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EVALUATION OF SOME SWEET SORGHUM GENOTYPES TO STEM CORN BORERS RESISTANCE WITH PRESENCE OF MORPHOLOGICAL AND CHEMICAL CHARACTERS

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ABSTRACT

This work was conducted in the Agricultural Experimentation Center, Faculty of Agricultural, Al-Azhar University, Assiut Branch, during two successive seasons 2007 and 2008. Fifty three genotypes of sweet sorghum (*Sorghum bicolor*.*L*) were screened to find out how much each of the resistance variables affects the genotypes resistance against corn and sugar cane borers namely, (*Sesamia cretica.* Ledder and *Chilo agamemnon*.Bleszyncki.). The tested trits were plant height, leaves number and number of days to 50 % flowering, T.S.S. %, sucrose % and purity %. Data obtained indicated that the tested genotypes could be divided into four groups according to their susceptibility to borer infestation. The grouping pattern was as follows: (1) highly resistant group (HR) which contained twelve genotypes; (2) moderately resistant group (MR) which contained thirteen genotypes; (3) low resistant (LR) group which contained twenty genotypes and (4) highly susceptible group (HS) which contained eight genotypes. Highest plant were the genotypes 14R3A, Brandes, 14R1, Wily, 187 and 191 these genotypes significantly surpassed the other genotypes. The earliest flowering was recorded in the follows: genotypes 202, 43, 185, 202R3, 204, 25, Wiley and 80, where the earliest of them was 202. The highest numbers of leaves per plant were recorded to the genotypes 174 and 7R3 followed by 197, 185, 186, 220, 14R3A, 142R3, 43, 134, 222, 203R3, 209 and 39R1. While, the lowest numbers of leaves per plant were obtained from the genotypes 25, 202R3 and 202. The genotype 39R1 recorded the highest percentage of T.S.S. %, while the genotype 44 recorded the lowest percent. The highest percentage of recorded sucrose was 18.2 % in genotype 199 followed by 17.9 %, 17.8 %, 17.6 %, 17.2 % and 17.1 % in genotypes 96, 109, 14R3A, 33 and 195R3, respectively, while the lowest percentage was obtained in the genotypes 44 and Wiley. The genotype 170R1 recorded the lowest percentage of purity and Wiley. On the other hand, the genotypes 33, 70, 199, 96, 187 and 39R3A recorded significantly higher percentage of purity in comparative to the other genotypes.

Generally, it could be concluded that the best promising genotypes lines were 195R2A, 203R3, 220, 25, 203, 74, 73, 199, 96 and 109, respectively. These lines had a high T.S.S % and sucrose %. Immunity and resistance against corn and sugar cane borers; they could be propagated to become a good varieties in Middle and Upper Egypt.

Keywords: Sweet sorghum, stem corn borers, resistance, morphological and chemical characters

INTRODUCTION

Sweet sorghum (*Sorghum bicolor*.*L*) is considered as one of the most important sugary syrup, molasses and forage crops. Recently, many attempts have been carried out to extract sugar from the sweet sorghum as its percent

of sucrose differs from 5 to 20 according to the variety. This crop is attacked by two Lepidopterous borer species, *Sesamia cretica* Lederer (Lepidoptera: Noctuidae) and *Chilo agamemnon* Bleszyncki (Lep. : Grambidae). These pests cause serious damage, as they lay eggs on leaves where their larvae borrow into the plant joints causing holes. *C. agamemnon* usually makes to internal tunnels all through up and down the stalks, with varying lengthes. Also the entrance and exit holes act as entry points for red rot and other pathogenic plant fungi, this inturn may cause serious deterioration in quality and quantity of juice extracted. Moreover, the infestation causes an increase in the amount of reducing sugars in the juice. Genotypes resistance has already played a major role in reducing the infestation of insect pests in many countries. Because of the importance of this crop as fodder crop or a source of sugar, the use of insecticides in pest control in such crops should be avoided, and replaced by other methods, the genotypes resistance in such particular aspect aught to be considered the types of plant resistance to moth borers were classified by Painter (1951) as follows:
1- unattractiveness of host plant to the moth for oviposition, 2- host plant characters unfavorable for entry of borers into the plant, 3- adverse effect of host plant on borer development usually due to certain nutritional and physical characteristic of the plant tissues, and 4- host plant tolerance, or the ability to yield well in spite of high infestation. Many authors in Egypt and abroad investigated the relationship between some morphological and chemical characteristic sugar crops lines and susceptibility to these pests attack (Abu-Dooh, 1980; Rizk *et al*., 1985; Rao *et al.,* 1991; Meagher *et al.*, 1996; White and Allsopp, 2000; Tohamy *et al*., 2002 and Nibouche and Tibe`re, 2009). However no considerable review was found on sweet sorghum.

