

APHIDS IN APPLE ORCHARDS IN CENTRAL-SOUTH BULGARIA

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Abstract: Observations were carried out in apple orchards and nurseries of the Plovdiv region (Central-South Bulgaria), aimed at determining specific composition, population density and economic importance of particular species of aphids, in the years 2004–2006. By surveys, carried out at 15-day intervals, the appearing species were identified and the degree of damage determined. Six species of aphids were found: *Aphis spiraecola* Patch., *A. pomi* Deg., *Dysaphis plantaginea* Pass., *D. devectora* Wlk., *Rhopalosiphum insertum* Wlk. and *Eriosoma lanigerum* Hsm. *A. spiraecola*, a polyphagous pest, was probably brought with the plant material from Greece and was identified in Bulgaria for the first time. It is similar to *A. pomi* and may be distinguished only by the microscopic investigation. *Aphis spiraecola* replaced almost completely *A. pomi* in the region studied. Its population was particularly high in nurseries. In the bearing orchards *D. plantaginea* was the most important aphid. Some tendency to an increase of population and damage caused by *D. devectora* was also noted. The other species had not any economic importance. *E. lanigerum* was present only in the orchards where no chemical control was applied.

Key words: apple, *Aphis-pomi*, *Aphis-spiraecola*, *Dysaphis-plantaginea*, *Rhopalosiphon-insertum*, *Dysaphis-devectora*, *Eriosoma-lanigerum*, population-density, damage

INTRODUCTION

Aphids appear in apple orchards in Bulgaria every year and they are considered as the third pest group in order of importance (Angelova et al. 1996). When feeding they cause anatomic-morphological alterations of leaves, shoots, fruits and roots. The damage caused by them in fruit nurseries and on young trees can result in discarding the whole batches of plant material, as well as of in delay of normal crown formation

and of early bearing. In bearing orchards aphids cause deformation of fruits, retardation of growth and general exhaustion of trees.

In Bulgaria, 12 aphid species have been reported as apple pests. The most important of them are: *Aphis pomi* Deg., *Dysaphis plantaginea* Pass., *D. devectora* Wlk. *Rhopalosiphum insertum* Wlk. and *Eriosoma lanigerum* Hsm. (Pelov 1977; Grigorov 1980). Other five species appearing in the Bulgarian aphid fauna are reported as apple pests in some other countries (Blackman and Eastop 1989; CAB 2005).

The last complete study on aphids in Bulgaria was conducted in the seventies of the past century. Since then, more than 25 years have passed and significant changes happened in the structure and the size of apple orchards in the country as well as in varietal composition and in the methods of tree training and management. Plant protection measures have been also significantly altered.

The main objective of the present study was to determine the specific composition, population density and importance of particular aphids in apple orchards and nurseries of the region of Plovdiv (Central-South Bulgaria).

MATERIALS AND METHODS

The observations were carried out during the period of 2004–2006. In the years 2004–2005, only two mature apple orchards were surveyed – at the Experimental Station of the Agricultural University – Plovdiv: one of 0.5 ha, maintained under the biological farming system, and another one, of 1 ha, grown under the IPM system. In 2006, the observations involved a private nursery of 1.5 ha, and bearing private orchards in the region of Plovdiv, as well as a fruit nursery and fruit bearing orchards of the Fruit-Growing Institute. The selected plots were checked for the incidence of aphids every fifteen days through visual inspections of 20 control trees in each orchard. The percentage of the damaged shoots was recorded. The results are presented in a five-grade scale:

- grade: 0 – no aphids,
- 1 – poor injury – individual shoots colonised (up to 5%),
- 2 – medium injury – from 5 to 15% shoots colonised,
- 3 – strong injury – from 15 to 50% shoots colonised,
- 4 – very strong injury – more than 50% shoots colonised.

In 2006, the microscopic determinations of the species found in all orchards were carried out, by the methodology of Martin (1983). To prove the species affiliation, the identification keys of Blackman and Eastop (1989) and of Leclant (2000) were used.

RESULTS

In the studies carried out for the years 2004–2005, only five species were identified as the most dangerous aphids in Bulgaria: *A. pomi*, *D. plantaginea*, *D. devectora*, *R. insertum* and *E. lanigerum*. In 2006, after analyses under microscope, it was found that in each plot observed *A. pomi* was almost completely replaced by *A. spiraeicola* Patch. It was found in 95.5% of samples. This aphid is polyphagous with cosmopolitan spreading. It has not been reported in Bulgaria before. It was unknown when and how the species entered the country; eventually it could happen when plant

material was imported from Greece. This species appeared in all observed orchards, but was the most important for fruit nurseries, where its density was extremely high during the vegetation period (Table 1). In spring, large colonies were also formed in orchards, where insecticide treatments are not applied.

