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Impact of Sugarcane (*Saccharum officinarum* L.) Genotypes and Different Weed Control Treatments on Weeds, Sugarcane Productivity and Quality

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Abstract: Afield experiment was carried out at Mallawy Agriculture Research Station, El-Minia Governorate during two successive growing seasons of 2016/17 and 2017/18 to study the effect of some promising sugarcane genotypes, some weed control treatments as well as their interaction on weeds, yield and juice quality of sugarcane. The experiment included twenty seven treatments designed in strip-plot design. The three sugarcane genotypes (G.99-103, G 2003-49 and G.T. 54-9 known as C9) were located in the main strips, while nine weed control treatments (diuron applied post-planting alone at 2.2kg a.i./faddan, diuron pre-emergence alone at 2.2kg a.i./faddan, diuron post-planting at 2.2kg a.i./faddan followed by triclopyr at 192 g a.i./faddan, triclopyr alone at 192 g a.i./faddan, triclopyr at 192 g a.i./faddan followed by one hand hoeing, hand hoeing followed by triclopyr at 192 g a.i./faddan, hand hoing twice, weed free for the whole season as well as unweeded check) were located in sub-strip. Results indicated that G.99-103 and G.T.54-9 genotypes significantly reduced broad-leaved, grassy and total annual weeds (g/m^2) in both seasons, compared to G.2003-49 genotype. G.99-103 genotype significantly surpassed G.2003-49 and G.T.54-9 in stalk height, stalk weight, cane yield and recoverable sugar yield in both seasons and stalk diameter in the first season only.G.T.54-9 genotype increased TSS, sucrose, purity% and sugar recovery%. Data indicated that weed free for the whole season, the sequence treatment of diuron post-planting with triclopyr and diuron applied pre-emergence alone gave the highest weed control% of total annual weeds (broad-leaved and grassy weeds) (g/m^2) in both seasons, which were 96.7, 93.1 and 92% in the first season and 97.8, 93.8 and 93.4% in the second season respectively, than unweeded check. Data also revealed that keeping sugarcane plants free of weed for whole season or the sequence treatment of diuron post-planting with triclopyr or diuron applied pre-emergence alone resulted the highest stalk height, stalk diameter, stalk weight, cane yield and sugar yield as compared with unweeded check in both seasons. Data indicated that weed control treatments significantly affected sugarcane juice quality in both season-except- purity percentage in the second season only. Results indicated that the effect of interaction between sugarcane genotypes and weed control treatments had a significant effect on dry weight of weeds (g/m^2) (broad-leaved, grassy and total annual) in both season-except- grassy weeds and total annual weeds in the second season. The use of diuron as a soil acting herbicide applied post-planting followed by triclopyr one month later can gave prolonged weed control, cane yield/faddan and economic feasibility almost similar to weed free for whole season, when growing G. 99-103 genotype.

Key words: Sugarcane (*Saccharum* spp. L.) genotypes · Weed control · Diuron · Triclopyr and hand hoeing

INTRODUCTION

Sugarcane (*Saccharum* spp. L.) is on of the main source for sugar production and an important cash and industrial crop in Egypt. It is cultivated in about 328 thousand fed. produced 15.68 million tons of cane with average 47.8 ton/faddan and produced 1,0252 million tons of sugar in crushing season of 2017.

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Sugarcane genotypes are considered the corner stone in sugar industry. Moreover, they are genetically differ in their growth characters in terms of stalk length, diameter, fresh weight, etc. likewise, they differ in their quality characteristics as sucrose, reducing sugars, juice purity and sugar recovery percentage, etc. All traits of cane genotypes are also affected by soil, wealthier factors and agronomic practices. Azzazy *et al*. [1] revealed that sugarcane genotype G.T.54-9 gave superiority in stalk height, stalk diameter, cane and sugar yield over F.153 and G. 74-96 genotypes. Bekheet [2] cleared that sugarcane genotype G. 84-47 significant superiority in the number of millable canes, cane and sugar yields/faddan as well as brix%, sucrose% and sugar recovery%. El-Geddawy *et al*. [3] indicated that genotype G.T. 54-9 surpassed the other genotypes in plant height, stalk fresh weight, number of millable canes/faddan, cane yield and sugar yield (ton/faddan). Srivastava *et al*. [4] reported that good and uniform stand of sugarcane crop develops complete canopy that shades the spaces between the cane rows, which is very helpful in reducing weed competition. Genotypes have the greatest tillering ability the widest leaf can be an economical measure of suppressing weed growth.

Weeds reduce sugarcane yields by competing for moisture, nutrients, space and light during its growing period. Khan *et al*. [5] found that weed competition can reduce sugarcane yield by 20-25%. Heavy weed infestation hinders sugarcane harvesting by adding unnecessary harvesting expenses. Even a single weed plant growing to maturity may produce seeds that create problems for many years to come. Sugarcane is a long duration crop which takes longer time for emergence due to which crop faces tough competition with weeds between 60 to 120 days of its planting which causes heavy reduction in cane yield ranging from 40-67% [6]. Also Singh *et al*. [7] reported that critical period of weed control was between 30 and 120 days after sugarcane planting. Punzelan and Cruzz [8] observed that weeds competition for two months reduced yield by 15% and for the whole season by 55% depending on weed infestation.

Chemical weed control methods are more effective in controlling weeds without any adverse effect on cane quality and are time saving [9]. Akhtar and Ahmed [10] repoted that the application of herbicide at the planting time produced maximum cane yield (168.79 tons/ha) that was 185.9 % higher than the weedy check (59.04 tons/ha). The pre-emergence application of diuron allows weed seeds to germinate normally, but interferes with chlorophyll formation which then leads to starvation and death of the young weeds [11].

Sharma [12] revealed that application of herbicides at pre-emergence treatments supplemented with one intercultural at 75-80 days after planting, gave 106-124% increase in cane yield over the control, this increase being comparable to that with hoeing twice (116.5%). Saini *et al*. [13] found that hand weeding at 30, 60 and 90 DAP had the lowest weed population/m^2 and weed dry matter but had the highest weed control efficiency as well as gave the highest millable canes and cane yield/ha. Singh and Menhi [14] indicated that plots receiving manual hoeing at 20, 40 and 60 days after planting resulted in minimum weed density (58.3g/m^2) as well as weed dry matter (15.1 g/m^2) and thus proved highly effective. Fakkar *et al.* [15] showed that hand hoeing thrice at 25, 45 and 65 DAP, using herbicides, triclopyr at rate 200 cm/fed, florasulam + flumetsulam at rate 30 cm/fed, fluroxypyr at the rate of 200 cm/fed and diuron at the rate of 2 kg/fed, gave reduced weeds dry weight and increased stalk height, diameter, number of internodes/stalk, brix%, sucrose% and sugar recovery percentages as well as number of millable canes/faddan, cane and sugar yields in both seasons. The objective of the present work is to investigate the effect of weed control treatments on some planted sugarcane (*Saccharum* spp. L.) genotypes.

