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ASSESSMENT OF SOME BREAD WHEAT GENOTYPES FOR CEREAL APHIDS INFESTATION UNDER UPPER EGYPT CONDITIONS

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ABSTRACT

Sixteen bread wheat cultivar and lines were evaluated in two experimental at Shandaweel Agric. Res. Sta., Sohag governorate, during 2004/2005 and 2005/2006 growing seasons in a randomized complete blocks design (RCBD). Results indicated highly significant difference between genotypes in; days to heading, plant height, 1000 kernel weight, number of spikes/ m^2, grain yield under control and natural conditions and their susceptibility to the infestation by cereal aphids. The data revealed that the early heading date genotypes harbored less number of cereal aphids and also the genotypes which possessed high number of cereal aphids gave slight 1000 kernel weight. Grain yield under aphids infestation ranged from 12.34 to 18.07 with an average of 15.59 (ard./fed). The highest grain yield was obtained by wheat genotypes no. 1, 16 and 8, under natural aphids infestation and control. The losses of grain yield ranged from 4.24% to 21.89% with an average of 9.38 %. Wheat genotypes, varied in their susceptibility to the infestation by cereal aphids and can be arranged in four groups, included one genotype (no. 1, Giza 168), was moderate resistance (MR), seven genotype (no. 3, 7, 10, 11, 14, 15 and 16), were low resistance (LR). Meanwhile, seven genotypes (no. 2, 4, 5, 8, 9, 12 and 13), were susceptible (S) and attracted high numbers of cereal aphids. On the other hand, genotype no. 6 was found to be highly susceptible (HS) and harboured high number of cereal aphids. In terms of the genotypes (no. 8, 9 and 11), (2) and (1 and 2) harboured the lowest number of *R. padi*, *S. graminum* and *R. maidis* respectively. Highly significant positive correlation

(r = 0.919), was found among grain yield under natural aphids infestation and grain yield under control but negative correlation (r = - 0.444) was observed among grain yield under natural aphids infestation and total cereal aphids. It is suggested that genotype no. 1 (Giza 168) is the best genotype, because it had moderate resistance (MR) of cereal aphids, highly grain yield under control and natural aphid infestation and it could be used in wheat breeding progrm for cereal aphid tolerance.**

INTRODUCTION

In Egypt, wheat is the most important winter crops. However, it suffers from many pests especialy cereal aphids. Breeding for cereal aphids tolerance included several steps i.e., searching for the genetic materials, selection between the genotypes and evaluation under aphids infestation. So, aphids are the limiting factors in wheat production in Upper Egypt, which cause sever damage and reduction in the yield. Wheat losses due to cereal aphids are 20 % (Ghanem et al., 1984) to about 25 % (National Bulletin of Wheat Research Program, 2004). Host- plant resistance restricts or eliminates the damage caused by the pest .It does not increase cost, does not require special equipment and does not cause environment pollution. In addition, the efficiency of this method is compatible with other chemical and biological control methods (Scott et al. 1977). With the advance in integrated pest management concept, the use of insect resistant plants in combination with other measures is possibly the most convenient and economical approach for pest control. Its desirable features include specificity to one or several pests, cumulative effectivness, compouned in successive insect generations, persistence to several years, harmony with environment, ease of adaptation into normal farm operations, usually at no extra cost, and compatibility with other tactics in pest management (Pathak, 1970 and Kogan 1982). Painter (1951), proposed three general mechanisms for plant resistance to insect damage:-

1- Non-preference: the terms non-acceptance and antixenosis were proposed by Van Marrewijik and De Ponti, (1975) and Kogan and Ortman (1978), respectively which is shown by plants that are

unattractive or unsuitable for colonization or oviposition by an insect.

2- Antibiosis: which, adversely affects the insect life history, such as reduced growth, reproduction or survival when the insect uses a resistant host plant for food.

3- Tolerance: which enables a host plant to grow and reproduce itself or to repair injury to a market degree in spite of supporting a population approximatily equal to that damaging a susceptible host.

Russell (1978) suggested a fourth type or resistance, pest avoidance, which is a tendency to escape infestation e-g- because the host plant is not at a susceptible stage when pest populations are at their peak. Dedryver and Pietro (1986) mentioned that the resistance of different wheat genotypes due to three fctors:- 1] antibiosis, 2] varietals earliness and 3] the pathological condition of the variety.

On the other hand, basic plant characteristics that may impart resistance or susceptibility to insects can be morphological, such as variation in foliage size, shape, colour, pubescence, hardness or thickness of tissue and especially the proportion of essential nutrients, and also all elochemic factors such as allomones (e.g.repellents, toxicants feeding deterrents) and kairomones e.g. attractants, arrestants, (Kogan, 1982).

Breeding methods used to develop cultivars to the insect are determined by the mode of gene action that conditions resistance in the host plant to insect (Russell, 1972).

The objectives of this study were to:-

1-Evalution of 16 genotypes of wheat to infestation by the oat aphid, *Rhopalosiphum padi* (L),the green bug, *Schizaphis graminum* (Rond) and corn leaf aphid *Rhopalosiphum maidis* (Fitch).

