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Seasonal Abundance of two Cereal Aphids, *Rhopalosiphum padi* (L.) and *Schizaphis graminum* (Rondani), (Homoptera, Aphididae) on Twelve Elite Wheat Lines in Riyadh, Saudi Arabia

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ABSTRACT. The seasonal abundance of two cereal aphids, *Rhopalosiphum padi* (L.) and *Schizaphis graminum* (Rondani) on twelve elite wheat lines was investigated. All wheat lines were infested by both aphid species. The population densities of *R. Padi* were much higher on all tested wheat lines than those of *S. graminum*. The numbers of the latter were lower on Durum than on Bread wheat lines and the opposite was true with the former. Wheat cultivar, West Bread was significantly less susceptible to *R. padi* than L 891 and L 893 bread lines. Also, durum line L 18 is significantly less susceptible to infestation by the former insect than L 894. It is preferable to choose early maturing wheat varieties to avoid the build up of high numbers of aphids.

Wheat is one of the most important food crops grown in Saudi Arabia. Proper insect pest management programs should be developed to maximize the production of the crop and to minimize the damage caused by insect pests. Using wheat cultivars, which are inherently less damaged or less infested than others under comparable environmental conditions in the field, is one of the Integrated Pest Management tactics used to reduce damage caused by insect pests.

Cereal aphids, *Rhopalosiphum padi* (L.) and *Schizaphis graminum* (Rondani) are the two most abundant species of aphids on wheat in Riyadh area. These insect

pests can cause severe damage to wheat plants. They extract large quantities of plant sap which can result in great yield reduction. Also, the honeydew excreted by these insects serves as a medium for sooty mold fungi that interfere with plant respiration and photosythesis. In addition, some aphid species serve as vectors of some economically important viral plant pathogens such as barley yellow dwarf virus (Pfadt 1978 and Leather *et al.* 1989).

The aim of the present work was to investigate the susceptibility of ten wheat lines and two commercial bread wheat cultivars to infestation by the two cereal aphid species.

Materials and Methods

This experiment was conducted at the Research and Agricultural Experiment Station at Deirab, near Riyadh (24°N, 46'E), Saudi Arabia, during the Fall-Winter season of 1990/1991. The study was done to investigate the susceptability to infestation with the two cereal aphids to six durum wheat lines (*Triticum durum* Desf.), four bread wheat lines (*Triticum aestivum* L.) and compare them with two commercial bread wheat cultivars. The durum wheat lines are L894, L895, L896, L897 (*Source:* ICARDA*, Syria) and L14 and L18 (*Source*: Mexico). The bread wheat lines are L9, L891, L892, L893 (*Source:* ICARDA, Syria) and the two commercial bread wheat cultivars are Yocora Rojo and West Bread (*Source:* USA). All those twelve wheat lines were registered by the Department of Plant Production, College of Agriculture, King Saud University.

The sowing date was on November 20, 1990, and the seeding rates were 140 kg/ha (for bread wheat) and 120 kg/ha (for durum wheat). Normal agricultural practices were followed (concerning irrigation, fertilization, *etc.*) and without any insecticidal applications. The experimental design used was Completely Rondomized Block Design (CRBD), with four replicates for each treatment, and each plot size was 5 x 5 m. At each sample date five tillers were selected randomly from each plot at weekly intervals throughout the growing season. The total number of aphids (all insect developmental stages; nymphes, adults and alates) were recorded for each sample. The mean numbers of aphids on each line was estimated.

Data were analyzed using the Statistical Analysis System (SAS 1981) program and Least Significant Difference (t-test) was applied to compare between means at P = 0.05 level.

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Results

The results of the seasonal abundance of the two cereal aphids, *R. padi* and *S. graminum*, on six bread wheat lines are given in Table (1). This table shows the mean number of each aphid species for each treatment and the standard error for each mean. The analysis of variance (Anova) of data showed that the standard error for LS Means for all treatments were 24.75 and 6.72 and the F-values were 1.36 and 0.96 for the two aphids. *R. padi* and *S. graminum*, respectively.

