SCREENING FOR RESISTANCE TO SCHIZAPHIS GRAMINUM (ROND.) AND RHOPALOSIPHUM PADI (L.) IN CEREAL CROPS.

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Abstract

Resistance to S.graminum and R.padi is scarce in durum and hexaploid wheat and only found in wheat-rye translocation lines and some related wild species, i.e. Aegillopes species. Four screening methods for resistance and for tolerance to aphids S.graminum and R.padi in cereals are described in this and previous papers (Youssef *et al.*, 1994). Field and greenhouse tests were conducted at Shandaweel Research Station, known to be an aphid hot spot, and at the greenhouse at Giza, ARC as well.

In field screening at Shandaweel, 22 wheat lines were grown in two large yield trials (Twelve rows, 3 reps.) and screened for resistance to aphids since 1990 through 1995. Two wheat lines developing in our program proved to be resistant though with a little increase in hight, and five lines No. 3,5 and 7 (exp. 1) and 4,9 (exp. 2) were unique in combining tolerance to R.padi with high yield and medium height and could be released as new lines. 52 wheat lines were grown in two small yield trials (6 rows, 3 reps.) and screened for resistance to S.graminum/ R.padi since 1992 and through 1995. 7 lines proved to be semi-resistant and 6 lines were tolerant. 130 lines also, were grown in 6 rows and 3 reps. Since 1992 through 1995, 26 lines proved to be fairly resistant and 30 lines were tolerant.

3-4 cycles of selfing and selection were sufficient to combine resistance with medium height and high grain yield.

420 lines grown in one row (3.5 m) were screened also for aphid resistance. 70 lines exhibited high level of resistance. However, the latter two sets will be confirmed by another test. A green house study was conducted in 1995/1996 season to identify possible sources for resistance to S.graminum/ R.padi. Out of 1042 wheat lines from completely new crosses, 15 lines proved to be resistant at the seedling stage and 12 were tolerant.

INTRODUCTION

Sources for resistance to S.graminum and/R.padi in durum and bread wheat are rare and can only be found in wild wheat relatives and related crops.

They were discovered among Aegilopes species, Aegilopex x durum ploids wheat-rye transloction lines and scale cereal (Youssef *et al*, 1994). Tylor *et al.*, (1987) designated five genes GB1, GB2, GB3, GB4, GB5 conferring resistance to biotypes A,B,C,D and E from the wheat resistant sources DS 28A, Amigo, Largo, CI 17959 an CI 17882, respectively. Two new biotypes from the greenbug, G and H were detected since then. Sources of resistance to biotypes E, e.g. Largo (GB3) and CI 1201-1205 conferred resistance to biotype. New sources for resistance such as GRs were developed. GRs 1201 was developed from an alien substitution line derived from wheat x rye crosses. Spikes from alien substitution line were x - rayed and used to pollinate TAM 105. The development of new biotypes in S.graminum itself and R.padi infestation represent challenge to the entomologists and breeders. Resistance, however, is often under monogenic control and as a result, insect population is negligible in number. However, if any individual insect with virulent gene at the locus corresponding to the resistant gene of the host will have a selective advantage and can multiply rapidly, thus develops a new biotypes that renders a new resistant cultivar susceptible. On the other hand, tolerance includes all plant responses resulting in the ability to withstand infestation and to support insect population. From a breeding point of view tolerance has less impact on yield and quality inspite of the presence of intense aphids population, since it allows normal aphid reproduction but with reduced crop losses.

MATERIALS AND METHODS

200 wheat lines produced from our aphid program were divided into 4 groups, according to the advanced cycle of selfing and selection, and were tested in 5 different experiments using a complete randomized block design conducted at Shandaweel Research Station. 22 different wheat varieties and lines were tested in two large yield trials, each entry was grown in 12 rows and 3 replicates. 47 wheat varieties and lines were tested in two small yield trials, 6 rows and 3 replicates each. On the other hand, 132 wheat varieties and lines were tested in one yield trial (6 rows and 2 reps.) and also, 420 lines grown in single rows 3.5 m long were also tested. Wheat

lines were developed, however, from crosses between 2 wheat-rye translocation lines namely, Bushland/Amigo T 101 and Bushland/Amigo T 105 and each of the three commercial varieties G. 157, Sakha 61 and Sakha 69 selected from selfed BC3. Finally, 1042 wheat lines were subjected to seedling tests for resistance to the greenbug under heavy artificial infestation in the greenhouse at Giza. These lines were produced from crosses between each of the two translocation lines and the newly released cvs Giza 160, Giza 162, Giza 164 and Giza 165 selected from selfed BC2. Contrary to 1994, natural aphid infestations at Shandaweel in 1995 was quite satisfactory.

