purity %			
		1995/96	1996/97	1995/96	1996/97	1995/96	1996/97	1995/96	1996/97
Unweeded	--	21.17	23.33	16.89	17.43	80.04	74.95	1.26	1.09
Hoeing at 4,8 and 12 WAS *	--	20.67	20.67	16.68	16.93	80.90	82.01	4.73	4.55
Pyrazon **	1.63	20.50	20.67	16.32	16.39	79.62	79.30	3.48	3.02
Pyrazon/TCA**	1.47	21.83	22.50	15.97	16.18	73.67	72.00	2.87	2.59
Phenmedipham at 4 WAS	0.34	20.67	21.33	16.40	16.79	79.37	78.72	1.46	1.10
Pyrazon ** + 1 hoeing at 4 WAS	1.63	20.83	21.17	16.62	16.90	79.85	80.23	4.72	4.61
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	20.17	22.67	17.01	17.25	84.31	76.13	4.88	4.45
Phenmedipham + 1 hoeing at 4 WAS	0.34	21.00	22.83	17.13	17.37	81.54	76.18	3.13	2.69
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	20.33	22.50	16.98	17.41	83.50	77.37	4.69	4.27
Pyrazon/TCA** + phenmedipham at 4 WAS	1.47+0.34	21.33	23.00	16.39	16.54	75.09	71.91	3.67	3.35
Phenmedipham at 4 and 6 WAS	0.17+0.17	21.17	22.67	16.56	16.65	78.24	73.57	1.96	1.48
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	21.50	21.67	17.05	17.03	79.35	78.62	3.58	3.09
$LSD_{0.05}$		0.59	0.82	0.26	0.67	2.32.	3.07	0.18	0.20

*: weeks after sowing, **: Pre -emergence in soil application

Table (11) : Effect of two planting patterns and some weed control treatments on some juice quality traits of sugar beet at harvest in 1995/96 and1996/97 seasons.

Weed control treatments (AxB)		Juice quality traits					
Treatments	Rate (a.i.kg /fed)	T.S.S %		Sucrose %		Purity %	
		1995/96	1996/97	1995/96	1996/97	1995/96	1996/97
Sowing on one side of ridges spaced 50 cm							
Unweeded	--	22.33	25.00	16.90	17.61	75.68	70.34
Hoeing at 4,8 and 12 WAS *	--	20.00	20.67	17.29	17.73	86.45	85.87
Pyrazon **	1.63	20.67	20.67	16.35	16.39	79.10	79.25
Pyrazon/TCA**	1.47	23.67	23.00	15.99	16.31	67.55	71.00
Phenmedipham at 4 WAS	0.34	20.67	21.00	16.33	16.74	79.00	79.73
Pyrazon * *+ 1 hoeing at 4 WAS	1.63	21.33	22.33	16.33	16.41	76.56	73.50
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	20.33	23.33	17.77	17.85	87.41	76.52
Phenmedipham + 1 hoeing at 4 WAS	0.34	21.67	24.00	17.88	17.95	82.51	74.79
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	20.33	23.00	17.06	17.62	83.92	76.60
Pyrazon/TCA** + phenmedipham at 4 WAS	1.47+0.34	22.00	23.33	15.82	15.98	71.91	68.50
Phenmedipham at 4 and 6 WAS	0.17+0.17	21.33	23.00	16.01	15.99	75.06	69.60
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	21.33	21.67	17.55	17.28	82.27	79.74
Mean		21.31	22.58	16.77	16.99	78.95	75.46
Sowing on both sides of ridges spaced 100 cm							
Unweeded	--	20.00	21.67	16.88	17.25	84.40	79.55
Hoeing at 4,8 and 12 WAS*	--	21.33	20.67	16.07	16.14	75.35	78.15
Pyrazon **	1.63	20.33	20.67	16.29	16.39	80.13	79.35
Pyrazon/TCA**	1.47	20.00	22.00	15.96	16.06	79.79	73.00
Phenmedipham at 4 WAS	0.34	20.67	21.67	16.48	16.84	79.73	77.71
Pyrazon ** + 1 hoeing at 4 WAS	1.63	20.33	20.00	16.90	17.39	83.13	86.96
Pyrazon/TCA + 1 hoeing at 4 WAS	1.47	20.00	22.00	16.24	16.65	81.20	75.73
Phenmedipham + 1 hoeing at 4 WAS	0.34	20.33	21.67	16.38	16.79	80.57	77.49
Pyrazon ** + phenmedipham at 4 WAS	1.63+0.34	20.33	22.00	16.89	17.19	83.08	78.13
Pyrazon/TCA** + phenmedipham at 4 WAS	1.47+0.34	21.67	22.67	16.96	17.09	78.26	75.39
Phenmedipham at 4 and 6 WAS	0.17+0.17	21.00	22.33	17.10	17.31	81.42	77.53
Phenmedipham at4 and 6 WAS+ 1 hoeing at 4 WAS	0.17+0.17	21.67	21.67	16.56	16.78	76.42	77.50
Mean		21.31	21.58	16.56	16.82	80.29	78.32
L.S.D.$_{0.05}$ for planting patterns (A)		0.24	0.33	0.10	N.S	0.94	1.25
L.S.D.$_{0.05}$ for (A x B)		0.83	1.17	0.37	0.95	3.29	4.34

*: weeks after sowing, **: Pre -emergence in soil application

3.5. Sugar yield

Pyrazon/TCA (1.47 kg a.i./fed) + one hoeing and pryrazon +phenmedipham (1.63 + 0.34 kg a.i./fed) gave higher sugar yield values during 1995/96 and 1996/97 seasons (Table 10).