2-Estamating grain yield (ard./fed.) and losses % grain yield due to the infestation by total cereal aphids and correlation between grain yield and cereal aphids.

MATERIALS AND METHODS

Two field experiments in each growing season 2004/05 and 2005/06 were carried out at Shandaweel, Agric. Res. Station ARC, Egypt, to evaluate sixteen spring bread wheat genotypes, (*Triticum aestivum* L), exposed to natural infestation conditions for cereal aphids in one of the two experiments, while the other was protected from the infestation of aphids (control) by spraying of Malathion 57 % EC at 10 days intervals before appearance any aphids infestation for aiming of estamating grain yield loss. The experimental layout was a complete randomized block design (RCBD), with three replication for each treatment. On 25 November, the plots were broadcasting sown in the plot size 1/400 feddan. Other cultural practices were applied as recommended for wheat production throughout the growing season. The genotypes used were as shown in Table 1.

Table 1: Pedigree and source for sixteen wheat genotypes are used in this study.

No.	Pedigree	Source
1	Giza 168	Egypt
2	Sakha 69	Egypt
3	Irena	Cimmyt
4	Dovin-2	Cimmyt
5	Irena / weaver	Cimmyt
6	Stork / dicoccoides	Icarda
7	S.w 89.3064 / star	Cimmyt
8	Attila/3/hui / carc // chen/chto/4/ attila	Cimmyt
9	Sakha 94	Egypt
10	Maya's'/ mon 's' /4/ cmh 72428/mrc// jup/3/582 /5/a2skha 816/ sakha 69	Egypt
11	Tevee"s"/kauz"s"	Icarda
12	Vee*716/kvz/4/t171/3/maia"s"/bb/inia/lgm/5/sakha 8	Egypt
13	Bush/amigo101/ sakha 69	Egypt
14	Gemmeza 10	Egypt
15	Sakha 93	Egypt
16	Czo/kauz // kauz	Egypt

Data recorded were:

1- Sampling for aphids, counts started from the aphids appearance and continued at weakly intervals untill aphid was compelately disappeared on the plants. Five tillers were chosen randomly every week, thus making the total sample size per sampling cycle 15 tillers.

2- Days to heading (HD): number of days from planting until the emergence of 50 % of the heads from the flag leaf sheath.

3- Number of spikes / m^2 (S /m^2).

4- 1000 –kernels weight (g).

5- Grain yields (ardab /fed.): weight of clean grains from 10 central rows.

6- The percentage of grain yield loss.

The percentage of yield losses was calculated according to Walker (1983):

W = (M-Y/M) 100

Where: W: is the percentage of yield losses, M: is the yield in the absence of aphids and Y: is the yield in the presence of aphids infestation.

7- The susceptibility degrees: was calculated according to Chiang and Talker (1980), the general mean ($\bar{x}$) and the standard deviation (SD), were used to evaluate the relative susceptibilty degrees, among the tested genotypes of wheat to aphids infestation:-

B-Highly resistant (HR): had an average numbers of insects less than ($\bar{x}$-2SD).

C-Susceptible (S): had an average numbers between $\bar{x}$ and ($\bar{x}$ +2SD).

D-Low resistant (LR): had an average numbers of insects between $\bar{x}$ and ($\bar{x}$-1SD).

E- Moderately resistant (MR): had an average numbers of insects between ($\bar{x}$-1SD) to ($\bar{x}$-2SD).

Statistical analysis, of the obtained data was performed by Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Analysis of variance:-

Analysis of variance (Table 2), showed highly significant differences among the genotypes, seasons and interactions between them for *R.padi, S. graminum and R. maidis,* days to heading, plant height, 1000 kernel weight, grain yield under control and natural conditions, except number of spikes/ m^2 was highly significant for genotypes.

Table, 2: Mean squares of combined analysis of variance for the all studied traits.

S.O.V	D.F	*R. padi*	*S. gram.*	*R. maidis*	Grain Control	Grain Nature	Heading date	Plant Height	1000 K.W	Spike/m^2
Seasons	1	115212**	8985.8**	7190.3**	3.19	15.4*	765.0**	0.04	94.0*	7579.2
R/S	4	1134.9	868.38	998.22	2.30	0.84	7.33	2.76	3.46	2317.2
Genotype	15	5558.8**	7155.2**	1503.3**	9.0**	4.1**	95.8**	823.9**	31.6**	7401**
GXS	15	74772.3	6341.4**	1011.8**	4.0**	2.5**	37.9**	13.2**	7.26*	1182.0
Error (b)	60	1049.2	29.1	65.6	0.61	0.61	3.09	5.01	3.94	860.0

Effect of days to heading and plant height on overall numbers of cereal aphids:-

Data in Table 3 indicate that the number of days to heading ranged from 96.2 for genotype no. 1 and 2 to 107.5 for genotype no. 10 with an average of 102.4 days. The best genotypes no.1 (Giza 168), which was the earliest one and consequently infested with the lowest total number of aphids (701.0 aphids) as shown in Table 5 compared with late genotype for days to heading.