MATERIALS AND METHODS

A field experiment was carried out at Mallawy Agricultural Research Station, El-Minia Governorate in two successive growing seasons of 2016/17 and 2017/18 to study the effect of sugarcane genotypes and some weed control treatments as well as their interaction on weeds, yield, its components and juice quality of three sugarcane genotypes under middle Egypt condition. Every field experiment included twenty seven treatments represent three sugarcane genotypes and nine weed control treatments. The experimental design was strip-plot design. The sugarcane genotypes were located in the main strips and weed control treatments located in the sub-strips as follow:

Main Strips: Sugarcane Genotypes:

- G.99-103.
- G 2003-49.
- G.T. 54-9, known as C9 (the commercial variety).

Sub-strips: weed control treatments:

- Diuron [*N*'-(3,4-dichlorophenyl)-*N,N*-dimethylurea] known commercially as Ready peak 80% WG applied post-planting and irrigated immediately at rate of 2.2 kg a.i./faddan.
- Diuron pre-emergence applied five days after planting irrigation at rate of 2.2 kg a.i./faddan.
- Diuron applied post-planting at rate of 2.2 kg a.i /faddan followed by triclopyr [[(3,5,6-trichloro-2-pyridyl)oxy]acetic acid] known commercially as Garlon4 48% EC applied as post-emergence after one month from planting at rate of 192 g a.i./faddan.
- Triclopyr applied as post-emergence after one month from planting at rate of 192 g a.i. /faddan.
- Triclopyr applied as post-emergence after one month from planting at rate of 192 g a.i. /faddan followed by one hand hoeing after one month from triclopyr application.
- One hand hoeing after one month from planting followed by triclopyr applied post-emergence after one month from hand hoeing at rate of 192 g a.i. /faddan
- Hand hoeing twice (30 and 60 days after planting).
- Weed free for the whole season.
- Unweeded check.

The soil texture was clay loam in both seasons. Each plot area was 21 m^2 including 4 rows of 5.25 m in length and 1.0 m apart. Sugarcane was planted on the 26th, 18th of March, in the first and second season, respectively and harvested after 12 months in both seasons. Nitrogen fertilizer was added as urea (46.5% N) and divided into two equal portions at rate of 200 Kg N/faddan as recommended dose in both seasons. The first nitrogen dose was applied after 60 days from planting, while the second dose was applied after 30 days later. Phosphorus fertilizer at the rate of 30 kg P_2O_5/faddan was applied during land preparation as calcium super phosphate (15.5% P_2O_5). Potassium fertilization was applied at rate of 24 Kg K_2O/faddan as potassium sulphate (48% K_2O) with the second portion of nitrogen fertilizer. The other agricultural practices were done as recommended by Sugar Crops Research Institute.

The Recorded Data

Weeds: Weeds were hand pulled from one square meter in each plot after 90 days from planting, separated into broad-leaved and grassy weeds and air dried for seven days then oven dried at 70°C until a constant weight to estimate the: dry weight of grassy, broad-leaved and total annual weeds (g/m^2).

Sugarcane Yield and its Component: At harvest, ten stalks were taken at random from each sub plot to: stalk height (cm), stalk diameter (cm) and stalk weight (kg).

Sugar canes of each plot were harvested, cleaned, topped and weighed to determine cane yield/ plot and converted into (ton/faddan).

Juice Quality Characteristics: The previous ten stalks were transferred to quality control laboratory of Abo-Qurqas sugar factory to estimate the following traits:

- Total soluble solids (TSS %) was determined using "Brix Hydrometer" standardized at 20°C according to A.O.A.C. [16].
- Sucrose % was determined using "Saccharometer" according to A.O.A.C. [16].
- Juice purity % was calculated according to Singh and Singh [17] using the following equation:

$$\text{Juice purity \%} = \frac{\text{Sucrose\%}}{\text{TSS}} \text{ X } 100$$

- Reducing sugars% was determined according to A.O.A.C. [16].
- Sugar recovery % was calculated using the following equation according to Yadav and Sharma [18].

$$\text{Sugar recovery \%} = \frac{\text{Pol\% - 0.8}}{\text{Purity\%}} \text{ X } \frac{\text{Purity \% - 40}}{\text{100 - 40}} \text{ X } 100$$

- Recoverable sugar yield (ton/fed) was calculated as described by Albert [19] using the following equation:

Recoverable sugar yield = cane yield (ton/fed) x sugar recovery %.

Economic Analysis: Economic evaluation for cane yield (ton/faddan) was done according to Heady and Dillon [20] and the following traits were estimated:-

- Total costs = fixed costs (i.e. land preparation, fertilization, irrigation land lease and labor costs + variable costs (treatments cost).
- Gross income (GI) = cane price (550 and 650 L.E in the first and second seasons, respectively) x cane yield (t/faddan).
- Net income (NI) = Gross income – Total costs.
- Profitability (P) = (Net income/Total costs) x 100.
- Benefit/Costs ratio (B/C) = Gross income/Total costs.

Statistical Analysis: The data were statistically analyzed according to Gomez and Gomez [21], using the computer "MSTAT-C" statistical analysis package [22]. The least significant differences (LSD) at probability level of 0.05 used to compare the differences between treatments means.

RESULTS AND DISCUSSION

Effect of Sugarcane Genotypes On

Weeds: The dominat weeds in the experiment site were *Echinochloa colona* L. and *Brachiaria eruciformis* as grassy weeds, while *Ipomoea purpurea, Hibiscus trionum, Portulaca oleraceus* L and *Corchorus oletorius* as broad-leaved weeds.

Data in Table (1) indicated that G.99-103 and G.T.54-9 sugarcane genotypes had a significant effect on broad-leaved, grassy and total annual weeds (g/m^2) in both seasons. These two genotypes reduced broad-leaved weeds by 23.74 and 24.71% in the first season and 22.32 and 31.06% in the second season. While, the reduction% in grassy weeds were 28.47 and 20.80% in the first season and 23.24 and 24.10% in the second season and total annual weeds by 25.94 and 22.90% in the first season and 22.73 and 29.52% in the second season, respectively as compared with G.2003-49 genotype. This may be attributed to the vigorous vegetative growth of G.99-103 and G.T.54-9 genotypes than G.2003-49. These results are in agreement with those obtained by Srivastava *et al*., [4] who found that genotypes have the greatest tillering ability and widest leaf can be an economical measure of suppressing weed growth.

Yield and its Components: It is clear from Table (2) that G.99-103 genotype was the best genotype in yield and its component in both seasons. G.99-103 genotype significantly surpassed G.2003-49 and G.T.54-9 in stalk height by 7.02 and 5.64%, stalk weight by 50.56 and 38.14%, cane yield by 54.76 and 39.76% and recoverable sugar yield by 52.45 and 20.43% in the first and second seasons, respectively and stalk diameter in the first season only by 8.56 %, as compared with G.2003-49 genotype. These results had the same trend with those obtained by Azzazy *et al*. [1]; Bekheet [2] and El-Geddawy *et al*. [3].

Juice Quality: Data in Table (3) indicated that the studied sugarcane genotypes differed significantly in juice quality. G.T.54-9 genotypes increased TSS, sucrose%,

Table 1: Effect of sugarcane genotypes on broad-leaved, grassy and total annual weeds (g/m^2) in 2016/17 and 2017/18 seasons.