1. Field screening technique

The reaction of plants exposed to insect attack is usually measured at the proper stage of plant growth and the highest combination of insect population. Visual counting by the estimate of the percentage of plant area occupied by aphids or by the actual measurement of the damage caused by direct feeding of the greenbug were the criteria used for estimation.

1.1. Field screening scale

We went through the following scale while wheat plants were at the adult stage :

0-10 % of the leaves are occupied with aphids = resistant

10-20 % of the leaves are occupied with aphids = fairly - resistant

20-30% of the leaves are occupied with aphids = semi - resistant

30-40% of the leaves are occupied with aphids = semi - susceptible

More than 40% = susceptible.

1.2. Field tolerance test

Varieties or lines that exhibit little or no yield losses under heavy aphid infestation compared with susceptible varieties, which are largely destroyed, are considered tolerant.

Single lines of tested material were grown in one row each 3.5 m long in the field at Shandaweel under heavy infestation pressure.

Infested plants, within one row, vigorous, exhibiting large number of tillers, spikes, and large dense spikes and well filled with heavy 1000 kernel weight and medium height morphologically evaluated were compared to known susceptible variety supporting similar aphid population density.

2. Laboratory screening technique

2.1. Mass rearing

The two aphid species were mass-reared as two separate clean cultures in the greenhouse under controlled conditions (20 ± 0.5°C, 50% ± 5 RH and 16-8 h light/ dark periods). The mother cultures were collected from wheat fields grown at Giza research station.

2.2. Screening the test material

Metal galvanized trays of 30x60x6 cm were used for screening tests of wheat. Each tray contained 10 rows (30cm long and 6 cm apart and 15-20 seeds/ row). A susceptible variety was planted randomly among the tested material at each tray. The trays were placed at the testing room under controlled conditions (20±0.5°C, 50% ± 5 RH and 16-8 h light/dark periods).

2.2.3. The greenbug scale

The seedling reaction was scored 14 days after artificial infestation, the scale is as follows:

0 = no injury

1 = red spots with black centers.

2 = enlargement of red spots and appearance of yellow colour.

3 = yellow patches around leaf blades.

4 = Spreading of the yellow colour on the whole leaf.

5 = (1-2) leaves are dead.

6 = the whole plant is killed.

2.2.4. R.padi scale

The oat aphid, however, does not cause visible symptoms owing to direct feeding on the leaves, i.e. there is no toxic saliva or obvious damage syndromes. So, we took insect population increase as a measure for susceptibility. Number of aphids found on seedlings was counted 10 days after initial of artificial infestation with fixed number of aphids on each plant (2 insects/seedling) was adequate for classifying tested lines (Youssef *et al.*, 1994).

2.2.5. Greenhouse tolerance test

The tested varieties were randomizely grown in metal trays artificially infested soon after emergence. Aphids were allowed to move freely between the va-

rieties to simulate field conditions.

Plants (varieties or lines) which were destroyed within two weeks were rated as susceptible, whereas those that harboured aphids without being dead were tolerant ones.

RESULTS

Date were consistent from season to season except of some variation in the level of reactions to aphids in particular to resistant or semi-resistant lines which could be due to differences in visual scaling or to fluctuation in environmental conditions, Tables 1 and 2. Aphid colonies were a mixture of the two species; *R.padi* and *S.graminum* .