The present study was conducted to screen fifty three sweet sorghum genotypes in order to find out how much the internal and external plant characters affect the genotypes resistance.

MATERIALS AND METHODS

Tested genotypes:

The breeding material used in this study included F_7 and F_8 generations were selected by pedigree method from two crosses: (Wiley × Rex) and (Wily × Roma). Fifty three sweet sorghum genotypes (lines numbers from 1 to 109 were selected from first cross and lines numbers from 109 to 203R3 were selected from second cross) were grown in the Agricultural Experimentation Center, Faculty of Agricultural, Al-Azhar University, Assiut Branch, during two successive seasons in summer 2007 and 2008.

General procedures:

A randomized complete block design and replicated three times are used. The seeds of used genotypes which were planted in the farm on 15th May 2007 and 2008 on lines, one line for each genotype in the replicate, with 5 meters tall, 40 cm apart. The plants spaced 25 cm within the line. All agricultural practices were carried out as the followed for grain sorghum over the experiment and no insecticides were used during the study period. The borers' infestation was done by cultivation of susceptible sweet sorghum variety surrounded experiment plants as a fodder crop before experiment date about three weeks; in addition to, the susceptible plants were put within and between genotype plants after six weeks. At hard dough stage of plants the infected plants were counted and 15 graded plants from each replicate were taken as a sample, their leaves and plant height were account, the juice was extracted in a hand extractor after stripping of the leaves and was estimated T.S.S. %, sucrose % and purity % in the laboratory of collage.

The recorded characters were recorded as follow:

1-Susceptibility %.
2-Plant height.
3-Leaves no/plant.
4-Days to 50% flowering.
5-T.S.S. % (total soluble solids).
6-Sucrose%.
7-Purity% = sucrose %×100/ T.S.S. %.

Chemical analysis:

T.S.S. % (total soluble solids %) and sucrose % were estimated by mean of the laboratory of college. The sixth and seventh internodes were squeezed by a handle mill for juice extraction. The T.S.S. % was determined by a handle refractometer. Sucrose % trait was determined by the polarization method.

Sampling and investigations:

At the harvesting time a sample of 15 stalks was taken from each plot. Percentage of bored joints (No. bored joints ×100/ Total No. joints) and the total number of holes were determined as indicators to the damage and loss caused by borers. The classification of the susceptibility degree of sweet sorghum genotypes were determined according to the general mean ($\overline{X}$) of holes number found per 15 plants and the standard deviation (SD) as reported by Chiang and Talekar (1980) and Amro *et al.* (2009).. Genotypes that had mean numbers of holes more than $\overline{X}$ +2 SD, were considered highly susceptible (HS), between $\overline{X}$ and $\overline{X}$ +2 SD, susceptible (S), between $\overline{X}$ and $\overline{X}$ -1 SD, low resistant (LR), between $\overline{X}$ -1 SD and $\overline{X}$ -2 SD, moderately resistant (MR) and less than $\overline{X}$ -2SD, were considered highly resistant (HR).

Statistical analysis:

Data of the 2007/2008 growing season were subjected to statistical analysis as outlined by Gomez and Gomez (1984) for the RCBD experiments**.**

Source of variance	D.F	M.S	E.M.S
Replications	r-1	M3	σ^2 E+gσ^2r
Genotypes	g-1	M2	σ^2 E+rσ^2g
Error	(r-1)(g-1)	M1	σ^2 E

Where: r and g = number of replications and genotypes, respectively.
$\sigma^2 E$ =error variance.
$\sigma^2 g$ = genetic variance.

