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SUSCEPTIBILITY OF SOME MAIZE AND SORGHUM GENOTYPES TO INFESTATION BY CERTAIN CEREAL APHIDS IN SOHAG GOVERNORATE.

F.A.A. Slman , M.A. Ahmed and H.A. Mohamed

Plant Protection Research Institute, Agricultural Research center, Dokki, Giza.

Abstract: Two field experiments were carried out at Shandaweel Agric. Res. Station, Sohag, Egypt during 2004 and 2005 seasons, to evaluate the susceptibility of seven genotypes of maize and sorghum to infestation by the corn leaf aphid, *Rhopalosiphum maidis* (Fitch) and the *greenbug*, *Schizaphis graminum* (Rondani.). The genotypes of maize were 10, 122, 123, 124, 129, 155 and Watania 4, whereas for sorghum Dorado, Kymone, R-89039, R-91022 were short genotypes, while Giza 15, Giza113, and R-2735 were long ones.

The obtained results revealed that: 1) In case of maize genotypes, the numbers of *R. maidis*, which is a major pest on the seven maize genotypes were significantly lower in the first season than in the second one. Single cross 10 was the most susceptible genotype to infestation by this aphid, whereas single cross 155 was the least susceptible ones, during 2004 and 2005 seasons. The tested genotypes were grouped into: moderate resistant (single cross 155 during 2004 and 2005 seasons and Watania 4 during 2005 season), Low resistant (Watania 4 in 2004 season, single cross 123 during 2004 and 2005 seasons and single cross 124 in 2005 season) and susceptible (genotypes 124 in 2004 season and 129, 122 and 10 during 2004 and 2005 seasons. 2) In case of sorghum genotypes: in regard to *R. maidis*, Dorado was more susceptible to aphid infestation than the other genotypes, while kymone was the least susceptible ones. The tested genotypes were grouped into: moderate resistant (Kymone in 2005 season) Low resistant Kymone in 2004 season and Giza 113, R-91022, R-89039 during 2004 and 2005 seasons, susceptible (Giza 15, R-2735 and Dorado during both seasons. Concerning *S. graminum*, Giza 15 harbored the highest numbers of aphids, while Kymone attracted the least ones during both seasons. The tested genotypes were grouped into moderate resistant (Kymon in 2005 season), Low resistant (Kymon in 2004 season and Dorada, Giza 113 and R-89093 during both seasons) and susceptible (R-91022, R-2735 and Giza 15).

Key words: maize, sorghum, genotypes, aphids.

Introduction

Maize (Zea mays L.) is one of the most important food crop in the world. Maize foliage are also a major constituent in cattle feeds, Also, Sorghum (*Sorghum bicolor* L.) is considered the most important cereal crop grown principally during summer in Upper Egypt. Sorghum was cultivated for a long time for bread making and recently for many other purposes such as green foliage, grains for feeding animals and as a row material in industries. Sorghum plants are subjected to attack by *R. maidis* and *S. graminum* in Sohag Governorate (Salman, 1995), while maize plants are infested by *R. maidis* (Hanafy, 2005). Damage to maize is a result of sucking the plant sap and excretion of honeydew which accumulate on the pollen grains of the male tassel spikelets. Aphids also act as vector of plant viral diseases such as muize dwarf mosaic virus (Minks and Harrewijn, 1989). The susceptibility of maize and sorghum genotypes to infestation by cereal aphids were reported by Hassan (1957), El-Hariry (1979), Attia (1989), Semeada *et al*. (1996), Ahmed (1996), Mansour *et al*. (2000), El-Naggar (2001), Mohamed (2001) and Hanafy (2005).

In general the chemical control of insect pests causes serious environmental hazards. Therefore, it is strictly necessary to select tolerant or resistant varieties as one of the simplest and useful tactic in integrated pest management programs (Dent, 1991). Also, Horber (1972) pointed out that resistant genotypes may improve the effectiveness of insecticides.