Reaction to aphids was often higher especially at the margin of each entry. Loding also affected the reaction against R.padi since the expression of resistance was decreased when resistant tall lines lodged. Entries were judged for their reaction to aphids according to the highest infestation recorded. Entries were divided into three categories as follows :

Table 1. Aphids reaction for some wheat lines selected from selfed BC3/BC4 grown in yield trials at Shandaweel Res. Station from 1990 through 1995 (Exp. 2).

Ser.	Pedigree	R. padi field reaction			
		1990	1992	1993	1995
1	Bush/Amigo T 101 x Sakha 69	10	10-15	20	15-20
2	Bush/Amigo T 101 x Sakha 69	10-20	10-20	20-30	20
3	Bush/Amigo T 101 x Sakha 69	30-40	30-40	60-70	50-70
4	Bush/Amigo T 101 x Sakha 69	20-30	20-30	50	30
5	Bush/Amigo T 101 x Sakha 69	30-40	30	50-60	30
6	Bush/Amigo T 105 x Sakha 69	30-40	40-50	50-60	50
7	Bush/Amigo T 105 x Sakha 69	20-30	20-30	50-60	100
8	Bush/Amigo T 105 x Sakha 69	20-30	20-30	50-60	50-70
9	Bush/Amigo T 105 x Sakha 69	20-30	20-30	50-60	50-70
10	Sakha 69	20-30	20-30	50-60	50-70
11	Sakha 69	40-50	50	40-50	50-70
12	Giza 164				50-60

1. Fairly resistant lines hosting a range from 10-20% aphids, such as lines Nos. 1 and 2 (exp. 2, table 5), thus confirming the results of previous data. After two more cycles of selfing and selection of BC3, selected single rows consisting of resistant or tolerant vigorous plants were grown in 1995 in 6 rows and two replicates each. Out of the 130 lines screened for resistance to R.padi, 26 lines exhibited good level of resistance (each hosting from 10-20% aphids).

Table 2. Aphids field reaction to some wheat lines resistant to S.graminum and selected from selfed BC3/BC4 grown in yield trials from 1990 through 1995 (Exp. 1).

Ser.	Pedigree	R. padi field reaction			
		1990	1992	1993	1995
1	Bush/Amigo T 101 x Sakha 69	40-50	30	40-60	30-40
2	Bush/Amigo T 101 x Sakha 69	40-50	40	60-70	50
3	Bush/Amigo T 101 x Sakha 69	20-30	40	60-70	40-50
4	Bush/Amigo T 101 x Sakha 69	40-50	60	50-60	40
5	Bush/Amigo T 101 x Sakha 69	30-40	50	50-70	20-30
6	Bush/Amigo T 101 x Sakha 69	20-30	40	60-80	50
7	Bush/Amigo T 101 x Sakha 69	30-40	50	50-60	70
8	Bush/Amigo T 105 x Giza 157	30-40	60	60-70	50
9	Sakha 69	50-60	70	60-70	70-80
10	Giza 164				60-70

2. Moderately resistant exhibiting medium level of resistance (hosting 20-30% aphids) such as lines 5 (exp. 1, Table 4 and exp. 2, Table 5), 1, 3, 6 and 13 (exp. 3, Table 6). In addition, around 30 lines out of the 130 (exp. 5) tested were also semi-resistant.

3. Moderately susceptible and susceptible include the rest of the lines in the 5 experiments under study.

Grain yield

Statistical analysis of the data on grain yield indicated that there is significant difference among lines in each experiment conducted at Shandaweel in 1990 through

1995. Accordingly, lines of the five experiments tested can be divided in the following:

Table 3. Reaction of selected wheat lines and check variety Giza 157 againts *Schizaphis graminum* at the seedling stage in the greenhouse.