Table 1. Means of seasonal Abundance of two cereal aphids, *R. padi* and *S. graminum* on six Bread wheat lines throughout the wheat growing season of 1990-1991

Treatment Durum Wheat line	Mean no. of *R. padi* ± Std Err. on five tillers of wheat	Mean no. of *S. graminum* ± Std Err. on five tillers of wheat
Yocora Rojo	123.25 ± 12.63	27.00 ± 9.16
West Bread	076.50 ± 07.24	24.50 ± 5.24
L9	129.00 ± 16.20	14.50 ± 1.94
L891	151.50 ± 41.75	34.25 ± 9.00
L892	109.25 ± 09.01	27.50 ± 6.36
L893	154.00 ± 37.14	21.75 ± 5.89

In addition, the results of the seasonal abundance of the two cereal aphids *R. padi* and *S. graminum*, on six durum wheat lines are shown in Table (2). This table reveals the mean number of both aphids for each treatment and the standard error for each mean. The Anova of data showed that the standard errors for LS Means for all treatments were 26.48 and 4.03 and the F-values were 1.45 and 1.37 for the two aphids, *R. padi* and *S. graminum*, respectively.

Table 2. Means of seasonal Abundance of two cereal aphids, *R. padi* and *S. graminum* on six Durum Wheat lines throughout the wheat growing season of 1990-1991

Treatment Durum Wheat line	Mean no. of *R. padi* ± Std Err. on five tillers of wheat	Mean no. of *S. graminum* ± Std Err. on five tillers of wheat
L14	177.25 ± 35.46	10.50 ± 2.22
L18	141.25 ± 18.33	15.75 ± 8.44
L894	235.25 ± 36.07	05.50 ± 2.10
L895	181.50 ± 30.88	04.50 ± 2.02
L896	158.00 ± 17.42	04.75 ± 2.29
L897	184.75 ± 07.55	03.75 ± 2.78

Discussions

In the study of the general abundance of aphids, it was found that all tested wheat lines (Durum and Bread wheat) were infested by both aphids; *R. padi* and *S. graminum.* However, the population desities of *R. padi* are much higher on all tested wheat lines than those of *S. graminum.* Also, it is evident that the mean numbers of *S. graminum* are lower on Durum wheat lines than on Bread wheat lines (Table 1 and Table 2). Dean (1974) found that the three genera of aphids *(Rhopalosiphum, Sitobion,* and *Metopolophium)* were not equally common in any one year. And, although *Rhopalosiphum* spp. were usually scarce when other aphids were common, and vice versa, they could be numerous when either *M. dirhodum* or *S. avenae* occurred in above-average numbers.

Although the results of this study showed insignificant F-values, the LSD t-test showed some significant differences between wheat lines regarding to their susceptibility to infestation by aphids. The following table set out the wheat lines in order of aphid abundance.

Type of Wheat	Aphid Species	T - Grouping		
		A	AB	B
Bread Wheat	*R. padi*	L891 > L893	L9 > Yocora Rojo L892	West Bread
Durum Wheat	*R. padi*	L894 >	L897 > L895 L14 L896	L18
	S. graminum	L18 >	L14 > L894 L895 L896	L897

As concerns the abundance of aphids within the tested wheat lines, it was found that the commercial bread wheat cultivar, West Bread, is significantly less susceptible to infestation by the aphid *R. padi* than the two bread lines, L891 and L893. Also, the two bread wheat cultivars, Yocora Rojo and West Bread, are not significantly different in regard to their suceptibility to infestation by this insect pest. Similarly, Yocora Rojo is not significantly different from all other bread wheat lines. In addition, neither the two commercial bread wheat cultivars, Yocoro Rojo and West Bread, nor the other bread wheat lines are significantly different in regard to their susceptibility to infestation by aphid, *S. graminum* (Table 1).