So, the present work was conducted to evaluate the susceptibility of some maize and Sorghum genotypes to infestation by *R. maidis* and *S. graminum.*

Materials and Methods

Two field experiments were carried out at the experimental farm of Shandaweel Research Agriculture Station, Sohag, Upper Egypt during two successive seasons 2004 and 2005. The experimental design was a complete randomized blocks design with four replicates. The plot area is 42 m2 (1/100 feddan.) Each plot considered of 10 rows of 6 m length and 70 cm width. Maize and Sorghum seeds were sown in 1 June 2004 and 2005 seasons, respectively. Seven genotypes of maize (Single cross 10, 122, 123, 124, 129, 155 and Watania 4.) and sorghum (Giza 15, Giza113, Line ICSR- 2735, Line ICSR-89039, Line ICSR- 91022, Dorado and Kymone. All Agriculture practices were manipulated as recommended in each crop except the use of insecticides. Sample of maize and sorghum plants were taken every week from aphids appearance till they disappeared from the plants. Samples each of 10 plants were randomly picked from each plot and the number of aphids per plant is counted. The data were compared using analysis of

variance and Duncan' s multiple range test.

The susceptibility degrees estimated according to Chiang and Talekar (1980), the general mean ($\overline{X}$), and the standard deviation (SD), were used to evaluate the relative susceptibility degrees among the tested genotypes of maize and sorghum to the cereal aphid infestations. The genotypes that had an average numbers of insects more than ($\overline{X}$ + 2SD), were considered highly susceptible (HS), between [($\overline{X}$ and ($\overline{X}$ +2SD)], as susceptible (S), between [($\overline{X}$ and ($\overline{X}$-1SD)], as having low resistant (LR) between [($\overline{X}$-1SD) to ($\overline{X}$-2SD)], moderately resistant (MR), and less than ($\overline{X}$-2SD), were considered highly resistant genotypes (HR).

Results and Discussion

1).**Susceptibility of maize genotypes to infestation by *R. maidis***:

As demonstrated in Table (1) maize varieties differed in their susceptibility to infestation with *R. maidis*. Single cross 10 was the most susceptible to infestation receiving the highest number of individuals (81.25 and 112.75 individuals/plant), while single cross 155 showed the least one (8.00 and 12.75 individuals/plant) during 2004 and 2005 maize seasons, respectively. The susceptibility of the different maize genotypes to aphid infestation could be arranged in descending order in the two tested seasons as follows, single genotypes 10, 122, 129, 124, 123, Watania 4 and 155. insignificant differences were found among genotypes 124, 123, Watania 4 and 155 during 2004 and 2005 seasons. Statistical method was used to classify the germplasm into various relative resistance categories to help in selecting accessions with a resistance level high enough for breeding purposes. Table (1) summarizes the relative resistance categories obtained from 11 hybrids tested in this screening for *R. maidis*, single hybrid 155 (MR) during 2004 and 2005 seasons, single hybrid 123 (LR) during both seasons, hybrid single Watanina 4 (LR) in 2004 seasons and (MR) in 2005 seasons, single hybrid 124 was (S) in 2004 season and (LR) in 2005 season, However single hybrids 129, 122, 10 were (S) during both seasons. These results are in agreement with those of Hanafy (2005) who mentioned that single hybrid 10 was highly susceptible to *R. maidis*. Various factors appear to be responsible for resistance susceptibility of maize genotypes to corn aphid infestation, including environmental effects (Bernays *et al*. (1983). The physical and chemical characteristics of plant (Wood head and Taneja, (1987). Chang and Brewbaker (1975) referred the maize infestation by the corn leaf aphid to the genetic resistance.

Table(1): Susceptibility of maize genotypes to infestation by *R. maidis* during 2004 and 2005 seasons.