Table 3: The average of days to heading, plant height and 1000 kernels weight for 16 weight bread weight genotypes.

Gen. No.	Days to heading		Mean	Plant height		Mean	1000 kernels weight		Mean
	2004 /2005	2005 /2006		2004 /2005	2005 /2006		2004 /2005	2005 /2006	
1	99.7	92.7	96.2	105.3	100.7	103.0	44.0	41.7	42.8
2	99.0	93.3	96.2	108.3	107.0	107.7	47.7	48.3	48.0
3	99.0	95.7	97.3	104.7	103.7	104.2	48.3	44.0	46.2
4	105.0	102.0	103.5	107.3	103.3	105.3	44.0	42.3	43.2
5	110.0	104.0	107.0	97.7	96.0	96.8	39.3	41.3	40.3
6	99.0	94.7	96.8	146.3	145.0	145.7	47.0	42.3	44.7
7	112.7	94.7	103.7	107.3	108.0	107.7	45.0	42.7	43.8
8	109.0	105.0	107.0	106.0	106.0	106.0	49.0	46.3	47.7
9	106.7	102.0	104.3	103.0	102.7	102.8	46.0	42.7	44.3
10	110.3	104.7	107.5	93.3	93.7	93.5	39.3	40.7	40.0
11	106.3	105.7	106.0	105.0	102.3	103.7	42.3	42.7	42.5
12	101.0	101.7	101.3	107.0	106.3	106.7	45.7	44.7	45.2
13	107.0	95.3	101.2	107.7	109.3	108.7	46.7	43.0	44.8
14	106.0	105.3	105.7	91.3	93.7	92.5	43.0	40.3	41.7
15	108.0	94.0	101.0	99.0	104.0	101.5	43.0	41.3	42.2
16	105.0	102.7	103.8	104.3	111.0	107.7	47.0	41.3	44.2
Mean	105.2	99.6	102.4	105.9	105.8	105.8	44.8	42.9	43.8
L.S.D0 .05			3.04			3.88			3.45

Dedryver and Pietro (1986) pointed out that differences among wheat cultivars in regard of infestation to aphids can be attributed to varietal earliness.

As regard plant height, genotype, no. 6 was the highest plant (145.7cm), therefore it was more acceptable to aphids (1598.7 aphids). Similar results were also reported by Cartier (1963), who found that infestation of pea by winged migrents aphids was significantly and positively correlated with height of pea varieties. Ali (1979) also found that infestion of different barly varieties with cereal aphids was directly correlated with plant height.

Effect of cereal aphids infestation on 1000 kernels weight, and number of spikes/m^2:-

Results in Table 4 show that genotype no; 3 had heavier 1000 kernel weight (48.0 g) and low number of aphids, while genotype no. 4, had high number of spikes /m^2 (477.0) and was highly preferred to cereal aphids (1145.5). It was expected that the number of tillers /m^2 will be followed by more spikes /m^2. In this respect Badulin and Lomtev (1975), mentioned that the greater the density of wheat plant, the greater the infestation by the wheat blossom mite, *steneotarsonemus panshini* (Vainshteine and Beglyarov). Also Starks and Merkle (1977) stated that croweded plants can be considered as a good shelter to protect aphids from direct sunlight, rainfall, wind and natural enemies. Soliman et al. (1985) and Ali and Ahmed (1996) found that the population density of cereal aphids increased with incresing of seed rate of wheat.

Grain yield and yield losses % to aphids infestation for 16 wheat genotypes:-

Results summarized in Table 4 reveal that the average of grain yield under aphids infestaton (nature) ranged from 12.34 (ard./fed.) for genotype no. 2 to 18.07 for genotype no. 16 with an average of 15.59 (ard./fed.). The highest grain yield was obtained by genotypes no. 16 (18.07), no 1 (17.86) and no 8 (17.80 ard./fed.). Therefore the best genotypes under aphid infestation were no. 1 (Giza 168) and 16, because they had high grain yield, lowest grain yield reduction compared with grain yield under control and other genotypes, in the mean time, having low total cereal aphids 701.0 and 893.0 aphids, respectively.

On the other hand the percentage of yield losses due to aphids infestation ranged from 4.24 in genotype no. 1, to 21.89 % in genotype no. 2. From Table 4, it is obivous that the highest yield losses (21.89%) was obtained in genotype no. 2 (Sakha 69), which had 1096.3 aphid, while genotype no. 1 (Giza 168), exhibited the lowest number of aphids and also recorded the lowest yield Losses 4.24 and 5.24 % respectively.

Table, 4: Average of number of spikes/m^2, Grain yield (ard./fed.) under Aphids, Grain yield under (control) and Grain yield Lossess %.