	Broad-leaved weeds (g/m^2)		Grassy weeds (g/m^2)		Total annual weeds (g/m^2)	
Genotypes	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18
G.99 -103	219.8	272.6	177.8	218. 5	397.6	491.0
G.2003-49	288.3	350.9	248.6	284.6	536.9	635.5
G.T.54-9	217.0	241.9	196.9	216.0	413.9	447.9
$LSD_{0.05}$	39.53	12.30	11.43	27.85	25.08	49.45

Table 2: Effect of sugarcane genotypes on sugarcane yield and its components in 2016/17 and 2017/18 seasons

	Stalk height (cm)		Stalk diameter (cm)		Stalk weight (kg)		Cane yield (ton/fed)		Recoverable sugar yield (ton/fed)	
Genotypes	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18
G.99 -103	233.2	255.0	3.17	2.85	1.34	1.45	52.34	53.79	5.034	5.20
G.2003-49	217.9	231.3	2.92	2.76	0.89	1.06	33.82	38.7	3.302	3.84
G.T.54-9	220.7	240.2	2.99	2.79	0.97	1.15	37.45	42.28	4.18	4.72
$LSD_{0.05}$	4.207	5.07	0.128	NS	0.025	0.025	1.305	2.275	0.190	0.153

Table 3: Effect of sugarcane genotypes on sugarcane juice quality in 2016/17 and 2017/18 seasons

	TSS%		Sucrose %		Reducing sugars%		Purity%		Sugar recovery%	
Genotypes	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18
G.99 -103	18.73	18.79	14.73	14.75	0.513	0.514	78.67	78.54	9.58	9.59
G.2003-49	19.87	20.03	15.21	15.32	0.486	0.487	76.71	76.47	9.74	9.81
G.T.54-9	20.09	19.99	16.58	16.53	0.447	0.457	82.55	82.76	11.07	11.06
$LSD_{0.05}$	0.25	0.36	0.19	0.38	0.01	0.03	2.0	3.01	0.26	0.44

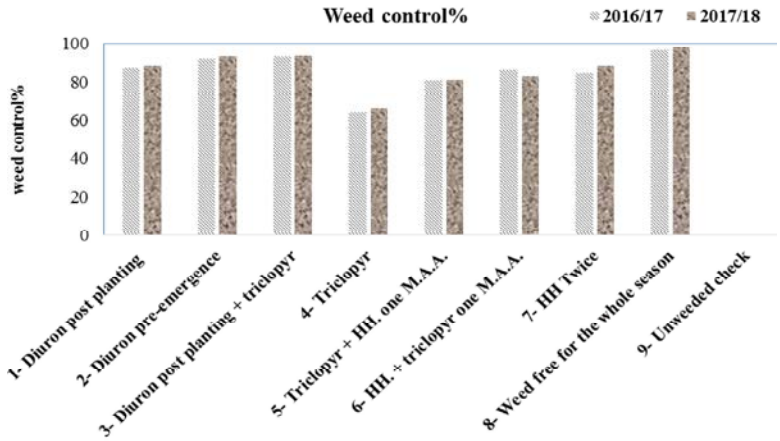

Fig. 1: Effect of weed control treatments on total annual weeds control % in 2016/17 and 2017/18 seasons.

purity % and sugar recovery% by 7.26, 12.56, 4.93 and 15.55%, respectively in the first season and by 6.39, 12.07, 5.37 and 15.33%, respectively, in the second season as compared with G.99-103 genotype. Whereas, G.T.54-9 genotype decreased reducing sugars% by 6.6 and 5.37% in the first and second seasons, respectively as compared with G.99-103.

Effect of Weed Control Treatments On

Weeds: It is clear from Table (4) and Figure (1) that all weed control treatments significantly decreased weeds dry weight (g/m^2) in both seasons, as compared with unweeded check.

Data indicated that weed free for the whole season, the sequence treatment of diuron post-planting with triclopyr, diuron pre-emergence alone and one hand hoeing followed by triclopyr gave the best control of broad-leaved weeds and reduced the dry weight by 97.9, 96.2, 94.2 and 93.1% in the first season and 97.9, 96.3, 94.9 and 91.0% in the second season, respectively, as compared to unweeded check. Concerning grassy weeds, weed free for the whole season, diuron post-planting alone and diuron pre-emergence alone decreased the dry weight of annual grassy weeds by 94.3, 90.2 and 87.4% in the first season and 97.8, 90.4 and 90.1% in the second season, respectively, as compared to unweeded check. Data indicated that weed free for the whole season, the sequence treatment of diuron post-planting with triclopyr and diuron applied pre-emergence alone gave the highest reduction in total annual (broad-leaved and grassy weeds) (g/m^2) in both seasons, the reduction reached to 96.7, 93.1 and 92% in the first season and 97.8, 93.8 and 93.4% in the second season respectively, compared to unweeded check. These results are in harmony with those obtained by Fakkar *et al*. [15].

Yield and its Components: Data in Table (5) and Figure (2) showed that weed control treatments significantly increased sugarcane yield and its components in both seasons-except- stalk diameter in the second season. It is clear from Table (5) that keeping sugarcane yield free of weed for the whole season, the sequence treatment of diuron post-planting with triclopyr and diuron pre-emergence alone increased stalk height by 53.96, 42.65 and 41.8%, stalk diameter by 82.41, 76.44 and 74.52%, stalk weight by 133.79, 110.69 and 106.72%, cane yield by 130.75, 119.14 and 117.59% and sugar yield by 151.92, 131.37 and 131.10%, respectively as compared with unweeded check in the first season. In the second season the same treatments increased stalk height by 52.89, 48.22 and 45.82%, stalk weight by 97.7, 81.06 and 78.21%, cane yield by 100.3, 92.94 and 93.21% and sugar yield by 134.19, 126.42 and 124.32%, respectively as compared with unweeded check. Cane yield reduction due to the competition of 1874 and 2269 (g/m^2) of weed were 43.34 and 49.94% in the first and second seasons, respectively as compared with weed free for the whole season. These results could be attributed to the efficiency of these treatments in controlling weeds competing with sugarcane for growth factors as water, nutrients, solar radiation and space as well, which positively reflected in better growth conditions and performance for sugarcane. These results are in agreement with those found by Akhtar and Ahmed [10] and Fakkar *et al*. [15].

Juice Quality: Data in Table (6) indicated clearly that weed control treatments significantly affected sugarcane juice quality in both season except purity % in the first season. Data indicated that keeping sugarcane free of weed for the whole season, the sequence treatment of diuron post-planting with triclopyr and diuron alone

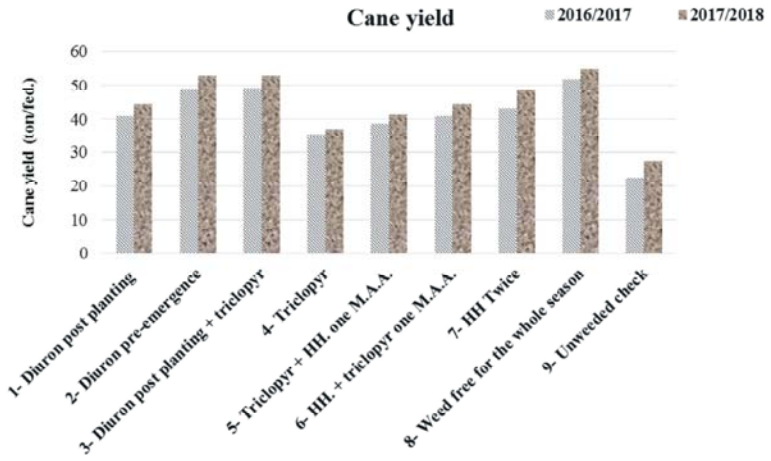

Fig. 2: Effect of weed control treatments on cane yield (ton/faddan) in 2016/17 and 2017/18 seasons.