$r = \Sigma xy - \Sigma x \Sigma y / \sqrt{(\Sigma x^2 - (\Sigma x)^2/n)(\Sigma y^2 - \Sigma (y)^2/n)}$
Where: r=correlation coefficient

RESULTS AND DISCUSSION

Analysis of variance:

Analysis of variance for the studied characters of the fifty three genotypes is shown in Tables 1 and 2 and indicates that presence of significant differences between the genotypes means for all the studied characters in the two seasons 2007 and 2008, respectively.

Table (1): Analysis of variance for studied characters for season 2007.

S.O.V	D.F	M.S							Tab F
		Susceptibility %	Plant height	Leaves no/plant	Days to 50% flowering	T.S.S.%	Sucrose %	Purity%	
Blocks	2	-----	-----	-----	-----	-----	-----	-----	
Genotypes	52	33.7*	2562.2*	9.00*	251.03*	13.28*	12.18*	104.23*	1.45
Error	104	1.53	888.04	2.37	64.58	1.69	1.28	30.47	
Total	158	2.28	54.99	2.84	14.83	2.4	2.09	10.19	

Table (2):Analysis of variance for studied characters for season 2008.

S.O.V	D.F	M.S							Tab F
		Susceptibility %	Plant height	Leaves no/plant	Days to 50% flowering	T.S.S.%	Sucrose %	Purity %	
Blocks	2	-----	-----	-----	-----	-----	-----	-----	
Genotypes	52	42.79*	3115.55*	7.63*	349.47*	11.26*	10.68*	179.88*	1.45
Error	104	1.42	851.82	3.11	70.73	2.31	1.23	23.91	
Total	158	2.2	53.86	3.25	15.52	2.8	2.05	9.02	

A- Screening of the tested lines:

The statistical analysis of data of table (3) indicated that there were highly significant differences between the mean number of holes and bored joints among genotypes.

a- Number of holes:

Data in Table (4) showed that the following patterns of grouping could be achieved as follows:

1- **Highly resistant group (HR):**
   This group contains seven lines which have had mean number of holes less than 5 holes/ 15 plants.
2- **Moderately resistant group MR):**
   Eighteen lines were belonging to this group. The mean of hole numbers ranged between 6.20 and 12.30 holes / 15.

3- Lower Resistant group (LR):

This group contains twenty lines. The mean numbers ranged between 14.90 and 29.50 holes / 15 plants.

4- Highly susceptible group (HS):

Eight lines were belonging to this group and their mean number of holes ranged from 34.60 to 62.90 holes / 15 plants.

b- Bored joints:

The same trend and the grouping pattern in case of holes were found with slight differences in case of bored joints (Table 4).

B- Simple correlation between number of holes per 15 plants and other variables:

Data in Table (5) showed the Simple correlation between number of holes per 15 plants and the physical and chemical variables.

Generally, data of the table cleared that there is no significant for correlation between number of holes per 15 plants and plant height (0.004), leaves number/ plant (-0.061), days to 50 % flowering (-0.026), T.S.S. % (-0.09), sucrose % (0.14) and purity % (0.057). The correlation between number of holes per 15 plants and plant height was very small and regularly, indicate that plant high may be help in increasing of susceptibility %. The correlation between number of holes per 15 plants and leaves number /plant was decreased and reversed, it means more of leaves which had a sheath covers and protects the internodes will decrease the susceptibility %. Also, the value of correlation between number of holes per 15 plants and days to 50 % flowering was very small and negative. This result means that the plant can be escape from insect infestation when the maturity period is short.

The correlation between number of holes per plant and T.S.S. % was very small and reversed, because might be increasing of soluble solids in the juice resistant insect infestation, somewhat. The association between sucrose %, purity % and number of holes per plant was decreased and regularly, because the insect prefers the sweet plant and had more of purity %, greatly.