Table 1. Population density of aphids in tree apple orchards: under biological farming (B), with IPM (I) and in nurseries (N) in Plovdiv region in 2006

Aphid	<i>A. spiraecola</i>			<i>R. insertum</i>			<i>D. plantaginea</i>			<i>D. devecta</i>			<i>E. lanigerum</i>		
	B	I	N	B	I	N	B	I	N	B	I	N	B	I	N
01–15.04.	1	1	1	1	1	0	1	1	1	1	1	0	1	0	0
16–30.04.	2	1	1	2	2	0	2	2	1	1	2	0	1	0	0
01–15.05.	1	0	2	1	0	0	2	3	2	1	3	0	2	0	0
16–31.05.	1	0	2	0	0	0	2	2	1	1	3	0	2	0	0
01–15.06.	1	0	3	0	0	0	1	1	1	1	2	0	2	0	0
16–30.06.	0	0	4	0	0	0	1	1	0	0	1	0	2	0	0
01–15.07.	0	0	4	0	0	0	1	0	0	0	0	0	1	0	0
16–31.07.	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0
01–15.08.	0	0	4	0	0	0	0	0	0	0	0	0	1	0	0
16–31.08.	0	0	4	1	0	0	0	0	0	0	0	0	1	0	0
01–15.09.	0	0	4	1	1	0	0	0	0	0	0	0	1	0	0
16–30.09.	0	0	4	1	0	0	0	0	0	0	0	0	2	0	0
01–15.10.	1	1	4	0	0	0	1	1	1	0	0	0	2	0	0
16–31.10.	1	1	3	0	0	0	1	1	1	0	0	0	2	0	0

D. plantaginea is the most important for the mature, bearing orchards. The species appears early in spring, forms large colonies and replaces the other species in orchards, where chemical pest control is carried out. The aphids cause strong deformations on leaves, shoots and fruits. Colonies are observed until midsummer. In the nurseries this species can compete with *A. spiraecola*. The re-migrants appear in October.

R. insertum has insignificant role as a pest in apple orchards because it migrates right after bloom and it does not form large colonies. The re-migrants appear in August.

D. devecta is a species which appears only in spring because of its short life cycle. During the three years of study, there a gradual increase of the grade of damage and of the extension of the affected areas was observed, particularly in the orchards with chemical pest control. The above means that the importance of this particular aphid as a pest is increasing.

E. lanigerum was found only in mature orchards where no insecticides have been applied. The aphid has not any significant role as a pest on apple in the observed region. Its density increases in periods with rainfalls.

During the summer of 2006, in some orchards, individual alate forms of *Aphis gossypii* Glov. and *Aphis fabae* Scop. were found, which can not be considered as apple pests.

CONCLUSIONS

There are 6 aphid species on apple in Plovdiv region: *A. spiraecola*, *A. pomi*, *D. plantaginea*, *D. devector*, *R. insertum* and *E. lanigerum*. The *A. spiraecola* species has been reported in Bulgaria for the first time. It ousted the similar species *A. pomi* in the Plovdiv region and is an important pest in nurseries. *D. plantaginea* is the most important pest for commercial bearing orchards. There is a tendency for increase of population density and damage caused by *D. devector*. The other species are not important.

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POLISH SUMMARY

MSZYCE NA JABŁONIACH W POŁUDNIOWO-WSCHODNIEJ BUŁGARII

W celu ustalenia składu gatunkowego, liczebności populacji i znaczenia gospodarczego poszczególnych gatunków mszyc, prowadzono obserwacje w sadach i szkółkach jabłoniowych w rejonie Płowdiw (południowo-wschodnia Bułgaria) w latach 2004–2006. W trakcie przeglądów dokonywanych w odstępach 15-dniowych, zidentyfikowano występujące gatunki oraz oceniano stopień powodowanych uszkodzeń. Stwierdzono występowanie 6 gatunków mszyc: *Aphis spiraecola* Patch., *A. pomi* Deg., *Dysaphis plantaginea* Pass., *D. devector* Wlk. *Rhopalosiphum insertum* Wlk. i *Eriosoma lanigerum* Hsm. *A. spiraecola*, polifag występujący w wielu krajach, został prawdopodobnie zawleczony wraz z materiałem roślinnym z Grecji; w Bułgarii zidentyfikowany po raz pierwszy. Mszyca ta jest podobna do *A. pomi*, można ją odróżnić dopiero przy badaniu mikroskopowym. *A. spiraecola* wyparła prawie całkowicie *A. pomi* w badanym rejonie; szczególnie licznie występowała w szkółkach. W sadach owocujących największe znaczenie miała *D. plantaginea*. Stwierdzono tendencję do wzrostu liczebności populacji i uszkodzeń powodowanych przez *D. devector*. Pozostałe gatunki nie miały istotnego znaczenia. Występowanie bawełnicy korówki, *E. lanigerum*, notowano tylko w niechronionych sadach owocujących.