Table 4: Effect of weed control treatments on weeds dry weight (g/m^2) in 2016/17 and 2017/18 seasons.

		Broad-leaved weeds (g/m^2)		Grassy weeds (g/m^2)		Total annual weeds (g/m^2)	
Weed control treatments	Rate a.i/fed.	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18
1- Diuron post planting	2.2 kg	179.4	194.2	60.9	68.4	240.3	262.6
2- Diuron pre-emergence	2.2 kg	72.3	79.6	78.2	70.0	150.5	149.6
3- Diuron post planting + triclopyr	2.2 kg + 192g	48.1	57.8	82.0	83.6	130.1	141.4
4- Triclopyr	192g	137.1	157.4	537.7	611.4	674.8	768.8
5- Triclopyr + HH. one M.A.A.	192g	181.9	199.4	184.0	229.3	365.9	428.7
6- HH. + triclopyr one M.A.A.	192g	85.9	139.8	170.2	250.8	256.1	390.6
7- HH Twice	30 + 60 DAP	192.6	175.5	99.6	87.6	292.2	263.1
8- Weed free for the whole season	----	26.4	33.2	35.3	15.8	61.7	49.0
9- Unweeded check	----	1252.5	1559.4	622.2	710.1	1874.7	2269.5
LSD $_{0.05}$		100.66	100.23	39.51	51.94	89.96	121.83

* HH = Hand hoeing M.A.A.= month after application DAP = days after planting

Table 5: Effect of weed control treatments on sugarcane yield and its components in 2016/17 and 2017/18 seasons.

Weed control treatments	Rate a.i/fed.	Stalk height (cm)	Stalk diameter (cm)	Stalk Weight (kg) Weed control	Cane yield (ton/fed)	Sugar yield (ton/fed)
			2016/2017			
1- Diuron post planting	2.2 kg	231.7	3.09	1.05	40.81	4.10
2- Diuron pre-emergence	2.2 kg	242.3	3.27	1.20	48.84	5.06
3- Diuron post planting + triclopyr	2.2 kg + 192g	243.8	3.31	1.22	49.19	5.07
4- Triclopyr	192g	190.9	2.90	0.60	35.33	3.46
5- Triclopyr + HH. one M.A.A.	192g	201.3	3.05	0.97	38.57	3.76
6- HH. + triclopyr one M.A.A.	192g	230.2	3.23	1.05	40.77	4.02
7- HH Twice	30 + 60 DAP	240.9	3.11	1.11	43.09	4.37
8- Weed free for the whole season	----	263.1	3.42	1.36	51.80	5.52
9- Unweeded check	----	170.9	1.88	0.58	22.45	2.19
LSD $_{0.05}$		10.04	0.12	0.06	2.03	0.26
			2017/2018			
1- Diuron post planting	2.2 kg	246.7	3.03	1.18	44.42	4.55
2- Diuron pre-emergence	2.2 kg	263.8	3.17	1.32	53.03	5.66
3- Diuron post planting + triclopyr	2.2 kg + 192g	268.1	3.20	1.34	52.96	5.71
4- Triclopyr	192g	209.2	2.22	1.04	36.97	3.42
5- Triclopyr + HH. one M.A.A.	192g	233.7	2.55	1.10	41.46	4.06
6- HH. + triclopyr one M.A.A.	192g	238.3	2.76	1.18	44.38	4.38
7- HH Twice	30 + 60 DAP	262.4	3.15	1.24	48.70	5.11
8- Weed free for the whole season	----	276.6	3.33	1.46	54.97	5.90
9- Unweeded check	----	180.9	1.77	0.74	27.45	2.52
LSD $_{0.05}$		7.75	NS	0.05	2.07	0.31

* HH = Hand hoeing M.A.A.= month after application NS= not significant DAP = days after planting

Table 6: Effect of weed control treatments on sugarcane juice quality in 2016/17 and 2017/18 seasons.

Weed control treatments	Rate a.i/fed.	TSS%	Sucrose %	Reducing sugars%	Purity%	Sugar recovery %
			2016/2017			
1- Diuron post planting	2.2 kg	19.53	15.48	0.486	79.22	10.12
2- Diuron pre-emergence	2.2 kg	19.63	15.79	0.461	80.42	10.40
3- Diuron post planting + triclopyr	2.2 kg + 192g	19.76	15.77	0.469	79.79	10.35
4- Triclopyr	192g	18.67	15.02	0.527	80.46	9.90
5- Triclopyr + HH. one M.A.A.	192g	19.16	15.12	0.504	78.92	9.86
6- HH. + triclopyr one M.A.A.	192g	19.47	15.31	0.464	78.62	9.96
7- HH Twice	30 + 60 DAP	20.17	15.69	0.460	77.96	10.15
8- Weed free for the whole season	---	21.54	16.62	0.408	77.16	10.70
9- Unweeded check	---	18.13	14.73	0.559	81.26	9.76
$LSD_{0.05}$		0.35	0.41	0.03	NS	0.44
			2017/2018			
1- Diuron post planting	2.2 kg	19.45	15.63	0.462	80.29	10.29
2- Diuron pre-emergence	2.2 kg	19.92	16.16	0.426	81.12	10.70
3- Diuron post planting + triclopyr	2.2 kg + 192g	20.10	16.31	0.433	81.13	10.80
4- Triclopyr	192g	19.03	14.55	0.564	76.44	9.13
5- Triclopyr + HH. one M.A.A.	192g	19.11	15.09	0.527	78.96	9.85
6- HH. + triclopyr one M.A.A.	192g	19.54	15.33	0.510	78.47	9.97
7- HH Twice	30 + 60 DAP	20.58	16.19	0.447	78.71	10.54
8- Weed free for the whole season	---	21.06	16.56	0.403	78.66	10.77
9- Unweeded check	---	17.61	13.99	0.600	79.56	9.16
$LSD_{0.05}$		0.47	0.51	0.03	2.59	0.51

* HH = Hand hoeing M.A.A.= month after application NS= not significant DAP = days after planting

pre-emergence gave the best values of TSS%, sucrose% and sugar recovery% in both season. Whereas, reducing sugars% were decreased significantly in both season. These results are in agreement with those found by Fakkar *et al*. [15].

