EFFECT OF WHEAT CULTIVARS AND SOWN DATES ON APHID INFESTATION IN EGYPT

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[Helmi, A. & Rashwan, R. 2013. Effect of wheat cultivars and sown dates on aphid infestation in Egypt. Munis Entomology & Zoology, 8 (2): 825-830**]**

ABSTRACT: The current study was conducted to determine the influence of wheat cultivars and wheat sown dates on aphids populations. Three cultivars of wheat (Gemiza-9; Giza-168 and Sakha-93) were sown on five sown dates (1st October, 16th October, 31st October, 15th November and 1st December) throughout two successive seasons 2011 and 2011 at Qalyubiya Governorate, Egypt. Three aphids species; *Rhopalosiphum maidis*, *Rhopalosiphum padi* and *Sitobion avenae* were found infesting wheat plants. *R. maidis* was the most abundant species followed by *R. padi* and *S. avenae*. Plants that sown on early December were significantly infested by aphids. The Gemiza-9 appeared to be the most resistant cultivar, while Giza-168 appeared to be the most susceptible one for aphid infestations. It is concluded from the study that suitable wheat sown date is from early October until mid November and the Gemiza-9 cultivar is resistant to the attack of aphid's population, this cultivar should be promoted in the areas of high aphid infestation. The selection of suitable wheat cultivar and wheat sown date can be important tool for IPM program in this area ecosystem.

KEY WORDS: Aphids, wheat cultivars, sown dates, *Rhopalosiphum maidis*, *Rhopalosiphum padi*, *Sitobion avenae*.

Wheat (*Triticum aestivum* L.) is a nutritious, convenient, economical source, and a source of the basic dietary product – breads which is consumed by more than 70 % of the human population. This cereal is grown on 23 % of global cultivated area and is of the great importance in bread, diet, pharmaceutics and other industry, but also important product of international trade on worldwide market (Wiese, 1987; Anwar et al., 2009). In 2001, the leading wheat producing countries were India, China, Russian Federation, U.S.A., Australia, Canada, Turkey, and Pakistan (Anonymous, 2001). Wheat is mainly grown in Egypt, as it is one of world's leading crops, and can affect the economy. Wheat is susceptible to various kinds of pests that feed on the underground and aboveground parts of the plant including roots, stems, leaves and ears. Among the sap sucking arthropods, aphids are the most widely distributed group. Aphids cause direct damage by feeding deeply within the leaf whorl and inject a toxin in the plant which destroy the chloroplast membrane and indirect damage by transmission of several plant viruses (barley yellow dwarf Luteo virus) and by developing molds on their honey dews. BYDV-PAV is spread worldwide and its most significant transmitter is the aphid (Gill, 1980; Kieckhefer & Kantack, 1980, 1988; Gair et al., 1983; Pike & Schaffner, 1985; Johnston & Bishop, 1987; Voss et al., 1997; Rossing et al., 1994; Jensen & D'Arcy, 1995; Marzocchi & Nicoli; 1991; Aslam et al., 2005; Bukvayova et al., 2006). The aphid infestations significant affect wheat cultivars (Ahmad & Nasir, 2001; Khattak et al., 2007; Khan et al., 2011; Zeb et al., 2011; Zhou et al., 2011). Host plant resistance is an important part of IPM for aphids (Khattak et al., 2007, Khan et al., 2011; Zhou et al., 2011) This work aims at determining the suitable wheat cultivar as well as the suitable sown dates to manage aphids infesting wheat at Qalyubiya ecosystem.

MATERIALS AND METHODS

Experimental locality:

In order to evaluate the response of three different wheat genotypes (*Triticum aestivum)* to different wheat aphid species as well as to investigate the effect of sown date on the population density of aphids species. An experiment was conducted at the Experimental Farm, the Faculty of Agriculture, Ain Shams University at Shalakan, Qalyubiya Governorate. Field trials were conducted throughout two successive seasons 2011and 2012 An area of about one Fadden was sown with three commercial wheat cultivars; Sakha 93, Giza 168 and Gemiza9. Each cultivar was grown in three plots (replicates). Each plot was 40 m^2 in space. These three cultivars were sown on five different sown dates; 1st October, 16th October, 31st October, 15th November and 1st December in the two successive seasons. No chemical treatments were done during the period of this experiment.