In both seasons, sugar yield increased with sowing on both sides of ridges, 100 cm apart compared with sowing on one side of ridges spaced 50 cm (Table 9). These results are in agreement with those obtained by Kamel *et al.*, (1984), El-Kassaby *et al.*, (1991) and El-Kassaby and Leilah (1992).

Concerning the interaction between weed control and planting patterns treatments, the highest sugar yield was achieved by pyrazon/TCA (1.47 kg a.i./fed) + one hoeing under sowing on one side of ridges , 50 cm apart in 1995/96. Whereas, pyrazon (1.63 kg a.i./fed) + one hoeing which combined with sowing on both sides of ridges, 100cm apart gave the highest sugar yield (5.17 ton/fad) in 1996/97 (Table 9).

The superiority of the herbicides; pyrazon (1.63 kg a.i./fad) + one hoeing combined with sowing on both sides of ridges,100 cm apart during both seasons may be due to higher root diameter and root dry weight/plant as a direct result of its control. The present results are in agreement with those obtained by Obead (1980),El-Hattab and Shaban(1982),Desheesh *et al.*, (1983),Adamczweski(1995),Mahmoud *et al.*, (1990 a &b) and El-Hattab *et al.*, (1996).

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تأثير نظم الزراعة وبعض معاملات مقاومة الحشائش على محصول بنجر السكر والحشائش المصاحبه له

شعبان عبد الهادى شعبان ، محمود عبد الرحيم حسانين، عبدالحميد عبدالحميد جابر * إيمان محمد عبد الفتاح*

قسم المحاصيل – كلية الزراعة – جامعة القاهرة
• قسم الفسيولوجى والكيمياء الزراعية – معهد المحاصيل السكرية– مركز البحوث الزراعية

ملخص

أجريت تجربتان حقليتان فى مركز البحوث والتجارب الزراعية التـــابع لكلية الزراعة – جامعة القاهرة خلال موســـمى 1996/1995 ، 1997/1996 بهدف دراسة تأثير المقاومة المتكاملة للحشائش فى بنجر السكر على الحشـــائش ومكونات المحصول وصفات جودة العصير لنباتات بنجرالسكر .أستخدم تصميم القطع المنشقة مرة واحدة مع أربع مكررات فى كلا الموسمين حيـــث وضـــع نظامى الزراعة (الزراعة على ريشة واحدة لخطوط عرضها 50 سم ، الزراعـة على جانبى خطوط عرضها100 سم) فى القطع الرئيسية بينما وضعت معـاملات مقاومة الحشائش ومعاملة العزيق ومعاملة بدون مقاومة فى القطع المنشقة وفيما يلى ملخص لأهم النتائج:

1- تم الحصول على أفضل مقاومة للحشائش الحولية الكلية من المعاملات TCA/ بيرازون (بيرادور) بمعدل 47ر1 كجم مادة فعالة/الفدان مع عزقة ، بيرازون (بيرامين) بمعدل 63ر1 كجم مادة فعالة /فدان مع عزقة ، فينميدى فام (بيتانال) بمعدل 43ر0 كجم مادة فعالة/فدان مع عزقة ، فين ميدى فام (بيتانال)بعد 4ر6 أسابيع من الزراعة بمعدل 17ر0 و 17ر0 كجم مادة فعالة/فدان مع عزقة، (معاملة العزيق) وذلك عند الزراعة على جانبى خطوط عرضها 100سم .

2- أدى إضافة مبيدات الحشائش فى صورة مخاليط إلى نقص كمية الكلورفيل أ ، ب والكاروتينيدات فى أوراق بنجر السكر عن إضافتها فى صورة فردية.

3- زاد طول وقطر الجذر، الأوزان الغضة والجافة للجذر والعرش زيادة ملحوظة فى كلا الموسمين باستخدام معاملات العزيق ، بيرازون (بيرامين) بمعدل 63ر1 كجم مادة فعالة/للفدان مع عزقة .

4- نتجت أعلى قيمة لكل من محصول الجذور ، العرش، محصول السكر من معاملتى بيرازون (بيرامين) بمعدل 63ر1 كجم مادة فعالة/الفعالة مع عزقة ، (معاملة العزيق) تحت نظام الزراعة على جانبى خطوط عرضها100 سم فى كلا الموسمين .

5- أدى استخدام المعاملات فين ميدى فام (بيتانال) بمعدل 34ر. كجم مادة فعال/الفدان مع عزقة TCA/بيرازون (بيرادور) بمعدل 47ر1 كجم مادة فعالة/الفدان مع عزقة وذلك عند الزراعة على جانب واحد من خطوط عرضها 50 سم الى إعطاء أعلى قيمة للنسبة المئوية للسكروز فى كلا الموسمين.

6- سجلت أعلى قيمة للنسبة المئوية للنقاوة عند استخدام معاملة TCA/بيرازون (بيرادور) بمعدل 47ر1 كجم مادة فعالة/الفدان مع عزقة ، (معاملة العزيق) وذلك بمعدلة تخطيط 50 سم وأيضا معاملة بيرازون بمعدل 63ر1 كجم مادة فعالة/الفدان مع عزقة تحت معدل تخطيط 100سم .