Effect of the Interaction Between Sugarcane Genotypes and Weed Control Treatment

Weeds: Data in Table (7) Indicated that the effect of interaction between sugarcane genotypes and weed control treatments had a significant effect on dry weight of weeds (g/m^2) (broad-leaved, grassy and total annual) in both season-except- grassy weeds and total annual weeds in the first season. Treating G.99-103 genotype with the sequence treatment of diuron post-planting with triclopyr or diuron pre-emergence alone exhibited the highest reduction of broad-leaved and total annual weeds weight (g/m^2) than the untreated G. 2003-49 genotype in both season. The difference between these treatments and keeping sugarcane free of weeds for the whole season did not reached the level of significance at 0.05.

Yield and its Components: Data in Table (8) indicated that the effect of interaction between sugarcane genotypes and weed control treatments reached to the level of significance at 0.05 level on their effect on sugarcane yield and its components in both seasons. Sugarcane free of weed for the whole season, the sequence treatment of diuron post-planting with triclopyr or diuron pre-emergence alone with G.99-103 genotype gave the highest values of stalk height, stalk diameter, stalk weight, cane yield and sugar yield in both seasons.

Juice Quality: Data in Table (9) showed that the effect of interaction between sugarcane genotypes and weed control treatments was significant at 0.05 level on sugarcane TSS in both seasons, Reducing sugars% in the second season only and purity% in the first season only. Keeping G.T.54-9 sugarcane genotype free of weed for the whole season, hand hoeing twice and diuron post-planting followed by triclopyr gave the highest TSS% in both seasons. Whereas, these treatments gave the lowest values of reducing sugar% in the second season. Applying the sequence treatment of diuron post-planting with triclopyr or diuron pre-emergence alone to G.T.54-9 sugarcane genotype gave the highest purity% in the first season.

Table 7: Effect of interaction between sugarcane genotypes and weed control treatments on weeds dry weight in 2016/17 and 2017/18 seasons.

Treatments			Broad-leaved weeds (g/m²)		Grassy weeds (g/m²)		Total annual weeds (g/m²)	
Genotypes	Weed control treatments	Rate a.i/fed.	2016/17	2017/18	2016/17	2017/18	2016/17	2017/18
G.99 -103	1- Diuron post planting	2.2 kg	168.4	178.7	32.7	50.3	201.1	229
	2- Diuron pre-emergence	2.2 kg	61.6	60.6	49.7	40.1	111.3	100.7
	3- Diuron post planting + triclopyr	2.2 kg + 192g	17.5	37.7	58.2	61.2	75.7	98.9
	4- Triclopyr	192g	95.8	136.9	463.7	592.1	559.5	729
	5- Triclopyr + HH. one M.A.A.	192g	182.8	186	160	199	342.8	385
	6- HH. + triclopyr one M.A.A.	192g	40.3	108.3	140.7	225.7	181	334
	7- HH Twice	30 + 60 DAP	189.4	167.3	91.5	77.6	280.9	244.9
	8- Weed free for the whole season	----	13.9	24.7	23.8	12.2	37.7	36.9
	9- Unweeded check	----	1208.6	1553.2	580.3	707.9	1788.9	2261.1
G.2003-49	1- Diuron post planting	2.2 kg	225.3	263.7	102	93	327.3	356.7
	2- Diuron pre-emergence	2.2 kg	79.7	104.1	112.5	104.7	192.2	208.8
	3- Diuron post planting + triclopyr	2.2 kg + 192g	81.9	91.6	117.3	117.7	199.2	209.3
	4- Triclopyr	192g	189.7	210.9	638.4	733.7	828.1	944.6
	5- Triclopyr + HH. one M.A.A.	192g	232.5	269	211.9	282.3	444.4	551.3
	6- HH. + triclopyr one M.A.A.	192g	132	218.4	204.2	292.3	336.2	510.7
	7- HH Twice	30 + 60 DAP	223.9	228.7	117.2	119.3	341.1	348
	8- Weed free for the whole season	----	42.2	40.6	52.7	16.6	94.9	57.2
	9- Unweeded check	----	1387.1	1731.1	681.7	801.6	2068.8	2532.7
G.T.54-9	1- Diuron post planting	2.2 kg	144.6	140.2	47.9	61.8	192.5	202
	2- Diuron pre-emergence	2.2 kg	75.7	74.1	72.3	65.3	148	139.4
	3- Diuron post planting + triclopyr	2.2 kg + 192g	45	44	70.6	72	115.6	116
	4- Triclopyr	192g	125.8	124.3	511.1	508.3	636.9	632.6
	5- Triclopyr + HH. one M.A.A.	192g	127.7	143.3	180.1	206.7	307.8	350
	6- HH. + triclopyr one M.A.A.	192g	85.5	92.6	165.9	234.3	251.4	326.9
	7- HH Twice	30 + 60 DAP	164.4	130.6	90	66	254.4	196.6
	8- Weed free for the whole season	----	23	34.3	29.5	18.7	52.5	53
	9- Unweeded check	----	1161.7	1394	604.7	620.8	1766.4	2014.8
$LSD_{0.05}$			60.30	74.85	NS	68.17	NS	89.44

* HH = Hand hoeing M.A.A.= month after application NS= not significant DAP = days after planting

Table 8: Effect of interaction between sugarcane genotypes and weed control treatments on sugarcane yield and its components in 2016/17 and 2017/18 seasons

Treatments			Stalk	Stalk	Stalk	Cane	Sugar
Genotypes	Weed control treatments	Rate a.i/fed.	height (cm)	diameter (cm)	Weight (kg)	yield (ton/fed)	yield (ton/fed)
					2016/2017		
G.99 -103	1- Diuron post planting	2.2 kg	237.0	3.09	1.36	52.63	5.01
	2- Diuron pre-emergence	2.2 kg	245.7	3.32	1.56	60.5	6.02
	3- Diuron post planting + triclopyr	2.2 kg + 192g	253.3	3.46	1.57	60.89	5.98
	4- Triclopyr	192g	190.7	2.88	1.22	48.46	4.49
	5- Triclopyr + HH. one M.A.A.	192g	211.0	3.18	1.27	52.36	4.84
	6- HH. + triclopyr one M.A.A.	192g	237.3	3.45	1.42	54.96	5.09
	7- HH Twice	30 + 60 DAP	265.0	3.49	1.37	52.89	5.15
	8- Weed free for the whole season	----	274.3	3.70	1.63	63.21	6.37
	9- Unweeded check	----	184.0	1.95	0.65	25.16	2.35
G.2003-49	1- Diuron post planting	2.2 kg	224.0	3.08	0.87	33.54	3.28
	2- Diuron pre-emergence	2.2 kg	240.0	3.22	0.97	41.08	4.09
	3- Diuron post planting + triclopyr	2.2 kg + 192g	234.0	3.17	0.91	40.89	4.01
	4- Triclopyr	192g	192.7	2.86	0.71	27.48	2.67
	5- Triclopyr + HH. one M.A.A.	192g	206.3	2.94	0.79	30.57	2.93
	6- HH. + triclopyr one M.A.A.	192g	227.7	3.10	0.85	32.9	3.17
	7- HH Twice	30 + 60 DAP	226.0	2.90	0.91	35.09	3.29
	8- Weed free for the whole season	----	253.0	3.25	1.13	43.86	4.46
	9- Unweeded check	----	157.0	1.80	0.49	18.96	1.83