Gen. No.	No. of spikes/m^2		Mean	Grain yield under (Aphids)		Mean	Grain yield under (control)		Mean	Grain yield loss %
	2004 /2005	2005 /2006		2004 /2005	2005 /2006		2004 /2005	2005 /2006		
1	390.7	333.7	362.2	17.98	17.73	17.86	18.26	19.04	18.65	4.24
2	362.7	346.0	354.3	13.67	11.01	12.34	17.06	14.54	15.80	21.89
3	432.0	401.3	416.7	16.48	13.82	14.15	17.16	16.21	16.68	15.17
4	528.0	426.0	477.0	14.59	13.41	14.00	15.66	16.18	15.92	12.06
5	420.7	414.0	417.3	15.05	13.98	14.51	16.13	16.85	16.99	14.59
6	424.7	412.3	418.5	15.27	14.44	14.85	15.85	16.80	16.32	9.00
7	417.3	401.3	409.3	16.55	15.89	16.22	17.49	17.17	17.33	6.41
8	370.3	370.7	370.7	17.63	17.37	17.80	18.88	18.20	18.54	5.61
9	452.0	446.7	449.3	14.31	13.14	13.72	14.83	15.44	15.14	9.38
10	350.7	357.3	354.0	16.66	16.99	16.83	17.54	18.56	18.05	6.60
11	413.3	400.7	407.0	14.97	15.96	15.47	16.36	16.99	16.67	7.20
12	425.3	412.7	419.0	15.88	15.41	15.65	17.98	17.05	17.51	10.62
13	385.3	383.0	384.2	16.00	14.18	15.09	18.58	14.64	16.61	9.15
14	452.0	433.0	442.5	16.70	14.31	15.81	18.43	14.93	16.68	5.22
15	389.3	370.7	380.0	15.47	15.85	15.66	17.84	16.03	16.94	7.56
16	388.0	409.0	398.5	17.92	18.21	18.07	18.37	19.96	19.17	5.80
Mean	412.7	394.9	403.8	16.07	15.11	15.59	17.27	16.78	17.03	9.38
L.S.D0.05			NS			1.35			1.36	

These results agree with those of Tantawi (1985), who pointed out that wheat yield losses due to cereal aphids ranged between 7.5 to 18.7 % in Sohag Governorate. Papp and Mesterhay (1993), found the losses in grain yield ranged from 26 - 33 % for the most tolerant genotyps to 58-63 for the most sensitive genotyps. Also, El-Heneidy *et al.* (2003), found that the losses of wheat yield due to cereal aphids infestation ranged from 21.2 to 75 %.

Susceptibility of wheat genotypes to aphid infestation:

Data in Table 5 clearly show that all tested wheat genotypes were attacked and colonized by *R. padi, S. graminum and R. maidis* but with variable infestation levels. However, *R. maidis,* infestations seemed to be of minor significance since it exhibited lower levels of abundance compared to *R. padi, and S. graminum.* Also, wheat

genotypes differed significantly in their relative susceptibility to infestaion with cereal aphids.

a) Oat aphids (*R. padi*) :

Table 5 shows that wheat genotypes no. 11, 9, 8, 15, 13 and 1 harboured the least numbers of aphid during 2005 and 2006 seasons, , whereas wheat genotypes no. 6, 2, 12 and 14 were the most perferrable the miximum numbers of aphids/5 tillers during two seasons, respectively. Finally, the wheat genotypes no. 2 and 6 was colonized by the miximum numbers of aphids (392.7 and 537.8 aphids/5 tillers), whereas the wheat genotypes 8, 9 and 11 were the least ones during the two cumulative seasons.

Table, 5: Susceptibility of some genotypes of wheat to infestation with cereal aphids.

Gen. No.	*R. padi*		Mean	*S. graminum*		Mean	*R. maids*		Mean	Overall aphids
	2004 /2005	2005 /2006		2004 /2005	2005 /2006		2004 /2005	2005 /2006		
1	192.7	190.7	191.7	52.7	147.7	100.2	121.3	00.0	60.7	705.1
2	698.3	87.0	392.7	56.3	108.3	82.3	147.0	00.0	73.5	1096.9
3	286.3	130.0	208.2	161.3	117.3	139.3	137.0	95.0	116.0	926.9
4	298.7	123.7	211.2	164.7	122.7	143.7	327.0	108.7	218.0	1145.5
5	302.3	110.7	206.5	189.0	116.7	152.8	254.7	120.7	187.7	1094.1
6	969.7	106.0	537.8	273.0	112.7	192.3	137.3	00.0	68.7	1598.7
7	333.3	104.0	218.7	150.0	110.3	130.2	299.7	00.0	149.8	997.3
8	179.3	177.3	178.3	234.0	129.0	181.5	327.0	00.0	163.5	1046.6
9	194.7	160.3	177.5	256.0	154.0	205.0	305.3	00.0	152.7	1070.3
10	262.0	153.3	207.7	202.3	112.0	157.2	173.0	00.0	86.5	902.6
11	221.3	115.0	168.2	276.0	136.3	206.2	109.7	00.0	54.8	858.3
12	390.0	127.7	258.8	246.7	129.3	188.0	151.3	00.0	75.7	1045.0
13	251.7	128.3	190.0	192.7	133.3	163.0	185.7	130.0	157.8	1021.7
14	372.3	124.3	248.3	171.0	112.7	141.8	171.0	00.0	85.5	951.3
15	254.0	112.3	183.2	174.7	149.3	162.0	187.7	00.0	93.8	878.0
16	301.0	108.0	204.5	189.7	119.3	154.5	175.0	00.0	87.5	893.0
Mean	344.2	128.7	236.4	186.9	125.7	156.8	200.6	28.4	114.5	1014.5
L.S.D0.05	76.06	6.64	56.32	11.89	3.75	9.38	17.11	8.45	14.07	84.9