The present data showed that two lines (203R3 and 209) were belonging in two different groups; the first was highly resistant and the second was highly susceptible, although, they contain the same percent of sucrose (16.0). Moreover, many of the highly susceptible lines have low sugar contents whereas others from the immune and resistant lines have a high sugar contents (Table 3, 4). This finding seems to be logic because these pests could infest and inhabit a very wide host range which differ in their sugar contents i.e. these borers infest and inhabit rice (very low sugar content) and sugar cane (very high sugar content). So, sugars seem not to be a key variable in the genotypes resistance against corn borers. In addition, the real interaction begins at first between laying moths and newly hatched larvae versus the physical variables among the host. These data are supported by those of Room *et al.*, (1978) who demonstrated that physical characteristics of substrate are of major important for moth oviposition. Jatawabu *et al.,* (1978) in their work to study the resistance mechanism of genotypes of sorghum to *C. partellus* reported that larval weight was not affected when reared on different varieties.

Table (3): Means of some physical and chemical measurements of fifty three genotypes of sweet sorghum as combined data of 2007 and 2008 seasons.

Serial number	Line name	Susceptibility%	Plant height	leaves no./plant	Days to 50 % flowering	T.S.S %	Sucrose %	Purity %
1	Wiley	11.16	396.6	15.2	66.3	16.6	10.0	59.5
2	Brandies	10.10	385.3	15.4	74.1	19.4	13.2	72.7
3	9	8.73	304.2	17.3	64.5	19.3	14.4	80.0
4	25	3.44	267.0	14.0	65.7	19.8	12.1	61.3
5	33	8.19	334.1	15.4	81.3	19.2	17.2	92.6
6	43	11.97	240.6	19.9	63.5	20.5	14.2	69.0
7	44	9.79	331.7	16.0	73.5	12.6	8.0	63.1
8	46	9.30	322.1	16.4	83.1	20.2	14.9	74.0
9	69	5.45	313.7	15.5	70.5	19.8	13.7	69.2
10	70	6.03	291.7	15.5	76.2	18.3	15.8	86.3
11	73	4.77	358.1	18.3	73.2	21.8	15.6	71.7
12	74	4.16	360.6	17.5	79.0	21.5	16.9	78.8
13	80	10.76	294.6	15.2	66.5	22.8	15.2	71.9
14	94	6.70	353.8	17.6	81.7	23.0	16.1	69.8
15	95	8.23	317.8	17.6	83.4	22.4	16.5	73.4
16	96	7.36	305.7	18.8	81.3	21.3	17.9	84.1
17	109	7.87	334.3	18.3	83.8	2.4	17.8	79.5
18	129	7.67	358.9	16.5	81.6	22.8	15.7	69.1
19	131	6.88	317.7	17.1	84.0	23.3	15.7	67.6
20	134	8.62	346.6	19.9	83.2	19.9	15.2	76.2
21	136	12.06	359	18.5	98.6	23.0	16.1	69.8
22	158	14.85	317.1	19.8	94.1	21.8	14.1	64.8
23	165	18.10	321.6	18.7	95.2	21.2	14.1	66.5
24	170	11.05	304.1	19.4	80.8	19.5	13.4	68.7
25	174	5.05	351.4	21.4	82.0	21.8	15.8	72.2
26	185	7.27	240.6	20.5	64.3	19.8	13.8	69.6
27	186	9.02	349.6	20.3	98.2	20.5	12.9	63.4
28	187	11.89	368.7	18.2	85.4	21.5	16.9	84.0
29	188	12.56	354.4	18.0	97.3	21.3	14.0	65.9
30	191	9.86	367.7	19.4	85.0	21.8	16.4	75.2
31	197	7.95	346.6	20.5	91.3	20.8	14.3	69.1
32	199	5.59	354.3	17.7	83.6	21.5	18.2	84.7
33	202	11.26	219.8	14.7	62.5	19.4	13.1	67.4
34	203	3.98	316.2	18.0	77.5	22.8	14.5	69.2
35	204	7.68	279.8	15.7	65.4	19.3	13.9	72.3
36	209	14.37	347.7	19.8	84.2	20.0	16.0	81.4
37	215	14.09	352.1	16.5	83.1	21.8	14.7	67.6
38	220	3.21	318.2	20.0	74.4	19.9	15.2	73.0
39	222	5.05	344.2	19.9	102.6	19.6	13.9	71.0
40	7R3	5.40	343.3	21.4	97.2	23.3	16.1	68.9
41	14R1	15.62	371.1	19.0	98.3	23.0	16.7	73.0
42	14R3A	12.95	387.6	20.0	104.1	24.0	17.6	73.6
43	18R2	14.11	366.7	16.2	107.1	20.8	15.1	72.6
44	39R1	13.21	281.1	19.5	105.2	24.8	16.5	66.5
45	39R3A	10.81	352.0	16.7	99.1	16.8	14.0	83.4
46	142R3	8.29	346.9	20.0	83.6	17.7	11.9	67.5
47	117R2	7.68	344.6	18.5	98.7	19.3	14.0	72.2
48	170R1	12.01	324.3	19.1	80.7	21.8	11.9	54.5
49	195R2A	0.53	327.3	18.3	77.6	22.3	15.6	70.2
50	195R2AA	8.99	330.2	18.3	78.0	21.0	15.3	78.7
51	195R3	7.28	311.9	16.2	73.6	23.2	17.1	73.9
52	202R3	10.74	333.0	14.3	64.6	20.1	16.2	80.6
53	203R3	2.00	307.6	19.9	72.1	22.3	16.0	71.9
	L.S.D5%	2.24	54.43	15.18	2.6	2.07	9.61	2.24