Table 8: Continued

Treatments			Stalk	Stalk	Stalk	Cane	Sugar
Genotypes	Weed control treatments	Rate a.i/fed.	height (cm)	diameter (cm)	Weight (kg)	yield (ton/fed)	yield (ton/fed)
G.T.54-9	1- Diuron post planting	2.2 kg	234.0	3.10	0.94	36.25	4.01
	2- Diuron pre-emergence	2.2 kg	241.3	3.29	1.07	44.95	5.08
	3- Diuron post planting + triclopyr	2.2 kg + 192g	244.0	3.30	1.18	45.8	5.21
	4- Triclopyr	192g	189.3	2.95	0.78	30.06	3.22
	5- Triclopyr + HH. one M.A.A.	192g	186.7	3.02	0.85	32.77	3.52
	6- HH. + triclopyr one M.A.A.	192g	225.7	3.13	0.89	34.44	3.79
	7- HH Twice	30 + 60 DAP	231.7	2.93	1.07	41.28	4.67
	8- Weed free for the whole season	----	262.0	3.31	1.30	48.32	5.73
	9- Unweeded check	----	171.7	1.88	0.60	23.22	2.40
$LSD_{0.05}$			16.93	0.22	0.11	4.42	0.45
					2017/2018		
G.99 -103	1- Diuron post planting	2.2 kg	247.0	3.09	1.47	55.12	5.42
	2- Diuron pre-emergence	2.2 kg	275.3	3.26	1.66	62.25	6.22
	3- Diuron post planting + triclopyr	2.2 kg + 192g	285.3	3.32	1.67	62.62	6.38
	4- Triclopyr	192g	227.3	2.10	1.34	45.55	3.96
	5- Triclopyr + HH. one M.A.A.	192g	250.3	2.56	1.39	52.08	4.86
	6- HH. + triclopyr one M.A.A.	192g	254.7	2.77	1.52	57.22	5.37
	7- HH Twice	30 + 60 DAP	273.7	3.12	1.47	55.37	5.51
	8- Weed free for the whole season	----	288.0	3.53	1.72	64.7	6.56
	9- Unweeded check	----	193.3	1.90	0.80	29.24	2.56
G.2003-49	1- Diuron post planting	2.2 kg	240.0	2.95	1.01	37.84	3.77
	2- Diuron pre-emergence	2.2 kg	257.0	3.08	1.10	45.02	4.71
	3- Diuron post planting + triclopyr	2.2 kg + 192g	252.3	3.01	1.05	44.68	4.60
	4- Triclopyr	192g	204.0	2.43	0.86	30.67	2.78
	5- Triclopyr + HH. one M.A.A.	192g	220.0	2.64	0.93	35.15	3.41
	6- HH. + triclopyr one M.A.A.	192g	224.7	2.75	0.99	37.25	3.63
	7- HH Twice	30 + 60 DAP	248.0	3.11	1.04	45.9	4.65
	8- Weed free for the whole season	----	267.0	3.17	1.25	47.17	4.95
	9- Unweeded check	----	169.0	1.69	0.66	24.63	2.09
G.T.54-9	1- Diuron post planting	2.2 kg	253.0	3.05	1.07	40.29	4.47
	2- Diuron pre-emergence	2.2 kg	259.0	3.18	1.19	51.83	6.04
	3- Diuron post planting + triclopyr	2.2 kg + 192g	266.7	3.27	1.30	51.59	6.15
	4- Triclopyr	192g	196.3	2.14	0.92	34.68	3.52
	5- Triclopyr + HH. one M.A.A.	192g	230.7	2.45	0.99	37.14	3.90
	6- HH. + triclopyr one M.A.A.	192g	235.7	2.76	1.03	38.66	4.16
	7- HH Twice	30 + 60 DAP	265.7	3.22	1.19	44.83	5.17
	8- Weed free for the whole season	----	274.7	3.30	1.41	53.04	6.20
	9- Unweeded check	----	180.3	1.73	0.76	28.48	2.93
	$LSD_{0.05}$		12.59	0.25	0.11	0.56	0.47

* HH = Hand hoeing M.A.A.= month after application DAP = days after planting

Table 9: Effect of interaction between sugarcane genotypes and weed control treatments on sugarcane juice quality in 2016/17 and 2017/18 seasons.

Treatments			TSS%		Reducing sugars%	Purity %
Genotypes	Weed control treatments	Rate a.i/fed.	2016/17	2017/18	2017/18	2016/17
G.99 -103	1- Diuron post planting	2.2 kg	18.63	18.70	0.477	78.57
	2- Diuron pre-emergence	2.2 kg	18.87	19.23	0.437	80.22
	3- Diuron post planting + triclopyr	2.2 kg + 192g	19.17	19.50	0.450	78.82
	4- Triclopyr	192g	18.21	18.17	0.590	78.36
	5- Triclopyr + HH. one M.A.A.	192g	18.33	18.27	0.537	78.00
	6- HH. + triclopyr one M.A.A.	192g	18.83	19.04	0.523	76.65
	7- HH Twice	30 + 60 DAP	18.53	19.10	0.520	80.05
	8- Weed free for the whole season	----	20.23	20.01	0.420	77.29
	9- Unweeded check	----	17.74	17.07	0.673	80.06

Table 9: Continued

Treatments			TSS%		Reducing sugars%	Purity %
Genotypes	Weed control treatments	Rate a.i/fed.	2016/17	2017/18	2017/18	2016/17
G.2003-49	1- Diuron post planting	2.2 kg	19.83	19.93	0.470	76.80
	2- Diuron pre-emergence	2.2 kg	19.93	20.57	0.420	77.44
	3- Diuron post planting + triclopyr	2.2 kg + 192g	19.90	20.20	0.440	76.89
	4- Triclopyr	192g	18.56	19.37	0.570	79.97
	5- Triclopyr + HH. one M.A.A.	192g	19.33	19.47	0.533	77.09
	6- HH. + triclopyr one M.A.A.	192g	19.73	19.87	0.527	76.35
	7- HH Twice	30 + 60 DAP	21.37	21.37	0.420	71.45
	8- Weed free for the whole season	----	22.13	21.47	0.410	73.49
	9- Unweeded check	----	18.00	18.03	0.590	80.94
G.T.54-9	1- Diuron post planting	2.2 kg	20.13	19.77	0.440	82.29
	2- Diuron pre-emergence	2.2 kg	20.10	19.97	0.420	83.59
	3- Diuron post planting + triclopyr	2.2 kg + 192g	20.20	20.60	0.410	83.67
	4- Triclopyr	192g	19.23	19.57	0.533	83.04
	5- Triclopyr + HH. one M.A.A.	192g	19.80	19.60	0.510	81.66
	6- HH. + triclopyr one M.A.A.	192g	19.83	19.70	0.480	82.85
	7- HH Twice	30 + 60 DAP	20.60	21.27	0.400	82.36
	8- Weed free for the whole season	----	22.27	21.69	0.380	80.69
	9- Unweeded check	----	18.64	17.73	0.537	82.78
	$LSD_{0.05}$		0.58	0.61	0.05	3.20