Ser.	Pedigree	Reaction type												
		1	2	3	4	5	6	7	8	9	10	11	12	13
1	Giza 164xGerman 3/531/1	1	1	1	1	1	1	1	1	1	1	1	1	
2	Giza 164xGerman 10/589/1	1+	1	1+	1	1+	1	1+	1+	1	1	1	2	
3	Giza 164xGerman 10/589/1	1	1	1	2	1								
4	Giza 164x Largo	1	1	1	1	1	1	+	1	1	1	1	2	
5	Giza 164xBush./Amigo T 105/864/3	1+	1+	1+	1	1+	1	2	2	1				
6	Giza 164xBush./Amigo T 101/863/1	1	1	1	1	1	1	1++	1+	1+	1+	2		
7	Giza 164xBush./Amigo T 101/854/1	1	1	1	1	1	1	1	1	2				
8	Giza 164xBush./Amigo T 101/856/1	1	1	1	1	1	1	1	2					
9	Giza 164xBush./Amigo T 105/856/1	1+	1+	1+	1	1+	1+	1+	1+	1+	1+	1+		
10	Giza 164xBush./Amigo T 101/884/4	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	1+	2	
11	Giza 164xBush./Amigo T 101/889/1	1+	1+	1+	1+	1+	1++	1++	1++	1+	1+	1+		
12	Giza 164xBush./Amigo T 101/890/1	1+	1+	1+	1+	1+	1++	1+	1+	2	1+	1+		
13	Giza 164xBush./Amigo T 101/861/1	1	1	1	1+	1+	1+	1+	1+	1+	2	1+	1	1
14	Giza 164xBush./Amigo T 101/861/2	1	1	1	1	1	1+	1+	1+	1+	1+	1+	1+	1
15	Giza 164xBush./Amigo T 105/863/1	1	1	1	1	1	1	1	1	1	1+	1	1	

1. Lines exceeded the recurrent variety Sakha 69 significantly such as lines 3 (1990, 1994 and 1995), 7 (1992, 1993 and 1994), 8 (1990,1992, 1993) of experiment 1, Table 5. Lines 4 (1992,1993,1995), 9 (1990,1993,1994) of experiment 2, Table 6. Lines 1,2,6,8,12 and 13 (in two seasons) of experiment 4, Table 7. Lines 8,10,12,22,23 and 25 (1993,1995) of experiment 4, Table 8. Lines 34,35, 51, 67, 78, 85, 89, 112 and 131 experiment 5.

Combining the data on aphid reaction with those on grain yield it can be concluded that the fairly resistant lines Nos. 1 and 2 were equal to the recurrent variety in grain yield in 1990, 1992, 1993 and 1994. The semi-resistant line 4 significantly outyielded Sakha 69 in grain yield (1992, 1993, 1995) and the semisusceptible line 9 also significantly exceeded Sakha 69 (1990, 1992, 1993, 1994).Exp.2, Table 6, line 3 hosting 40-50% aphids (semi-susceptible) significantly outyielded Sakha 69 in grain yield (1990, 1994, 1995) and lines 7 and 88 hosting 50-70% aphids signifi

Table 4. Field reaction to aphids and grain yield of some wheat lines resistant to S.graminum at the seedling stage and from selfed BC3/BC4 in large yield trials in 1995 at Shandaweel Research Station.

Ser.	Pedigree	R.padi reaction 1995	Grain yield (kg/plot)				
			1990	1992	1993	1994	1995
1	Bush/Amigo T 105 x Sakha 69	30-40	0.88	1.04	0.38	1.43*	5.57
2	Bush/Amigo T 105 x Sakha 69	50	0.82	1.22**	0.37	1.51**	5.23
3	Bush/Amigo T 105 x Sakha 69	40-50	1.00*	1.09	0.48	1.39*	6.16*
4	Bush/Amigo T 105 x Sakha 69	40	0.96*	1.08	0.62*	1.50**	4.80
5	Bush/Amigo T 105 x Sakha 69	20-30	0.98*	0.95	0.59	1.22	6.18*
6	Bush/Amigo T 101 x Sakha 69	50	0.75	0.82	0.48	1.35	5.42
7	Bush/Amigo T 101 x Sakha 69	70	0.88	1.18*	0.62*	1.46*	4.76
8	Bush/Amigo T 105 x Giza 157	50	0.94*	1.41*	0.68*	1.01	4.45
9	Sakha 69	70-80	0.83	0.96	0.55	1.21	5.37
10	Giza 164	70		0.65		1.00	5.89

cantly exceeding Sakha 69 in grain yield in 1992, 1993, 1994 and 1990, 1992, 1993 respectively Exp. 1, and could by considered tolerant.