Wheat line, L18, (Table 2) is significantly more susceptible than wheat line L897, to infestation by *S. graminum.* However, no significant differences between other durum wheat lines in concern to their susceptibility to this insect pest. Furthermore, the durum wheat line, L18, is significantly less susceptible to infestation by the aphid *R. padi* than L894. However, no significant differences exist between other durum wheat lines concerning their susceptibility to the same insect pest (Table 2).

The degree of abundance of aphids (more pronounced with *R. padi*) seems to be affected by the earliness of maturity of the different wheat lines. For example, early to moderate maturing wheat lines or cultivars (*e.g.* L18 and West Bread,

respectively) (Al-Otaiby 1993), evidently hosted the least number of aphids when compared to other lines or cultivars. El-Khidir (1977) mentioned that the early manturing wheat variety Lerma Rajo had quick drop in aphid numbers when compared with Giza 148. Also, Walker and Peairs (1992) concluded that early maturing wheat varieties may experience less problems with Russian wheat aphid, *Diuraphis noxia,* if they are more mature than other varieties in the vicinity. Finally, it is recommended to grow early maturing wheat varieties to avoid the build up of large numbers of aphids that may severely injure the crop.

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الوفرة العددية لنوعين من مَنْ الحبوب (L.) *Rhopalosiphum Padi* و (Rond.) *Schizaphis graminum* (رتبة متشابهة الأجنحة ، فصيلة المن) على اثنتي عشر من سلالات القمح المختارة في الرياض ، المملكة العربية السعودية

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من أهم حشرات المن التي تصيب نباتات القمح في منطقة الرياض في المملكة العربية السعودية حشرة المن *R. padi* وكذلك المن *S. graminum* . تسبب حشرات المن أضراراً لنباتات القمح بطرق مختلفة ، فهي بجانب امتصاصها لعصارة النبات وإضعافه فهي تفرز الندوه العسلية التي تلوث النباتات وتعيق عملية التنفس والتمثيل الضوئي وعمليات حصاد المحصول . هذا بالإضافة إلى أن مثل هذه الحشرات قد تتسبب في حدوث مشكلة أكبر تتمثل في نقل الأمراض الفيروسية النباتية لنبات القمح منها مثلاً مرض اصفرار وتقزم الشعير الفيروسي .

وحيث أن من أهم الطرق المستخدمة لإدارة الآفات الزراعية هي استخدام السلالات المقاومة للإصابة بالآفات ومنها حشرات المن فقد أجريت هذه الدراسة للتعرف على مقدار شدة الإصابة بالحشرات المذكورة على اثنتي عشر من سلالات القمح المختارة . وقد بينت نتائج هذه الدراسة أن كل سلالات القمح المختبرة قابلة للإصابة بكلا نوعي المن السابقين . كما وجد أن الكثافة

العددية لنوع المن *R. padi* أعلى بكثير على كل سلالات القمح المختبرة مقارنة بنوع المن الآخر *S. graminum* . كما كانت اعداد النوع الأخير من المن على اقماح المكرونة أقل منها على اقماح الخبز وكان العكس صحيح تماماً بالنسبة للحشرة الأولى . وقد بينت النتائج وجود فروق معنوية من حيث شدة الإصابة بنوع المن *R. padi* بين صنف القمح التجاري (وست برد) وبين سلالات اقماح الخبز L891 و L893 . كذلك وجد أن سلالة قمح المكرونة L18 أقل اصابة بحشرة المن السابقة مع وجود فارق معنوي بينها وبين سلالة قمح المكرونة L894 . هذا وتوصي هذه الدراسة بزراعة سلالات القمح المبكرة النضج حيث أنها تكون أقل تعرضاً في الحقل للإصابة بأعداد كبيرة من حشرات المن عند مقارنتها بالسلالات المتأخرة النضج .