* HH = Hand hoeing M.A.A.= month after application DAP = days after planting

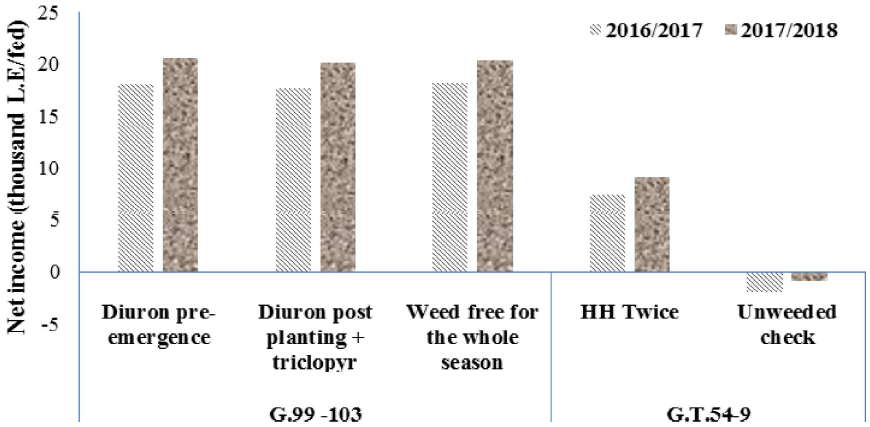

Fig. 3: Effect of interaction between sugarcane genotypes and weed control treatments on net income (thousand L.E/fed) of the best weed control treatments with G.99-103 genotype as compared to farmer's treatment (hand hoeing twice) and unweeded check with commercial variety G.T. 54-9.

Economic Analysis: Economic analysis presented in Table (10) and Figure (3) reported that the gross income, net income, profitability and benefit/cost ratio affected significantly by the interaction between sugarcane genotypes and weed control treatments in both season. Keeping G.99-103 genotype free of weed for the whole season, or treat it with the sequence treatment of diuron post-planting with triclopyr or diuron pre-emergence alone gave the highest gross income (34.77, 33.49 and 33.28 thousand L.E, respectively, in the first season and 42.06, 40.70 and 40.46 thousand L.E, respectively, in the second season), net income (18.18, 17.64 and 18.01 thousand L.E, respectively, in the first season and 20.30, 20.04, 20.54 thousand L.E, respectively, in the second season), profitability (109.43, 111.29 and 117.91 %, respectively, in the first season and 93.27, 97.01 and 103.13 %, respectively, in the second season) and benefit/cost ratio (2.09, 2.11 and 2.18, respectively, in the first season and 1.93, 1.97 and 2.03 respectively, in the second season). Meanwhile, the lowest values of these traits obtained from leaving weeds compete with G. 2003-49. This increases in gross income and net income were due to increasing cane yield due to reduction of weed-sugarcane competition and the increases in cane yield.

Table 10: Effect of interaction between sugarcane genotypes and weed control treatments on economic analysis for cane yield/faddan in 2016/17 and 2017/18 seasons

Treatments			Total cost	Gross income	Net income		Benefit/
Genotypes	Weed control treatments	Rate a.i/fed.	(1000 L.E)	(1000 L.E)	(1000 L.E)	Profitability	cost ratio
					2016/2017		
G.99 -103	1- Diuron post planting	2.2 kg	15.27	28.95	13.68	89.56	1.90
	2- Diuron pre-emergence	2.2 kg	15.27	33.28	18.01	117.91	2.18
	3- Diuron post planting + triclopyr	2.2 kg + 192g	15.85	33.49	17.64	111.29	2.11
	4- Triclopyr	192g	15.38	26.65	11.27	73.30	1.73
	5- Triclopyr + HH. one M.A.A.	192g	15.62	28.80	13.18	84.37	1.84
	6- HH. + triclopyr one M.A.A.	192g	15.62	30.23	14.61	93.52	1.94
	7- HH Twice	30 + 60 DAP	15.34	29.09	13.75	89.63	1.90
	8- Weed free for the whole season	----	16.60	34.77	18.17	109.43	2.09
	9- Unweeded check	----	14.80	13.84	-0.96	-6.50	0.94
G.2003-49	1- Diuron post planting	2.2 kg	15.27	18.45	3.18	20.81	1.21
	2- Diuron pre-emergence	2.2 kg	15.27	22.59	7.32	47.96	1.48
	3- Diuron post planting + triclopyr	2.2 kg + 192g	15.85	22.49	6.64	41.89	1.42
	4- Triclopyr	192g	15.38	15.11	-0.27	-1.73	0.98
	5- Triclopyr + HH. one M.A.A.	192g	15.62	16.81	1.19	7.64	1.08
	6- HH. + triclopyr one M.A.A.	192g	15.62	18.10	2.48	15.85	1.16
	7- HH Twice	30 + 60 DAP	15.34	19.30	3.96	25.81	1.26
	8- Weed free for the whole season	----	16.60	24.12	7.52	45.32	1.45
	9- Unweeded check	----	14.80	10.43	-4.37	-29.54	0.70
G.T.54-9	1- Diuron post planting	2.2 kg	15.27	19.94	4.67	30.57	1.31
	2- Diuron pre-emergence	2.2 kg	15.27	24.72	9.45	61.90	1.62
	3- Diuron post planting + triclopyr	2.2 kg + 192g	15.85	25.19	9.34	58.93	1.59
	4- Triclopyr	192g	15.38	16.53	1.15	7.50	1.07
	5- Triclopyr + HH. one M.A.A.	192g	15.62	18.02	2.40	15.39	1.15
	6- HH. + triclopyr one M.A.A.	192g	15.62	18.94	3.32	21.27	1.21
	7- HH Twice	30 + 60 DAP	15.34	22.70	7.36	48.01	1.48
	8- Weed free for the whole season	----	16.60	26.58	9.98	60.10	1.60
	9- Unweeded check	----	14.80	12.77	-2.03	-13.71	0.86
	$LSD_{0.05}$		--	3.48	3.48	22.40	0.23
		---			2017/2018		
G.99 -103	1- Diuron post planting	2.2 kg	19.92	35.83	15.91	79.86	1.80
	2- Diuron pre-emergence	2.2 kg	19.92	40.46	20.54	103.13	2.03
	3- Diuron post planting + triclopyr	2.2 kg + 192g	20.66	40.70	20.04	97.01	1.97
	4- Triclopyr	192g	20.10	29.61	9.51	47.30	1.47
	5- Triclopyr + HH. one M.A.A.	192g	20.42	33.85	13.43	65.78	1.66
	6- HH. + triclopyr one M.A.A.	192g	20.42	37.19	16.77	82.14	1.82
	7- HH Twice	30 + 60 DAP	20.08	35.99	15.91	79.24	1.79
	8- Weed free for the whole season	---	21.76	42.06	20.30	93.27	1.93
	9- Unweeded check	---	19.36	19.01	-0.35	-1.83	0.98
G.2003-49	1- Diuron post planting	2.2 kg	19.92	24.60	4.68	23.47	1.23
	2- Diuron pre-emergence	2.2 kg	19.92	29.26	9.34	46.90	1.47
	3- Diuron post planting + triclopyr	2.2 kg + 192g	20.66	29.04	8.38	40.57	1.41
	4- Triclopyr	192g	20.10	19.94	-0.16	-0.82	0.99
	5- Triclopyr + HH. one M.A.A.	192g	20.42	22.85	2.43	11.89	1.12
	6- HH. + triclopyr one M.A.A.	192g	20.42	24.21	3.79	18.57	1.19
	7- HH Twice	30 + 60 DAP	20.08	29.84	9.76	48.58	1.49
	8- Weed free for the whole season	---	21.76	30.66	8.90	40.90	1.41
	9- Unweeded check	---	19.36	16.01	-3.35	-17.31	0.83
G.T.54-9	1- Diuron post planting	2.2 kg	19.92	26.19	6.27	31.47	1.31
	2- Diuron pre-emergence	2.2 kg	19.92	33.69	13.77	69.12	1.69
	3- Diuron post planting + triclopyr	2.2 kg + 192g	20.66	33.53	12.87	62.31	1.62
	4- Triclopyr	192g	20.10	22.54	2.44	12.15	1.12
	5- Triclopyr + HH. one M.A.A.	192g	20.42	24.14	3.72	18.22	1.18
	6- HH. + triclopyr one M.A.A.	192g	20.42	25.13	4.71	23.06	1.23
	7- HH Twice	30 + 60 DAP	20.08	29.14	9.06	45.16	1.45
	8- Weed free for the whole season	--	21.76	34.48	12.72	58.47	1.58
	9- Unweeded check		19.36	18.51	-0.85	-4.37	0.96
	$LSD_{0.05}$		--	3.32	3.31	16.36	0.16