Genotypes	Average number of aphids/plant			
	2004 season		2005 season	
155	8.00 a *	MR	12.75 a *	MR
Watania 4	10.25 a	LR	15.00 a	MR
123	20.75 b	LR	27.50 b	LR
124	30.00 b	S	39.00 c	LR
129	50.75 c	S	80.25 d	S
122	71.50 d	S	99.00 e	S
10	81.25 e	S	112.75 f	S
	$\overline{X}$= 38.93		$\overline{X}$ = 55.18	
	SD= 29.39		SD = 41.44	

*Means followed by the same letter, within the same column in each season, are insignificantly different at 5% level of probability, according to Duncan's Multiple Range Test.

2). A. Susceptibility of sorghum genotypes to infestation by *R. maidis*:

Data in Table (2) revealed differences in average number of *R. maidis* /plant among tested genotypes.

As shown in this Table Dorado exhibited the highest number of aphids (111.25 and 130.25 ind./plant) while since Kymon harboured the least number of aphids (12.75 and 25 ind./plant) during 2004 and 2005 seasons, respectively.

The susceptibility of the different sorghum genotypes to aphid infestation could be arranged in descending order in the two tested seasons as follows: Dorado, R-2735, Giza 15, R-89039, R-9022, Giza 113 and Kymon. Insignificant differences were found between Kymon and Giza 113, R-91022 and R-89039 and Giza 15 and R-2735 during both seasons.

Also, Table (2) summarizes the relative resistance categories obtained from 7 sorghum genotypes, Kymon (LR) during 2004 season, while (MR) in 2005 season, Giza 113, R-91022 and R-89039 were (LR), Giza 15, R-2735, Dorado were (S).

Table(2): Susceptibility of sorghum genotypes to infestation by *R. maidis* during 2004 and 2005 seasons.

Genotypes	Average number of aphids/plant			
	2004 season		2005 season	
Kymone	12.75 a *	LR	25.00 a *	MR
Giza 113	14.25 a	LR	30.75 a	LR
R-91022	29.00 b	LR	45.50 b	LR
R-89039	36.50 b	LR	52.00 b	LR
Giza 15	52.50 c	S	72.00 c	S
R-2735	58.00 c	S	79.25 c	S
Dorado	111.25 d	S	130.25 d	S
	$\overline{X}$ = 44.89		$\overline{X}$ = 62.11	
	SD= 33.98		SD= 35.99	

*Means followed by the same letter, within the same column in each season, are insignificantly different at 5% level of probability, according to Duncan's Multiple Range Test.

B. Susceptibility of sorghum genotypes to infestation by *S. graminum*:

Data in Table (3) show the mean number of *S. graminum* on seven sorghum genotypes during 2004 and 2005 seasons. Statistical analysis revealed that the highest numbers of aphids were existed significantly on Giza 15 with means of (56.25 and 76.00 ind./plant) followed by R-2735 and R-91022, while the least affinity to infestation occurred on Kymon with means of (7 and 15 ind./plant) during 2004 and 2005 seasons, respectively.

Also, Table (3) summarizes, the relative resistance as follows, Kymon (LR) and (MR) during both seasons, Dorado, Giza 113 and R-89093 (LR), and R-91022, R-2735 and Giza 15 (S). The aforementioned results were coincided with Ahmed (1996) who noticed that short variety (Dorado) was highly infested sorghum varieties by *R. maidis* and *S. graminum*, whereas long variety (Giza 15) was the least infested ones. Short genotypes seem to offer very good shelter for both aphid species, since they have wider leaves and may be nutritionally

suitable. Similar results were mentioned by Hanafy (2005).

Several investigators found differences in susceptibility among mazie and sorghum genotypes and/or different seasons to infestation with *R. maidis* Painter (1951 and 1958) reveled that resistance to infestation may be due to one or more of the following factors: (1) preference or nonpreference, shelter or food, (2) tolerance resistant plants under levels of infestation that would kill or severely injure susceptible plants and (3) antibiosis, adverse effect of resistant varieties on the pest's biology. Various factors appear to be responsible for this tendency, including environmental effects (Bernays *et al*. 1983), physical and chemical characteristics of plant (Woodhead and Taneja, 1987), genetic resistance in corn cultivars (Guthrie, 1989 and Harvey *et al.* 1996).