b) The Greenbug *(S. graminum)*:-

It is obvious from the data in Table 5 that the wheat genotype no. 2 (Sakha 69) was less acceptable (56.3 and 108.3) to aphids / 15 tillers during 2005 and 2006 seasons, whereas genotypes no. 11 and 9 (Sakha 94) were the highest perferable ones to *S. graminum* during the

two seasons. Regarding the two combined seasons, the wheat genotype no. 2 (Sakha 69) was less attractive (82.3 aphids / 5tillers) to *S. graminum*. In contrast, wheat genotypes no. 11 was the highest preferred ones (206.2 aphids / 5tillers).

c) Maize leaf aphid (*R. maidis*):

Data in Table, 5, show that wheat genotypes no. 4, 8, 9 (Sakha 94), 7 and 5 were the highest preferred genotypes (327.0, 327.0, 305.3, 299.7 and 254.7 aphids / 5 tillers) to *R. maidis,* and on the contrary genotype no. 1 (Giza 168) and no. 11 were the least preferred genotypes (121.3 and 109.7 aphids / 5 tillers) by this pest during 2005 season. Interestingly, *R. maidis* appeared only on four wheat genotypes (no. 3, 4, 5 and 13) during 2006 season, perhaps due to climatic conditions (temperature and humidity). Hence, the wheat genotypes were evaluated on the basis of the two combined seasons, wheat genotypes no. 4 was the most favorable to *R. maidis* (218.0 aphids / 5 tillers) whereas no. 11 (59 aphid/5tillers) and 1 (Giza 168) (60 aphid/5tillers) was the least favorable ones to *R. maidis.*

d) Overall cereal aphids:-

As shown in Table (5), Giza 168 harboured the lowest numbers of aphids (705.1 aphids / 5 tillers), while wheat genotypes no. 6, 4, 2, and 9 harboured the highest numbers of aphids being 1598.7, 1145.5, 1096.9 and 1070.3 aphids respectively.

Evaluation of the relative susceptibility degrees among the wheat genotypes, to cereal aphid infestations: -

Data in Table 6 summarize the susceptibility degrees of wheat genotypes towards infestation by cereal aphids for each growing seasons and also over either growing seasons. It is obvious from the data that the susceptibility degrees of 16 wheat genotypes are:-

a- Oat aphid (*R. padi*):-

Wheat genotypes could be arranged in three groups, according to their susceptibility degrees, the first group: include the low resistant (LR) genotypes no. 1, 3, 4, 5, 7, 8, 9, 10, 11, 13, 15 and 16; the second group: include highly susceptibility (HS) genotype no. 6 and. the third group: include the susceptible (S) genotypes no. (2, 12 and 14).

Table 6: The susceptibility degrees of 16 bread wheat genotypes for *R. padi, S. graminum* and *R. maidis* under field coditions.

Gen No.	*R. padi*		Mean	*S. graminum*		Mean	*R. maidis*		Mean	Overall Aphids
	2004 /2005	2005 /2006		2004 /2005	2005 /2006		2004 /2005	2005 /2006		
1	LR	HS	LR	HR	S	MR	MR	LR	MR	MR
2	S	MR	S	MR	MR	HR	LR	LR	LR	S
3	LR	S	LR	LR	LR	LR	LR	S	S	LR
4	LR	LR	LR	LR	LR	LR	S	S	S	S
5	LR	LR	LR	S	LR	LR	S	S	S	S
6	HS	LR	HS	S	LR	S	LR	LR	LR	HS
7	LR	LR	LR	LR	MR	LR	S	LR	S	LR
8	LR	S	LR	S	S	S	S	LR	S	S
9	LR	S	LR	S	S	S	S	LR	S	S
10	LR	S	LR	S	LR	S	LR	LR	LR	LR
11	LR	LR	LR	S	S	S	MR	LR	MR	LR
12	S	LR	S	S	S	S	LR	LR	LR	S
13	LR	LR	LR	S	S	S	LR	S	S	S
14	S	LR	S	LR	LR	LR	LR	LR	LR	LR
15	LR	LR	LR	LR	S	S	LR	LR	LR	LR
16	LR	LR	LR	S	LR	LR	LR	LR	LR	LR

b) Greenbug (*S. graminum*):

Table 6 reveals moderate resistant (MR) to infestation in genotype no. 1 (Giza 168), low resistant (LR) in genotypes no. 3, 4, 5, 7, 14 and 16, highly susceptible (HS) in genotype, no. 2 (Sakha 69), while the rest could be considered as susceptible genotypes (S).