* HH = Hand hoeing M.A.A.= month after application DAP = days after planting

Table 11: Effect of interaction between sugarcane genotypes and weed control treatment sugarcane yield and its components

Characters	Grassy weeds	Total annual weeds	Stalk height	Stalk diameter	Stalk weight	Cane yield	Sugar yield	TSS%	Sucrose %	Reducing sugar%	Purity %	Sugar recovery
							2016/17 season					
Broad leaved weeds	0.73 **	0.96 **	-0.70 **	-0.93 **	-0.62**	-0.64**	-0.67 **	-0.49 *	-0.347 NS	0.60 **	0.19 NS	-0.24 NS
Grassy weeds	--	0.89 **	-0.88**	-0.82**	-0.68**	-0.69**	-0.75 **	-0.59 **	-0.416 *	0.68**	0.24 NS	-0.28 NS
Total annual weeds	--	--	-0.82 **	-0.95 **	-0.69 **	-0.70 **	-0.75 **	-0.56 **	-0.397 **	0.67 **	0.22 NS	-0.27 NS
Stalk height	--	--	--	0.85 **	0.78 **	0.78 **	0.83 **	0.55 **	0.377 NS	-0.65 **	-0.23 NS	0.25 NS
Stalk diameter	--	--	--	--	0.78 **	0.79 **	0.81 **	0.43 *	0.284 NS	-0.58 **	-0.21 NS	0.18 NS
Stalk weight	--	--	--	--	--	0.99 **	0.96 **	0.15 NS	0.048 NS	-0.29 NS	-0.16 NS	0.03 NS
Cane yield	--	--	--	--	--	--	0.96 **	0.13 NS	0.025 NS	-0.28 NS	-0.17 NS	-0.03 NS
Sugar yield	--	--	--	--	--	--	--	0.29 NS	0.282 NS	-0.45 *	-0.01 NS	0.24 NS
TSS%	--	--	--	--	--	--	--	--	-0.778 **	-0.91 **	-0.24 NS	0.57 **
Sucrose %	--	--	--	--	--	--	--	--	--	-0.84 **	0.422 *	0.96 **
Reduce sugar%	--	--	--	--	--	--	--	--	--	--	0.01 NS	-0.69 **
Purity%	--	--	--	--	--	--	--	--	--	--	--	0.66 **
							2017/18 season					
Broad leaved weeds	0.73 **	0.97 **	-0.76 **	-0.76 **	-0.61 **	-0.644 **	-0.68 **	-0.64 **	-0.56 **	0.64 **	- 0.07 NS	-0.48 *
Grassy weeds	--	0.88 **	-0.91**	-0.93 **	-0.66 **	-00.75 **	-0.84 **	-0.67 **	-0.71 **	0.86 **	-0.32 NS	-0.67 **
Total annual weeds	--	--	-0.86 **	-0.87 **	-0.67 **	-0.72 **	-0.78 **	-0.70 **	-0.66 **	0.76 **	0.17 NS	-0.59 **
Stalk height	--	--	--	0.94 **	0.85 **	0.90 **	0.94 **	0.59 **	0.59 **	-0.77 **	0.21 NS	0.55 **
Stalk diameter	--	--	--	--	0.70 **	0.78 **	0.87 **	0.73 **	0.70 **	-0.86 **	0.20 NS	0.63 **
Stalk weight	--	--	--	--	--	0.98 **	0.86 **	0.21 NS	0.22 NS	-0.46 *	0.09 NS	0.21 NS
Cane yield	--	--	--	--	--	--	0.95 **	0.31 NS	0.33 NS	-0.58 **	0.15 NS	0.31 NS
Sugar yield	--	--	--	--	--	--	--	0.49 **	0.59 **	-0.75 **	0.36 NS	0.58 **
TSS%	--	--	--	--	--	--	--	--	0.84 **	-0.85 **	0.07 NS	0.71 **
Sugar %	--	--	--	--	--	--	--	--	--	-0.88 **	0.60 **	0.98 **
Reduce sugar%	--	--	--	--	--	--	--	--	--	--	-0.37 NS	-0.82 **
Purity%	--	--	--	--	--	--	--	--	--	--	--	0.75 **

**= significant at 0.05 level *= significant at 0.01 level NS= not significant

Correlation Analysis: Data in Table (11) revealed that dry weight of grassy, broad-leaved and total annual weeds (g/m^2) were negatively significantly correlated with sugarcane stalk height, stalk diameter, stalk weight cane yield, sugar yield, TSS, sugar% in both seasons meaning that weed density was high enough to express strongly about weed competition to sugarcane and gave reliable results about the efficacy of these treatments in controlling weeds. Whereas, positively significantly correlated with sugarcane reducing sugar contents in both seasons.

CONCLUSION

Based upon the results obtained, to obtain the maximum yield and the best juice quality sugarcane should be kept weed free for the whole season or applying the sequence treatment diuron post-planting with triclopyr one month later or diuron pre-emergence alone.

If the broad-leaved weeds were dominant in the field we should control it using the sequence treatment of diuron post-planting with triclopyr or diuron pre-emergence alone or one hand hoeing followed by triclopyr. Meanwhile, if grassy weeds were dominant, using diuron post-planting alone or diuron pre-emergence alone were the best treatments in controlling these weeds.

G.99-103 or GT54-9 genotypes had better competitive ability to weeds than G.2003-49 genotype. However, G.99-103 genotype gave the best yield and its component, whereas, GT54-9 gave the best juice quality.

From these results it could be concluded that El-Mina farmers could plant G. 99-103 genotype an treat it by the sequence treatment diuron post-planting with triclopyr one month later or diuron pre-emergence alone to obtain the maximum cane yield and net return.

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