Table(3): Susceptibility of sorghum genotypes to infestation by *S. graminum* during 2004 and 2005 seasons.

Genotypes	Average number of aphids/plant			
	2004 season		2005 season	
Kymone	7.00 a *	LR	15.00 a *	MR
Giza 113	9.75 a	LR	20.50 a	LR
R-91022	11.25 ab	LR	27.50 b	LR
R-89039	11.00 ab	LR	31.00 b	LR
Giza 15	30.50 c	S	49.25 c	S
R-2735	43.00 d	S	61.75 d	S
Dorado	56.25 e	S	76.00 e	S
	$\overline{X}$ = 24.11		$\overline{X}$ = 40.14	
	SD= 19.44		SD= 22.72	

*Means followed by the same letter, within the same column in each season, are insignificantly different at 5% level of probability, according to Duncan's Multiple Range Test.

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حساسية بعض التراكيب الوراثية للذرة الشامية والذرة الرفيعة للإصابة ببعض انواع من النجيليات فى محافظة سوهاج.

فرغل احمد على سلمان و مجدى عبد العظيم احمد و حامد عبد الدايم محمد

معهد بحوث وقاية النبات –مركز البحوث الزراعية- الدقى –جيزة

أقيمت تجربتان بمحطة البحوث الزراعية بجزيرة شندويل بسوهاج جمهورية مصر العربية عامى 2004 و2005م وذلك لتقييم سبعة تراكيب وراثية للذرة الشامية (هجين فردى 10 ، 122 ، 123 ، 124 ، 129 ، 155 ، وطنية 4) وكذلك سبعة تراكيب وراثية للذرة الرفيعة منهم اربعة قصيرة الساق هم دورادو ، كيمون ، السلالة ، 89039 ، السلالة 91022 وثلاثة طويلة الساق هم جيزة 15 ، وجيزة 113 ، ، ،السلالة 2735 وذلك من حيث حساسيتها للإصابة بمن أوراق الذرة الشامية ***Rhopalosiphum maidis* (Fitch)** وكذلك من الغلال أو البق الأخضر ***Schizaphis graminum* (Rondani.)** وقد أسفرت النتائج عما يلى :-

1- وجود فروق معنوية بين التراكيب الوراثية للذرة الشامية وكذلك الذرة الرفيعة من حيث الإصابة بتلك الآفتين ولقد كان متوسط أعداد المن للنوعين أعلى فى السنة الثانية من السنة الأولى على كلا المحصولين.

2- وبالنسبة للهجن الفردية للذرة الشامية وجد أن الهجين الفردى 10 يجذب اكبر عدد من أوراق الذرة الشامية بينما جذب الهجين الفردى 155 اقل أعداد من المن وذلك فى كلا الموسمين.

3- كانت الهجن الفردية للذرة الشامية 129 ، 122 ، 10 حساسة للإصابة بمن أوراق الذرة فى حين أن الهجين الفردى 155 كان ذات مقاومة متوسطة أما الهجين الفردى 123 كان ذات مقاومة منخفضة وذلك خلال الموسمين.

4- أما بالنسبة لأصناف الذرة الرفيعة:-

كان الصنف دورادو (القصير الساق) اكثر تفضيلا لمن أوراق الذرة الشامية من الأصناف الأخرى فى حين أن الصنف جيزة 15 (الطويل الساق) كان اكثر تفضيلا لمن الغلال بالمقارنة بالأصناف الأخرى خلال الموسمين.

أبدت الأصناف جيزة 15 ، 2735 ، دورادو حساسية للإصابة بمن أوراق الذرة الشامية ومن الغلال أما التراكيب الوراثية الاخرى فقد أبدت مقاومة منخفضة خلال الموسمين للإصابة بمن أوراق الذرة الشامية وكذلك من الغلال.