Table (4): Grouping pattern of 53 sweet sorghum genotypes according to their susceptibility to corn borers infestation as combined data of 2007 and 2008 seasons.

Serial number	Genotypes	% Bored joints	No. holes per 15 plants	Group
1	195R2A	0.4	0.70	Highly resistant group (HR)
2	203R3	1.2	2.20	
3	220	1.4	3.60	
4	25	1.4	3.70	
5	203	1.5	4.20	
6	74	1.7	4.30	
7	73	1.4	4.80	
1	174	9.2	6.20	Moderately resistant group (MR)
2	222	8.3	6.30	
3	69	7.2	6.50	
4	7R3	5.6	6.70	
5	199	5.1	6.90	
6	70	7.2	7.95	
7	131	4.6	7.70	
8	94	4.3	7.77	
9	195R3	4.8	8.10	
10	204	4.2	8.30	
11	185	9.2	8.40	
12	96	5.6	9.50	
13	117R2	6.2	9.80	
14	33	6.8	9.80	
15	129	5.3	10.00	
16	109	5.2	11.10	
17	197	6.1	12.10	
18	134	6.3	12.30	
1	9	9.2	14.90	Low resistant group (LR)
2	95	11.6	14.90	
3	195R2AA	9.4	14.90	
4	142R3	11.3	16.80	
5	186	9.0	17.90	
7	46	9.3	18.90	
8	Wiley	7.4	19.00	
9	191	10.2	19.00	
10	44	10.6	19.10	
11	39R3A	8.2	20.10	
12	202R3	11.4	21.30	
13	80	6.2	21.40	
14	170	9.2	22.54	
15	170R1	9.6	22.40	
16	202	10.6	24.70	
17	43	11.8	27.80	
18	187	10.5	28.10	
19	136	8.9	28.30	
20	14R3A	8.4	29.50	
1	39R1	13.2	34.60	Highly susceptible group (HS)
2	188	14.9	36.80	
3	215	15.0	39.10	
4	18R2	16.2	40.40	
5	209	16.0	40.90	
6	14R1	15.2	44.90	
7	158	23.2	50.00	
8	165	23.8	62.90	

Abou-Dooh (1980) found that the damage caused by these borers was positively correlated with the sugar contents in sugar cane varieties. This may due to that the varieties with high sugar content may have in the same time some physical characters which were favorable for moth oviposition and for the newly hatched larvae to feed and develop.