Aphids Population Density counting:

Regularly weekly interval excursions were made to this experimental region for two successive seasons, from 13th of January 2011 to 5th of May 2011 for the first season, and from 15th of January 2012 to 6th of May 2012 for the second season.. For recording the aphid's population density ten wheat plants were randomly selected from each cultivar replicate (30 plants/ cultivar). Population density of different aphid species was determined by counting all individuals of each aphid species per plant on leaves, stem and in later stage also on spike using 10x lenses in the field.

Identification of different aphids on wheat:

Wheat aphid species which collected during this experimental period were brought to the laboratory for identification. Mounted microscopic slides of for different aphid species alate form were prepared. Available taxonomic keys were used to identify different collected aphid species according to Blackman (2000) and Helmi (2010).

Statistical Analysis:

The average number of aphids/plant for each cultivar was calculated. GLM procedure was used to test the significant effect of wheat cultivars and sown dates on aphid populations as well as analysis of variance between different aphids population density. These tests followed by using Duncan's test at 0.05 probability level (Duncan, 1955) to compare the significant differences in the mean numbers using SAS Package.

RESULTS AND DISCUSION

Seasonal abundance of different wheat Aphid species:

Three different aphid species found infesting the three different wheat cultivars during the two successive seasons 2011 and 2012. These species were identified according to available identification keys; Corn leaf aphid, *Rhopalosiphum maidis* (Fitch), Bird cherry-oat aphid, *Rhopalosiphum padi* (Linnaeus) and English grain aphid, *Sitobion avenae* (Fabricius). Analysis of variance among mean numbers of population density of the three aphids showed significant differences during the two successive seasons (F= 12.04 and 20.42). the data of relative abundance of different aphid species (average of all wheat cultivars and sown dates) throughout 2011 and 2012 seasons (Fig. 1) showed that *R. maidis* was the most abundant species (86.2 & 132.3 individuals / season) followed by *R. padi* (4.3 & 11.4 individuals / season) then *S. avenae* (2.1 & 2.3 individuals / season) throughout the two successive seasons, respectively. The

seasonal abundance of aphids in the second season (2012) was higher than this recorded in the first season (2011) with seasonal mean number of population densities; 30.9 and 48.7 individuals/plant for the first and second seasons, respectively. No aphids infestation was observed on wheat plants until first week of March then population density increased gradually until mid of April whereas the highest population density then decreased until end of April and early May throughout the two studied seasons. Corn leaf aphid, *R. maidis* was found to be the earliest species appearing on wheat plants during first week of March followed by *R. padi* that appeared during second week of March while *S. avenae* appeared during last week of March throughout the two successive seasons

Effect of Sown Dates on wheat aphids infestation:

Statistical analysis of variance indicated significant effect of different sown dates on the aphid population densities throughout the two successive seasons 2011 and 2012 whereas F values were 4.8 and 2.8, respectively. Wheat that was sowed in the late sown date (1st December) was the most infested with the three aphid species (100.6 & 103.7 individuals / season for the two successive seasons, respectively.) followed by the other four sown dates those showed insignificant differences in the first season. While in the second season the fourth sown date (15th November) followed the late sown date in infestation showing significant differences with the other three sown dates (Fig. 2).

From the above results it could concluded that the preferred wheat sown date under field conditions in this region of Egypt ranged from early October to mid November to avoid high aphids infestation. This results in agreement with those obtained by Acreman & Dixon (1985) and Aslam et al. (2005) reported that potential for aphid infestation can be reduced by sown wheat early in the season. Also Aheer et al. (1993) cited that aphid infestation increases on late plantings of wheat and reduces the yield as compared to normal planting.

Effect of wheat cultivars on wheat aphids infestation:

Statistical analysis of variance among mean numbers of aphids population on different studied wheat cultivars showed highly significant differences throughout the two successive seasons (F= 12.02 & 20.42). Giza 168 cultivar had the highest mean numbers of aphids per plant (59.6 & 87.6) followed by Sakha 93 cultivar (20.6 & 39.3) while Gemiza 9 cultivar had the lowest mean numbers of aphids per plant (12.5 & 19.1) for the two successive seasons, respectively (Fig. 3).

The current results reveal that there were significant differences in the number of aphids among the wheat cultivars. Numbers of aphids per plant were high in Geiza 168 cultivar and low in Gemiza 9 cultivar. Thus, Geiza 168 seems to be more susceptible while Gemiza 9 more resistant. Variations in the aphid populations among the different cultivars has been reported by several researchers like Zhang et al. (1989), Kindler et al. (1992), Aheer et al. (1993), Havlickova (1993), Zia et al. (1999), Bosque & Schotzko (2000), Ahmed & Nasir (2001), Aslam et al. (2005) and Aheer et al. (2007).