The semi-resistant lines 1,2,3,4,6,8 and 13 of experiment 3 significantly outyielded Sakha 69 in grain yield in two seasons out of three. Lines 1,3 in 1994 and 1995; lines 2,4, 13 in 1993 and 1995 and lines 6,8,12 in 1993 and 1994, Table 7. The semi-susceptible lines Nos. 8, 10,12,22,23 and 25 of experiment 4 also significantly exceeded Sakha 69 in grain yield (in 1993 and 1995), Table 8. The fairly resistant lines Nos. 42, 43, 84, 85, 87 and 119 (hosting 10-20% aphids) of experiment 5 significantly outyielded Sakha 69 in grain yield in 1995. Lines 42, 43 and 119 are medium tall, while lines 84, 85, 89 are medium in height. The semi-resistant lines Nos. 34, 35, 39, 67, 112, (hosting 20-30% aphids) of experiment 5 outyielded significantly Sakha 69 in grain yield. In addition, 15 lines exhibited medium level of resistance significantly outyielded the recurrent parent, 6 out of them exceeded Sakha 69 at the 1% level.

DISCUSSION

It is well known that aphid distribution on most plants is far from uniform and varies with the aphid species race, the host plant and its stages of growth and matu-

Table 5. Field reaction to aphids and grain yield of some wheat lines from selfed BC3/BC4 grown in large yield trials at Shandaweel Research Station in 1995.

Ser.	Pedigree	R.padi reaction 1995	Grain yield (kg/plot)				
			1990	1992	1993	1994	1995
1	Bush/Amigo T 101 x Sakha 69	20	0.82	1.22	1.01	0.57	2.97
2	Bush/Amigo T 101 x Sakha 69	20	0.89*	1.29*	1.09	0.57	3.03
3	Bush/Amigo T 101 x Sakha 69	50-70	0.83*	1.22	1.12	0.66*	4.34
4	Bush/Amigo T 101 x Sakha 69	30	0.68	1.29*	1.43**	0.53	5.24
5	Bush/Amigo T 101 x Sakha 69	30	0.67	1.15	12.39*	0.67*	4.90
6	Bush/Amigo T 105 x Sakha 69	50	0.73	1.34*	1.21	0.56	4.48
7	Bush/Amigo T 105 x Sakha 69	100	0.78	1.09	1.25	0.66*	4.47
8	Bush/Amigo T 105 x Giza 157	50-70	0.98*	1.06	1.26	0.60	4.75
9	Bush/Amigo T 105 x Giza 157	50-70	0.89*	1.43*	1.37*	0.64*	5.23
10	Bush/Amigo T 105 x Giza 157	50-70	0.65	0.87	1.09	0.65*	4.53
11	Sakha 69	70-90	0.78	0.30	1.06	0.53	5.46
12	Giza 164	70-90	--	0.68	0.95	0.68	5.02

Table 6. Field reaction to aphids and grain yield of some wheat lines from selfed BC3/BC4 grown at Shandaweel Research Station in 1995.

Ser.	Pedigree	R.padi reaction 1995	Grain yield (kg/plot)		
			1993	1994	1995
1	Bush/Amigo T 101 x Sakha 69	20-30	0.621	1.826*	1.51**
2	Bush/Amigo T 101 x Sakha 69	30	0.637*	1.143	1.54**
3	Bush/Amigo T 105 x Sakha 69	30-40	0.595	1.660*	1.45
4	Bush/Amigo T 101 x Sakha 69	20-30	0.673*	1.620	1.39
5	Bush/Amigo T 101 x Sakha 69	30	0.617	1.405	1.09
6	Bush/Amigo T 101 x Sakha 69	20-30	0.643*	1.728**	1.31
7	Bush/Amigo T 101 x Sakha 69	40	0.627	1.985**	1.23
8	Bush/Amigo T 101 x Giza 157	50	0.746**	1.882**	1.39
9	Bush/Amigo T 105 x Giza 157	70	0.543	1.825**	1.29
10	Bush/Amigo T 105 x Giza 157	40-50	0.638*	1.215	1.09
11	Bush/Amigo T 105 x Giza 157	50	0.641	1.753**	1.23
12	Bush/Amigo T 105 x Giza 157	50	0.648*	1.795**	1.32
13	Bush/Amigo T 105 x Giza 157	20-30	0.714**	0.880	1.61**
14	Bush/Amigo T 105 x Giza 157	50	0.532	1.305	1.21
15	Giza 164				1.47

Table 7. Reaction against aphids and grain yield for some wheat lines selected from advanced selfing BC3/BC4 grown in small yield trials at Shandaweel 1995.