c) Maize leaf aphid, *R. midis*:

Two genotypes (no. 1 and 11) were chsaracterized as moderate resistant (MR), seven genotypes (no 2, 6 , 10 , 12 , 14 , 15 and 16) low resistant (LR) whereas the remaining ones could be considered as susceptible (S).

d) Overall of cereal aphids:

Genotype no. 1 (Giza 168) achieved moderate resistant (MR), genotypes no. 3, 7, 10, 11, 14, 15 and 16 appeared as low resistant (LR), genotype no. 6 was highly susceptible (HS), while the rest of the genotypes could be considered as susceptible (S). Also, it is obvious from data in Table 6 that all wheat genotypes were more preferrable to *R.padi* than *S. graminum* and *R. maidis,* except for wheat genotype no. 9 (Sakha 94) which was more acceptable to *S. graminum.* The present

results are in line with the findings of Ali *et al.* (1985) who reported that the rates of aphid reproduction (*R.padi, S. graminum* and *R. maidis)* varied according to wheat variety. Bush *et al.*(1989) found that reproductive capacity of Russian wheat aphid, *(Diuraphis noxia* Mordvilko) was affected by wheat variety. Dedryver and Pietro (1986) found significant differnces among 15 winter wheat cultivars and lines for *R.padi* and *S. avenae.*

In Egypt Hafez *et al.* (1994) screened 10 local and exotic wheat genotypes for aphid infestations in the field, two of these genotypes were susceptible, three genotypes were highly susceptible and little susceptibility was detected in two genotypes while three genotypes were resistant. Al-Suhaibani (1996) studied seasonal abundance of *R. padi* on 12 elite wheat lines and found that densities of *R.padi* were much higher on all tested wheat lines than those of *S. graminum.* He added that densities of *S. graminum* were lower on durum than bread wheat lines while the opposite was true for *R.padi* (densities of *R.padi* were lower in bread than durum wheat). Abdel-Hafez and El-Hagag (1999), screened 11 cultivars for resistance to *R.padi, S. graminum and R. maidis* during two seasons in Upper Egypt. They found that two cultivars were moderate resistance, five were low resistant and four were susceptible. Abou- Elhagag *et al.* (2001), found that durig the evaluation of 10 wheat varieties in Upper Egypt, Sakha 69 was susceptible and attracted high numbers of cereal aphids. Nassef *et al.* (2002), stated that the wheat varieties Sakha 69 was the more susceptible to cereal aphids infestatios than Sakha 61. Niraz *et al.* (1985), found that more resistant winter cultivars wheat showed a higher level of yellow-orange pigments and lower chlorophyll content than the less resistant ones. The leaves of susceptible cultivars had the highest sucrose levels, and the numbers of aphids were directly proportional to the total free amino acid content. High levels of resistance were associated with free phenol content in the tissues and also associated with a high toxicity index (the ratio of free phenol content to free amino acid content). Infestation was inversely proporational to the structural polysaccharide content (cellulose, hemicelluloses and pectins). Leszczynski *et al.* (1985) mentioned that preference for winter wheat cultivars was negatively proportional to

the level of phenolic compounds occurring naturally in the plants. He also stated that dihydroxyphenols inhibited feeding of R.padi and Sitobion avenae (F) on winter wheat cultivars.

4- **Correlation coefficient between grain yield under Aphids infestation and grain yield under control, total cereal aphids and grain yield Losses %.**

According to the obtained data in table (7), there was a highly significant correlation between grain yield under natural aphids and grain yield under control (r =0.919**). Also, there was a highly negative significant .

Table, 7: Correlation coefficients for 16 genotypes between grain yield under Aphids infestation and each of grain yield under control, total cereals aphids and grain yield Losses %.

Characterss	Grain yield (control)	Total cereal aphids	Grain yield Lossess %.
Grain yield under Aphid	0.919**	-0.444	-0.837**

Correlation, between grain yield under natural aphids and grain yield losses % (r = -0.837**).

Finally, there was a negative correlation between grain yield under natural infestation and total cereal aphids (r = - 0.444). These results agree with those of El-Heneidy *et al.* (2003), who found a negative correlation between grain yields under natural infestation and the increase in aphids numbers / plant.

REFERENCES

Abdel- Hafez, N. A.,and G. H. A. El-Hagag (1999). Susceptibility of some wheat cultivers to infestation with cereal aphids in Upper Egypt. Assiut J. of Agric. Sci, 30 (3): 1-11.

Abou- Elhagag, G. H., A. M. A. Salman and M.H. Motowe (2001). Susceptibility of some wheat varieties to cereal aphid infestation under field conditions in Upper Egypt. Assiut J. Agric. Res. 32(4): 29-37.

Ali, A. A., A. S. Rajab and H. Al-Hussian (1985). Relative susceptibility of fifferent wheat varieties to aphid infestation Journal of Agriculture and water Resources Research. 4.25-39.