As a conclusion, the physical variables of the substrate play very important roles in the genotypes resistance and the chemical status of the host comes after. Meanwhile, there are very important variables which adverse borer infestation must be studied. Such variables are stemming hardness, number and type of hairs, wax layer on the stem, type of leaf venation etc.

Table (5): Simple correlation between number of holes per 15 plants and other variables.

Characters	No. holes per 15 plants	Computed t
	r	
Plant height	0.004	0.029
leaves no/plant	-0.061	-0.44
Days to 50 % flowering	-0.026	-0.19
T.S.S %	-0.090	-0.65
Sucrose %	0.140	1.01
Purity %	0.057	0.41
Tabular t 5%	2.00	

C- Morphological characteristics of sweet sorghum genotypes:

1- Plant height:

Results presented in table (3) showed that the plants of the genotypes 14R3A, Brandies, 14R1, Wily, 187 and 191 were significantly taller than the other genotypes, while the plants of the genotypes 80, 70, 39R1, 204, 25, 43, 185 and 202 were recorded as the shorter plants. The differences of plant height among sweet sorghum genotypes can be attributed to the growth habit of each genotype controlled either by genetic factors or environmental agents. These results were in agreement with Bartel (1949), Quinby and Karper (1954) and Quinby (1963) and Ahmad (2006).

2- Days to 50% blooming:

The results indicated that sweet sorghum genotypes significantly differed in number of days from sowing to 50% flowering. The earliest flowered genotypes were 202, followed by 43, 185, 202R3, 204, 25, Wiley and 80 with values ranged from 62.5 to 66.5 days, respectively. However, the least genotype flowering was 18R2 followed by the genotypes 39R1 and 14R3A, respectively. Bartel (1949), Quinby and Karper (1954), Quinby (1963) and Petal *et al*. (1983) and Ahmad (2006) found similar results.

3- Number of leaves per plant:

Significant differences among sweet sorghum genotypes for this trait in both combined seasons. The genotypes 174 and 7R3 followed by 197, 185, 186, 220, 14R3A, 142R3, 43, 134, 222, 203R3, 209 and 39R1 showed the highest numbers of leaves per plant, while the lowest numbers of leaves per plant were obtained the genotypes 25, 202R3 and 202. The differences among those genotypes may be due to their genetic potential for leafing. These results are in a harmony with results of Liang (1966) and Ahmad (2006).

D- Chemical characteristics of sweet sorghum genotypes:

1- Percentage of total soluble solids (% T.S.S.):

Means of the percentage of total soluble solids (% T.S.S.) of the genotype 39R1 followed by 14R3A, 131, 7R3, 195R3, 94, 136 and 14R1 were higher than of the other genotypes. However, the genotype 44 showed the very lowest percentage of T.S.S. % (12.4 %). These results were in agreement with Gupta and Baliwal (1976), Bapat *et al.* (1987) and Ahmad (2006).

2-Percentage of sucrose:

There were significant differences among sweet sorghum genotypes of percentage of sucrose. The genotype 199 followed by 96, 109, 14R3A, 33 and 195R3 showed the highest percentage of sucrose, (18.2, 17.9, 17.8, 17.6, 17.2 and 17.1 %, respectively) while the lowest percentage were obtained the genotypes 44 and Wiley (8 and 10 %, respectively). The results obtained are acceptance with those findings of Govile and Murty (1983) and Bapat *et al.* (1986) and Ahmad (2006).

3- Percentage of purity:

The results indicated that sweet sorghum genotype 170R1 was the lowest percentage of purity (54.5%) and Wiley (59.5%). On the contrary, the genotypes 33, 70, 199, 96, 187 and 39R3A were significantly higher than the other genotypes in percentage of purity, (92.6 %, 86.3 %, 84.7 %, 84.1 %, 84.0 %, and 83.4 %, respectively). These findings are in agreement with Bapat *et al.* (1987) and Ahmad (2006).

Generally, it could be concluded that the best promising genotypes lines were 195R2A, 203R3, 220, 25, 203, 74, 73, 199, 96 and 109, respectively. These lines had a high T.S.S % and sucrose %, immunity and resistance against corn and sugar cane borers; they could be propagated to become good varieties in Middle and Upper Egypt.