Ser.	Pedigree	R.padi reaction 1995	Grain yield (kg/plot)		
			1993	1994	1995
1	Bush/Amigo T 101 x Sakha 69	60-70	0.747*	1.089	1.370
2	Bush/Amigo T 101 x Sakha 69	60-70	0.439	1.300	1.260
3	Bush/Amigo T 101 x Sakha 69	70	0.853**	1.331	1.030
4	Bush/Amigo T 101 x Sakha 69	70-80	0.582	1.440	1.300
5	Bush/Amigo T 101 x Sakha 69	70-70	0.815**	1.150	1.340
6	Bush/Amigo T 101 x Sakha 69	70	0.732**	1.173	1.060
7	Bush/Amigo T 101 x Sakha 69	70	0.860**	1.093	1.310
8	Bush/Amigo T 101 x Sakha 69	60-70	0.688	1.296	1.600*
9	Bush/Amigo T 101 x Sakha 69	40-50	0.911**	1.228	1.480
10	Bush/Amigo T 101 x Sakha 69	60	0.836**	1.285	1.540
11	Bush/Amigo T 101 x Sakha 69	60	0.842**	1.296	1.460
12	Bush/Amigo T 101 x Sakha 69	70	0.806**	1.426	1.710
13	Bush/Amigo T 101 x Sakha 69	70	0.807**	0.555	1.240
14	Bush/Amigo T 101 x Sakha 69	70	0.737**	1.193	1.080
15	Bush/Amigo T 101 x Sakha 69	70	0.775**	1.450	1.440
16	Bush/Amigo T 101 x Sakha 61	70	0.556	1.526*	1.420
17	Bush/Amigo T 101 x Sakha 61	50-60	0.593	1.446	1.190
18	Bush/Amigo T 101 x Sakha 61	40-50	0.507	1.412*	1.250
19	Bush/Amigo T 101 x Sakha 61	40-50	0.578	1.471*	1.120
20	Bush/Amigo T 101 x Sakha 61	60-70	0.573	1.391	1.530*
21	Bush/Amigo T 101 x Sakha 69	60-70	0.530	1.218	1.100
22	Bush/Amigo T 101 x Sakha 69	70	0.667*	1.235	1.390
23	Bush/Amigo T 101 x Sakha 69	70	0.675*	1.395	1.320
24	Bush/Amigo T 101 x Sakha 69	70	0.466	1.620**	1.100
25	Bush/Amigo T 101 x Sakha 69	40-50	0.362	1.631	1.380
26	Bush/Amigo T 101 x Sakha 69	40-50	0.510	1.420	1.230
27	Bush/Amigo T 101 x Sakha 69	40-50	0.629	1.558**	1.000
28	Bush/Amigo T 105 x Sakha 69	40-50	0.690	1.436	1.320
29	Bush/Amigo T 101 x Sakha 69	40-50	0.582	1.451	0.850
30	Sakha 69	50-60	0.511	1.358	1.140
31	Giza 164	40-50	0.740	1.114	1.500

ration. So, there may be various problems encountered which Heathcote (1972), Hughes (1972) and Vickerman and Wratlen (1979) have discussed and described various techniques utilized for the evaluation of aphid populations on plants. These

techniques should serve as useful guides for screening plant germplasm for resistance to aphids.

Wood (1961) and Johnson *et al.* (1976) however, have presented more specific information for screening techniqe for evaluating resistance of small grains. Schveissing and Wilde (1979) have focused on the necessity of evaluating plants for resistance in the absence of natural infestations, that mass-rearing of aphids must be carried out to supply insects for artifical infestation and that the greenhouse tests should be conducted with uniform illumination, temperature, water and fertilizers.