Ali, A. G and A. A. S. Ahmed (1996): Effect of plant density and nitrogen fertlization on the infestation of the wheat plants with cereal aphids.Assiut J. Agric. Sci., 27(2): 119-124.

Ali, A. G. (1979). Relationship between certain species of aphids and some cereal crops. M. Sc. Thesis, Fac. Agric., Assiut Univ., 123 pp.

Al-Suhaibani, A. M. (1996). Seasonal abudance of two cereal aphids *Rhopalsiphan padi (L.)* and *Schizaphis graminum* (Rondani) (Homopetra: Aphididae) on twelve elite wheat lines in Riyadh, Saudi Arabia. Arab Gulf Journal of Scientific Research, 14: 2, 405-4B.

Badulin, A. V. and A. V. Lomtev (1975). The role of cultural measures in reducing the numbers of the wheat blossom mote. Zashchita Rastenii 2: 31-32.

Boush, L., J. E. Slosser and W. D. Worrall (1989). Variations in damge to wheat caused by Russian wheat aphid (Homoptera: aphididae) in Texas. J. Econ. Entomol., 82: 466-471.

Cartier, J. J. (1963). Varietal resistance of peas to pea aphid biotypes unde field and grenbugs conditions. J. Econ. Entomol., 56: 205-213.

Chiang H. S. and N. S. Tolekar (1980). Idetification of source of resistance to the beanfly and two other agronomyzid flies in Soybean and mung bean. J. Econ. Entomol., 73: 197-199.

Dedryver, C. A., and J. P. DI Pietro (1986). Biology of cereal aphids in the west of France.VI. Comparative study of the development of field populations of *Sitobon avena, Metopolophium dirhodum (*WIK.*) and Rhopulosiphum padi(*L.*)* on different winter wheat cultivars. Agronomie, 6 (1): 75-84.

El-Heneidy, A. H., M. M. Ibraheem, Megahed,E., A .A. Attia,M. A. Ahmed, W. M. Abdel-Awal and M. M. Hassan (2003). Assessment of Economic of injury and threshold levels for key cereal species in Egyption wheat regions. Bull. Ent.Soc. Egypt, 29 (43): 43-56.

Ghanem H. Enyat, A. M. Tantawi, A. Abdel-Shafi, A. A. El-Sayed and Mitkees (1984). Assessment of losses in wheat grain yield due to aphid infestation 2 _nd General Conference of ARC. Giza: 9-11 April.

Gomez, K. A. and A. A. Gomez, 1984. Statistical procedures for agricultural research. Wiley – Inter science Publ. John Wiley and Sons Inc. New York, USA.

Hafez, A. A., E. F. El- khayat and M. M. M. Bakheet (1994). Screening of some local and exotic wheat wheat genotypes for aphid infestation and Egypt. Science, Moshtoher, 32: 1, 523-535.Ali, A.G.(1979): Relationship between certain species cereal crops. M. Sc. Thesis, Fac. Agric., Assiut Univ, 123 pp.

Kogan, M. 1982. plant resistance in pest mangement, introduction to insect pest mangement. R.L. Metcalf and W.H. Luckmann (Eds.) Wiley, New York: 44-93.

Kogan, M. and E. E. Ortman.1978. Antixenosis-a new term proposed to define painter,s Nonperference modality of resistance. Bulletin of the Entomological Society of America, 24: 175-196.

Leszczynki, B., J. Warchol and S. Niraz (1985). The influence of phenolic compounds on the perfermance of winter wheat. Insect Science and its Application. 6 (3): 157-158.

Nassef, A. M. A., E. M. E. Khalafalla, R.M. Salem and S.H. Mitri (2002). Abundance of aphids and associated parastoids in

wheat fields and its relation to yield at. kafr El-Sheikh. Tanta. J. Agric. Res. 28(4): 408-418.

National Bulletin of Wheat Research Program (2004), Bulletin No. 914, 31 pp.

Niraz. S., B. Leszezynski, A. Ciepiela, A. Urbanska and J. Warchol (1985). Biochemical aspects of winter wheat resistance to aphids. Insect Science and its Application, 6: 253-257.

Painter, M. D 1951. Insect Resistance in crop plants. The University press of Kansas. Lawrence, KA, 520pp.

Papp, M.and A. Mesterhazy (1993). Resistance to bird cherry –oat aphid (*Rhopalosiphum padi L.*) in winter wheat varieties. Euphytica, 67: 49-57.

Pathak, M. D. 1970. Genetics of plants in pest mangement. In Concepts of pest mangement. R.L. Rabb and W.D. Guthrie (Eds). Proceedings of a Conference of North Carolina State university. Raleigh. NC. 138-157.

Russell, G. E. (1978). plant breeding for pests and disease resistance. Butterworths, London, 485 pp.

Russell, W. A. (1972). Breeder look at host plant resistance for insec. Proceeding of North central branch of entomogical society of America, 27:77-87 (Abs).