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تقييم بعض التراكيب الوراثية للذرة الرفيعة السكرية لمقاومة ثاقبات الذرة والقصب مع وجود صفات مورفولوجية وكيميائية

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أجرى هذا البحث فى مزرعة مركزالتجارب الزراعية بكلية الزراعة جامعة الأزهر فرع أسيوط خلال عامى 2007 و2008 . وذلك لتقييم ثلاثة وخمسين تركيب وراثى من الذرة السكرية لمعرفة لأى مدى تؤثر كل من الصفات الطبيعية والصفات الكيماوية للنبات فى مناعة التركيب الوراثى للإصابة بديدان الذرة والقصب (دودة القصب الكبيرة والدودة الدوراة) ولقد درست العلاقة بين الست صفات الآتية وعلاقتها بدرجة الإصابة وهى: طول النبات , عدد الأوراق ,الأيام حتى 50% تزهير, والنسبة المئوية للمواد الصلبة الذائبة الكلية والنسبة المئوية للسكروزوالنسبة المئوية للنقاوة.

ولقد بينت الدراسة أن التراكيب الوراثية المختبرة يمكن تقسيمها الى أربعة مجموعات كالتالى:

1- المجموعة العالية المقاومة وتشمل إثنى عشر تركيبا وراثيا. 2- المجموعة المتوسطة المقاومة وتشمل ثلاثة عشر تركيبا وراثيا.

3- المجموعة القليلة المقاومة وتشمل عشرين تركيبا وراثيا. 4- المجموعة العالية الحساسية وتشمل ثمانية تراكيب وراثية. ولقد نوقش فى هذه الدراسة دور الصفات الطبيعية فى عملية المقاومة. وقد تفوقت التراكيب الوراثية (14ر3أ) وبرانديز و(14ر1) وويلى و187 و191 بالنسبة لصفة ارتفاع النبات عن بقية التراكيب تحت الدراسة على الترتيب. وجد أن التركيب الوراثى 202 هو أكثر التراكيب الوراثية تبكيرا فى التزهير وتلاه 80 و43 و185 و(202ر3أ) و ويلى و80. أظهرت السلالتان 174 و(7ر3) أعلى عدد من الأوراق لكل نبات وقد تلاهما التراكيب الوراثية 197 و185 و186 و220 و(14ر3أ) و(142ر3) و43 و134 و222 و(203ر3) و209 و(39ر1) بينما كان أقل التراكيب الوراثية فى عدد الأوراق لكل نبات هى 25 و(202ر3) و202 على الترتيب. سجل التركيب الوراثى (39رأ) أعلى نسبة مئوية فى المواد الصلبة القابلة للذوبان بينما التركيب الوراثى 44 كان الأقل عن بقية التراكيب الوراثية من الذرة السكرية تحت الدراسة. وجد أن التركيب الوراثى 199 هو أعلى التراكيب الوراثية فى النسبة المئوية للسكروز وتلاه التراكيب96 و109 و(14ر3أ) و33 و195ر3 على الترتيب فى حين كان أقلها التركيبين الوراثيين 44 و ويلي. كان التراكيبان الوراثيان (170ر1) و ويلى أقل التراكيب فى نسبة النقاوة (54.5 و59.5 على الترتيب) وعلى العكس كانت أعلى نسبة نقاوة فى التراكيب الوراثية 33 و70 و199 و96 و187 وأخيرا التراكيب (39ر3أ).

ووفق ما تم الحصول عليه من نتائج يوصى بإكثار السلالات المبشرة (203ر3) و 220و 25و 203و74 و 37 و199 و96 و 109 وذلك لإحتوائهم على مناعة ومقاومة عالية ضد ثاقبات القصب والذرة وكذلك المحتوى العالى من المواد الذائبة الكلية والسكروز حيث يمكن إكثارها لتصبح أصنافاً جيدة تحت ظروف مصر الوسطى والعليا.

قام بتحكيم البحث

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