SCREENING TEN BARLEY GENOTYPES FOR YIELDING POTENTIAL AND RESISTANCE TO APHID INFESTATION IN MIDDLE EGYPT.

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Abstract

Two field experiments were conducted in Mallawi Agricultural Research Station, El-Minia Governorate in Middle Egypt, during the two growing seasons 1994/1995 and 1995/1996 to evaluate ten introduced barley genotypes for high yielding potential and resistance to the corn leaf aphid (Ropalosiphum maidis F.). Local variety Giza 124 was used as check. The results revealed that three genotypes (No. 21, 22 and 62) were resistant to aphids. Genotypes No. 21 and 22 possessed high yielding potential with high resistance to aphids. The tallest genotype was No. 24, while the longest spike came from genotype No. 15. The heaviest grains was obtained from genotypes No. 10 and 15. Genotypes No. 21, 15, 62 and 22 had the highest tillering capacity as well as number of spikes/unit area and straw yield (ton/fed). Genotypes No. 10, 24, 21 , 22 and 27 proved high potentiality and moderate resistance to aphids under Middle Egypt conditions.

INTRODUCTION

Barley is considered one of the most suitable crops which can be grown over a wide range of variability and under many adverse conditions (Plisted, 1960, Mohamed *et al.*, 1978, El-Sayed *et al.*, 1992 and El-Bawab, 1994). Ambient air temperatures during grain filling and aphids infestation caused by Ropalosiphum maidis F. are considered the major factors reducing barley production in Middle and Upper Egypt (Noaman *et al.*, 1992). The main objectives of this study were developing high yield barley genotypes and a reasonable degree of aphid resistance.

MATERIALS AND METHODS

Two field experiments were conducted at the experimental farm of Mallawi Agricultural Research Station, El-Minia Governorate, during the two successive

growing seasons 1994/1995 and 1995/1996 to evaluate 10 barley genotypes previously selected in 1993/1994 season from the exotic materials (366 genotypes) for yielding potential and resistance to aphids in Middle Egypt. Plot size was 4.2 m2. The sowing date was 22nd of November in the two successive seasons. The experimental design was randomized complete blocks with three replications.

Table 1. Barley genotypes used as plant material in this study .

Entry number	Name and pedigree
1	Giza 124 (check variety)
5	Comp.Cr. 29/C63//Cr. 366. 15. 2/Nopal 'S'
10	Harmal - 01/Arar
15	Api/CM68//Mona/3/01/Asse/CM65/IW-B/4/Harmal-01
21	Lignee 527//BC/B95/3/Lignee 527H/Avt/Aths
22	ROD586/Nopal 'S'/3/Pm B/Aths//Bc
27	Assala-02//Bc
29	Rihane-03
61	Roho//Alger/Ceres, 362-1-1/5/Giza 121 ? CI 06248/4/APM/IB 65//11012/2/3/Api/CM 67/DS/Apr
62	Comp. Cr. 229/APM//Atem

Data recorded

1. Rate of aphids infestation (R.I.), estimated according to a scale of 5 scores, where.

1 = 0-25 2 = 26-50

3 = 51 - 100 4 = 101- 500

5 = more than 500 aphids/plant.

2. Percentage of infested plants/plot. Barley genotypes harbouring the least number of aphids (score 1) and lowest percentage of infested plants/plot (10% or less) were considered resistant. Standard analysis of variance using least significant differences (L.S.D) was performed to estimate the significant differences (Steel and Torrie, 1980).

3. Plant height (cm).

4. Spike length (cm).
5. Number of kernels/spike.
6. Spike kernels weight (gm).
7. 100 kernels weight (gm).
8. Number of spikes/one meter long.
9. Straw yield (ton/feddan).
10. Grain yield (ardab/feddan).

RESULTS AND DISCUSSION

Out of 366 barley genotypes originally screened in 1993/1994, ten genotypes exhibited varying degrees of resistance to aphid build up. Therefore, in an attempt to develop cultivars for Middle Egypt area, aphid resistance was given serious consideration.