Scott, G. E.; F. M. Davis, G.L. Bland ; W. B. Williams and S. B. King (1977). Host plant resistance is necessary for late planted corn Miss. Agric. For Exp. Stn. Res.Rep. 3, 13-40.

Soliman, M. A., E. A. M. Moftah and A. A. A. Abdel Naby (1985). Relation of certion cereal aphids to wheat plant density and nitrogen fertilization. Minia J. Agric. Res and Dev., 7 (2): 399-409.

Starks, K. J. and O. G. Merkle (1977). Low level resistance in wheat to greenbugs. J. Econ. Entomol., 70: 305-306.

Tantawi, A. M. (1985). Studies on wheat aphids in Egypt . II-Germplasm evaluation and crop loss assessment. Rachis. 4: 26-27.

Van Marrewijik,G. A. M and O. M. B. De Ponti. (1975). Possibilities and limitations of breeding for pest resistance.

Mededelingen van de fakulteit landbouwwete-nschappen, Pikkaniversiteit Gent., 40: 229-247.

Walker, P.T. (1983). Crop losses; the need to quantity the effects of pests, diseases and weeds on agricultural production. Agricultural, Ecosystem and environment. 9: 119-158.

تقييم بعض التراكيب الوراثية من قمح الخبز للاصابه بمن ألنجيليات تحت ظروف مصر العليا

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تم تقييم ودراسة حساسية ستة عشر صنفا و سلالة من قمح الخبز للأصابه بمن النجيليات في تجربتين حقليتين بمحطة بحوث شندويل – محافظة سوهاج خلال المواسمين الزراعيين ٢٠٠٤/٢٠٠٥، ٢٠٠٥/٢٠٠٦م في تصميم قطاعات كاملة العشوائية وأظهرت النتائج ما يلى :-

١- أن هناك اختلافا معنويا بين التراكيب الوراثية في كل من عدد أيام التزهير ووزن ١٠٠٠حبه وعدد السنابل في المتر المربع ومحصول الحبوب تحت ظروف ألاصابه بمن ألنجيليات والمحصول المقارن (الكنترول) وكذلك الحساسية للاصابة بمن ألنجيليات.

٢- كانت التراكيب الوراثية المبكرة فى ألتزهير تأوي اقل عدد من حشرات من ألنجيليات. بينما كان هناك نقص في وزن ألالف حبه للتراكيب الوراثية التى تأوي اكبر عدد من حشرات من ألنجيليات.

٣- أعطت التراكيب الوراثية محصول حبوب يتراوح من ١٢,٣٤الي ١٨,٠٧بمتوسط ١٥,٥٩ أردب /فدان وحققت التراكيب الوراثية أرقام (١، ١٦، ٨) أعلى محصول حبوب تحت ظروف ألآصابه بحشرة ألمن ومعاملة ألمقارنه (الكنترول).

٤- كان معدل الفقد في محصول حبوب نتيجة للاصابه بحشرة ألمن يتراوح مـــن ٤,٢٤ الى ٢١,٨٩ بمتوسط ٩,٣٨ % أردب /فدان مقارنة بالكنترول .

٥- وجد انه هناك تباين بين التراكيب الوراثية للحساسية للاصابة بمن ألنجيليات ورتبت في أربعة مجاميع هي :

ا- التركيب الوراثي رقم ١(جيزة ١٦٨) كان متوسط المقاومة لمن ألنجيليات.

ب- التراكيب الوراثية أرقام (٣، ٧، ١٠، ١١، ١٤، ١٥، ١٦) كانت منخفـضة المقاومة لمن ألنجيليات.

ج- يوجد كذالك سبعة تراكيب الوراثية حساسة للاصابة بمن ألنجيليـات أرقامهـا (٢، ٤، ٥، ٨، ٩، ١٢، ١٣) وتجذب عدد كبير من حشرات ألمن .

د- بينما كانت التركيب الوراثي رقم (٦) عالي الحساسية ويأوي اكبـر تعـداد مـن حشرات من ألنجيليات.ومن ناحيه وجد أن التراكيب الوراثية أرقام (٨، ٩، ١١) ، (٢) ، (١، ٢) تأوي أقل عدد من حشرات من ألـشوفان ، القمـح الاخـضر، أوراق ألذرة على ألتوالى.

٦- وجد من تقدير الارتباط انه هناك علاقة موجبة بين محصول حبوب تحت ألاصـابه بحشرة من ألنجيليات والمحصول المقارن (الكنترول) ، وكذألك هناك علاقة سـالبة بين محصول حبوب تحت ألاصابه بمن ألنجيليات والتعداد الكلي لحشرة ألمن.

يتضح من النتائج السابقة أن التركيب الوراثي رقم ١ (جيزة ١٦٨) كان افضل التركيب الوراثي لانه متوسط المقاومة لحشرة من ألنجيليات وعالي المحـصول تحـت ظروف ألآصابه وألمقارنة (الكنترول) لحشرة ألمن وكذا التبكير في ألتزهير ولذلك يفضل استخدامه في ألتربيه لتحمل ألاصابه بمن ألنجيليات .