On the other hand, Watson and Dixon (1984) stressed on the importance for controlling infestation rates so that aphid population pressure does not destroy or obscure potential germplasm sources, and that results from greenhouse tests must be confirmed under field conditions. However, small grain such as wheat, oats, *Avera* spp., barley and rye, secal cereal are infested by several aphid species, and the most serious of these are the greenbug and the cherry bird oat aphid, R.padi. Auclair (1989) described the feeding damage caused by the greenbug, and found that some of the wheat and rye varieties showed a high degree of resistance, but several, especially some T.durum types were considerably more tolerant than varieties grown commercially.

Arriaga and Back in 1956, had observed resistance to *S.graminum* in rye and in T.tusechii and registered a resistant rye cultivar, insave F.A. Wood *et al.* (1974) however, developed cv Gaucho and octopolid triticale developed from a cross between the susceptible Chinese spring wheat and cv, Insave F.A. and were resistant to biotype (c) of the greenbug.

Cultivar Amigo wheat germplasm, released in 1977 was found when the source of resistance in cv. Insave F.A. was translocated using X-rays.

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الإنتخاب لصفة المقاومة لحشرتى من القمح الأخضر S.graminum ومن الشوفان R.padi فى المحاصيل النجيلية

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صفة المقاومة لحشرتى من القمح، من الشوفان نادرة الوجود فى الأقماح الصلدة، الأقماح السداسية إلا أنها وجدت فى السلالات الناتجة من القمح، الراى وبعض الأنواع البرية كالأجولبس. وفى هذا البحث تم تحديد أربعة طرق يمكن بها تقييم صفة المقاومة وقدرة التحمل بالنسبة لحشرتى من القمح ومن الشوفان وذلك تحت الظروف الحقلية فى محطة بحوث شندويل بالإضافة إلى التجارب المعملية بصوبة المن بالجيزة. حيث أستخدمت ٢٢ سلالة من القمح فى تجربتين مكبرتين (١٢ صنف، ٣ مكررات) تم تقييمها منذ ١٩٩٠ حتى ١٩٩٥، وقد تم التحصل على سلالتين من القمح ثبت مقاومتهما لحشرة المن بالإضافة إلى ظهور ٥ سلالات تتميز بأنها اكثر تحملاً للاصابة بمن الشوفان وتتميز هذه السلالات بارتفاع بسيط فى أطوالها مع إرتفاع محصولها ويمكن إستخدامها كسلالات جديدة. كما تم زراعة ٥٢ سلالة من القمح فى تجربتين مصغرتين (٦ صفوف ، ٣ مكررات) منذ عام ١٩٩٢ حتى ١٩٩٥ تم التحصل منها على ٧ سلالات وجد أنها شديدة المقاومة للإصابة بحشرتى من القمح، من الشوفان، ٦ سلالات لها قدرة على التحمل بالإضافة إلى إنماء ١٣٠ سلالة (٦ صنف ، ٣ مكررات) خلال عام ١٩٩٢ حتى ١٩٩٥ ثبت وجود ٢٦ سلالة ذات درجة مقاومة عالية، ٣٠ سلالة أخرى ذات صفة تحمل.

كما تم زراعة ٤٢ سلالة فى صف واحد (٣,٥ متر) لتقييمها لصفة المقاومة للاصابة بالمن حيث تم الحصول على ٧ سلالات أعطت درجة عالية من المقاومة.

كما أجريت إختبارات معملية لـ ١٠٤٢ سلالة قمح ناتجة من تلقيحات وإنتخابات لسلالات جديدة ثبت ظهور ١٥ سلالة مقاومة فى طور البادرة. بالاضافة إلى ١٢ سلالة ذات تحمل للإصابة.

وقد ثبت من تجارب البحث أن إجراء من (٣ – ٤) دورات من التلقيح والإنتخاب كانت كافية لإدماج صفة المقاومة مع الإرتفاع المتوسط فى طول النباتات بالإضافة إلى المحصول العالى.