The performance of the genotypes evaluated in the two successive growing seasons and the combined analysis are presented in Table 2. There were significant differences among the genotypes in all characters. Concerning the plant height and spike length, only one genotype (Genotype No. 24) exceeded the national check variety (Giza 124) significantly in the two growing seasons and the combined analysis, while for number of kernels/spike and spike kernel weight, non of the genotypes tested increased than the national check significantly. For 100-kernels weight, genotypes No. 10 and 15 had significantly heavier grains compared with the national check. Regarding the number of spikes/m long only, three genotypes No. 21, 62 and 15 had higher tillering capacity as well as number of spikes/m long significantly compared with Giza 124. On the other hand, straw yield of six genotypes (No. 21, 22,62, 61, 15 and 10) outyielded Giza 124 (national check) significantly. This is true because these genotypes had high tillering capacity. For grain yield, the results showed that genotypes No. 10 and 29 had the first rank in this respect (23.3 ardab/fed) followed by genotypes No. 21 , 22 and 27 being 22.5, 21.4 and 18.7 ardab/fed, respectively. This is not surprising because these genotypes had higher number of spikes/m long and 100 kernels weight compared to check (El-Bawab, 1994).

Regarding the effect of aphids on tested barley genotypes Table 3, the aphid

Table 2. Performance of 10 barley genotypes in Middle Egypt (1994/1995 and 1995/1996 and the combined analysis .

Entry number	Sea son	Plant height	Splike length	Number of kernel/spike	Spike kernel wt.	1000 ker-nel weight	Number of spike/m long	Straw yield (ton/fed)	Grain yield (ardab/ fed)
1	94/95	93.3	6.5	42.5	1.73	46.4	118.0	5.50	17.7
	95/96	103.3	6.4	48.9	1.55	36.2	103.3	6.23	14.2
	Comb.	98.3	6.5	45.7	1.64	41.3	110.7	5.87	15.9
5	94/95	90.0	6.9	34.4	1.55	42.5	94.0	4.77	15.7
	95/96	103.3	6.1	31.4	1.23	46.1	83.0	5.50	13.8
	Comb.	96.7	6.5	32.9	1.39	44.3	88.5	5.13	14.8
10	94/95	95.0	7.0	38.8	1.85	54.6	118.3	6.43	26.1
	95/96	83.3	7.2	37.0	1.80	51.6	106.3	7.43	20.5
	Comb.	89.2	7.1	37.9	1.83	53.1	112.3	6.93	23.3
15	94/95	91.7	8.0	30.3	0.93	45.6	151.7	6.10	21.0
	95/96	80.0	7.6	30.0	1.02	54.4	122.7	7.50	14.2
	Comb.	85.8	7.7	30.1	0.97	50.1	136.4	6.50	17.6
21	94/95	83.3	6.7	50.0	1.80	40.3	161.0	6.03	26.2
	95/96	82.3	4.9	35.8	1.21	35.8	103.3	8.73	18.7
	Comb.	82.8	5.8	42.9	1.51	38.1	132.2	7.38	22.5
22	94/95	85.0	6.5	36.6	1.10	34.2	133.0	6.63	23.2
	95/96	77.3	6.4	43.1	1.44	35.0	101.7	9.13	19.5
	Comb.	81.2	6.5	39.9	1.27	34.6	117.3	7.88	21.4
27	94/95	88.3	6.0	43.6	1.62	41.4	100.3	5.83	20.2
	95/96	91.7	6.1	47.6	1.80	41.2	98.0	6.07	17.3
	Comb.	90.0	6.1	45.6	1.72	41.3	99.2	5.95	18.7
29	94/95	100.0	6.2	42.8	1.75	43.8	107.7	6.57	24.7
	95/96	118.0	6.4	46.7	1.60	38.7	107.0	6.27	21.8
	Comb.	109.0	6.3	44.8	1.68	41.2	107.3	6.42	23.2
61	94/95	90.0	6.4	27.8	1.03	36.0	93.3	6.53	18.9
	95/96	96.7	7.8	22.2	0.93	46.6	110.7	7.33	15.2
	Comb.	93.3	7.1	25.0	0.98	41.3	102.0	6.93	17.1
62	94/95	88.3	6.0	39.2	1.42	42.5	138.3	7.90	16.2
	95/96	87.3	4.9	30.7	1.41	35.2	120.2	7.80	9.2
	Comb.	87.8	5.5	35.0	1.41	38.9	129.2	7.70	12.7
X	94/95	89.2	6.7	32.1	1.29	40.1	140.5	6.27	19.6
	95/96	91.1	6.4	31.2	1.25	42.9	117.9	7.37	15.3
	Comb.	90.2	6.5	31.7	1.28	41.5	129.7	6.82	17.4
S.D.	94/95	13.6	0.8	4.6	0.31	8.15	27.8	1.11	2.9
	95/96	10.4	1.2	3.7	0.48	5.32	29.3	1.16	3.1
	Comb.	8.4	0.7	2.9	0.35	4.72	19.7	0.78	2.1
	94/95	9.12	7.32	8.86	14.47	16.90	111.55	10.5	8.76
C.V.	95/96	6.83	11.32	7.28	19.19	7.38	14.84	9.42	12.2
	Comb.	8.03	9.42	8.11	16.90	10.14	13.04	9.94	10.29