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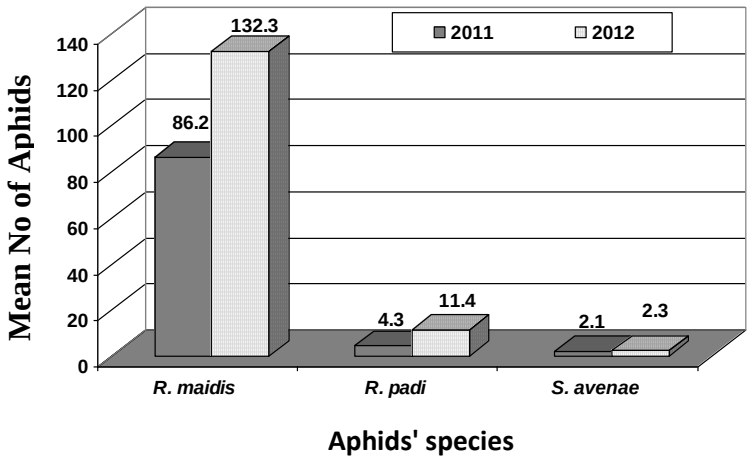

Figure 1. Seasonal mean numbers of three wheat aphid species on wheat plants at Shalakan, Qalyubiya Governorate throughout two successive seasons 2011 and 2012.

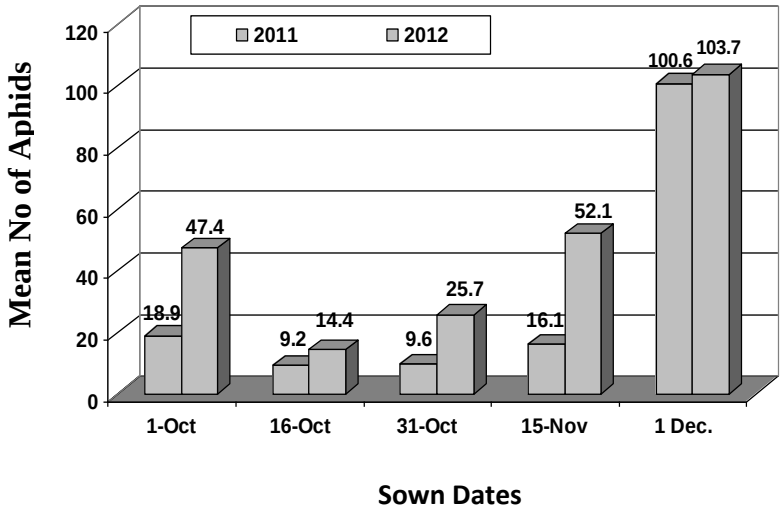

Figure 2. Seasonal mean numbers of aphid population density in five different sown dates of wheat at Shalakan, Qalyubiya Governorate throughout two successive seasons 2011 and 2012.

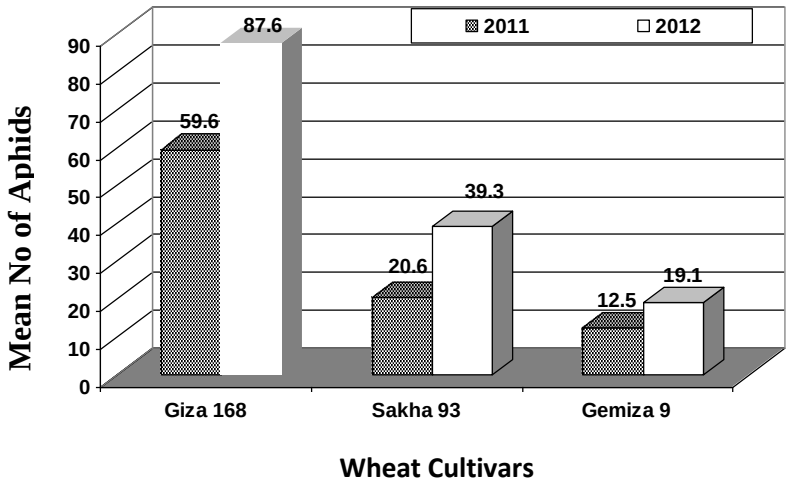

Figure 3. Seasonal mean number of aphid population densities on three wheat cultivars at Shalakan, Qalyubiya Governorate throughout two successive seasons 2011 and 2012.