infestation was relatively low on barley in the first season compared with the second season. The level of infestation ranged from 1 to 3 on the 1-5 scale. However, out of 366 tested genotypes only two genotypes No. 21 and 22 were free of aphids exhibiting high level of resistance followed by genotype No. 62 which had RI = 1 and percentage of infested plants per plot being 3.3%. Two genotypes (No. 61 and 15) gave score 1.5 and had 23.4 and 26.7% infestation/plot, so these genotypes were considered moderatly resistant to aphids. Genotypes No. 5, 29, 10 and 27 had score ranged from 2.4 to 2.9 and had percentage of infestation ranging from 15.9 to 50.0%. On the other hand, 57 genotypes suffered from high aphid attack with score 4 and these could be considered as highly susceptible. Several authors, however, dealt with screening barley genotypes for aphid resistance.

Hormchang and Wood (1963) suggested that the gene-pair responsible for S.graminum resistance in barley was apparently different from the pair that impact resistance to R. maidis. Webster and Starks (1984) stated that great resistance and tolerance were considered together resistance to aphids in barley has been attributed to either physical factors, e.g. thickness of schlerenchyma cells and number of vascular bundles (El-Serwiy *et al.*, 1985) or surface wax on the leaves (Tsumuki *et al.*, 1987).

From this study we concluded that genotypes No. 21, 22 and 62 can be used as a source of aphid resistance in the breeding program. Also, genotypes No. 10, 29, 21, 22 and 27 proved high yield potentiality under Middle Egypt conditions.

Table 3. Rate of infestation with aphids (R.I.) and percentage of infested barley plants per plot at two successive growing seasons and the combined analysis .

Entry number	Rate of infestation with aphids (R.I.)			% of infested plants/plot		
	94/95	95/96	Comb.	94/95	95/96	Comb.
1	3.0	2.5	3.3	75.0	50.0	62.5
5	2.7	2.0	2.4	53.3	23.3	38.3
10	2.7	2.7	2.7	6.7	25.0	15.9
15	1.0	1.7	1.4	13.3	40.0	26.9
21	1.0	1.0	1.0	0.0	0.0	0.0
22	1.0	1.0	1.0	0.0	0.0	0.0
27	3.0	2.7	2.9	13.3	53.3	33.3
29	2.0	3.0	2.5	70.0	30.0	50.0
61	1.0	2.0	1.5	16.7	30.0	23.4
62	1.0	1.0	1.0	6.7	0.0	3.3

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غربلة بعض التراكيب الوراثية للشعير للمحصول العالى والمقاومة للإصابة بحشرة المن

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تم تقييم أولى لـ٣٦٦ تركيب وراثى مستورد من الأيكاردا عام ١٩٩٣ / ١٩٩٤ من حيث المحصول العالى والمقاومة للإصابة بحشرة المن وأنتخبت منها عشرة أصناف تم زراعتها فى موسمين متتاليين (١٩٩٤ / ١٩٩٥ و ١٩٩٥ / ١٩٩٦) لتأكيد النتائج ونفذت هذه التجارب فى محطة ملوى للأبحاث الزراعية التابعة لمحافظة المنيا.

وقد أوضحت النتائج ما يلى :-

* أظهرت السلالات أرقام ٢١ ، ٢٢ ، ٦٢ مقاومة كبيرة للإصابة بحشرة المن.

* أعطى التركيبين الوراثيين أرقام ٢١ ، ٢٢ كفاءة محصولية عالية بالإضافة إلى المقاومة العالية لحشرة المن (من الذرة R.maidis).

* أعطى التركيبين الوراثى رقم ٢٩ أطول نباتات فى حين أعطى التركيب الوراثى رقم ١٥ أطول سنابل.

* أعلى وزن للألف حبة جاء من التركيين الوراثيين (١٠ و ١٥).

* التركيبات الوراثية أرقام ١٥ ، ٢١ ، ٦٢ أظهرت أعلى معدل للتفريع فى وحدة المساحة وكذلك أعلى محصول قش/طن للفدان.

* بينت النتائج المتحصل عليها تفوق التراكيب الوراثية ١٠ ، ٢٩ ، ٢١ ، ٢٢ و ٢٧ من حيث محصول الحبوب بالمقارنة بالصنف التجارى رقم ١ (جيزة ١٢٤)، وكذلك أظهرت مقاومة متوسطة لحشرة المن وذلك تحت ظروف منطقة مصر العليا.