

APHIDS (HOMOPTERA: APHIDIDAE) HARMFUL TO THE APPLE TREE (*MALUS DOMESTICA* BORKH.) AND THE COMPLEX OF ENTOMOPHAGOUS INSECTS

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Key words: *Aphids, parasitoids, hyperparasitoids, predators*

INTRODUCTION

The aphids are distinguishable in the fauna of insects in apple tree orchards, especially in mixed orchards from particular gardens in which chemical control is never done, owing to numerical abundance of each species and to a great number of species. The purpose of this study was to identify the harmful aphids to the apple tree of garden (*Malus domestica* Borkh.) and the predator and parasitoid species identified in colonies of respective aphids.

MATERIAL AND METHOD

The study material was represented by the species of harmful aphids (Insecta, Homoptera: Aphididae) to the cultivated apple tree (*Malus domestica* Borkh.) and by the predator and parasitoid insects fauna that feed on the respective aphids. The biological material was collected in 2002, 2003 and 2004 from cultivated apple trees in particular garden, situated on the territory of Iassy and Vaslui counties, in which chemical control and care work was never done. In this way a favorable background to the evolution of species was preserved, keeping the predator-prey and host-parasitoid bio-systems so necessary for the equilibrium of an ecosystem. The samples were collected directly (in bowls of collection), through shaking-up of the young offshoots and with the use of the Möericke trap from 33 locations from Iassy county and 33 locations from Vaslui county. Some adult insects were obtained in laboratory from mummies and pupae collected in the field. The collected and obtained insects were identified and situated systematically after the relations existing between them were established.

RESULTS AND DISCUSSION

We identified on *Malus domestica* Borkh. 16 species of aphids (Figure 1). The species noted in our research represent 71,42% from the total of the identified species in the research done until now on *Malus domestica* Borkh. Some unidentified species in our research are characteristic species for other areas of the world (such as, *Ovatus malisuctus* Matsum. that was noted only in Japan, China, Korea, Taiwan and Georgia (Blackman & Eastop, 1984)).

A number of 10 species have been identified for the first time in our country as species that infest *Malus domestica* Borkh. (*Aphis craccivora* Koch, *Aphis gossypii* Glov., *Aphis fabae* Scop., *Dysaphis anthrisci* Börn., *Dysaphis brancoi* Börn., *Dysaphis chaerophylli* Börn., *Macrosiphum rosae* L., *Myzus persicae* Sulz., *Ovatus insitus* Walk., *Ovatus crataegarius* Walk.) and the species *Rhopalosiphum padi* L. has been identified for the first time in science (new relation) as species that infests *Malus domestica* Borkh. (Blackman & Eastop, 2000; Ciochia & Boeriu, 1996; Hullé et al., 1998; Nafria et al., 1984).

From those 16 species of aphids that attack the *Malus domestica* Borkh. only 4 species of aphids were attacked by predator and parasitoid insects. The species of aphids in the colonies of which were identified predators and parasitoids are: *Aphis pomi* Deg., *Dysaphis plantaginea* Pass., *Ovatus crataegarius* Walk. and *Rhopalosiphum insertum* Walk.

Aphis pomi Deg. is a holocyclic monoecic species (Hullé et al., 1998). It attacks especially the apple, the pear and the quince trees and also other Rosaceae: *Cotoneaster*, *Crataegus*, *Mespilus* and *Sorbus* (Blackman & Eastop, 1985). Predator insects that we identified in colonies of *Aphis pomi* De Geer from apple are: *Adalia bipunctata*, *Adalia decempunctata*, *Adonia variegata*, *Calvia quatuordecimgutata*, *Coccinella septempunctata*, *Exochomus quadripustulatus*, *Oenopia globata*, *Platynaspis luteorubra*, *Propylaea quatuordecimpunctata*, *Scymnus apetzi*, *Scymnus frontalis*, *Scymnus interruptus*, *Scymnus rubromaculatus*, *Scymnus subvillosus*, *Stethorus punctillum* (Coccinellidae), *Episyrphus balteatus*, *Metasyrphus corollae*, *Metasyrphus latifasciatus*, *Metasyrphus luniger*, *Paragus albifrons*, *Paragus bicolor*, *Paragus tibialis*, *Syrphus ribesii*, *Syrphus vitripennis* (Syrphidae), *Chrysopa carnea*, *Chrysopa flavifrons* (Chrysopidae), *Leucopis caucasica*, *Leucopis glyphinivora*, *Leucopis melanopus* (Chamaemyiidae), *Aphidoletes aphidimyza* (Cecidomyiidae), *Deraeocoris ruber* (Miridae) and *Forficula auricularia* (Forficulidae). From the category of parasitoid insects we identified the following species: *Aphidius ervi*, *Diaeretiella rapae*, *Ephedrus persicae* și *Lysiphlebus fabarum* (Aphidiidae).

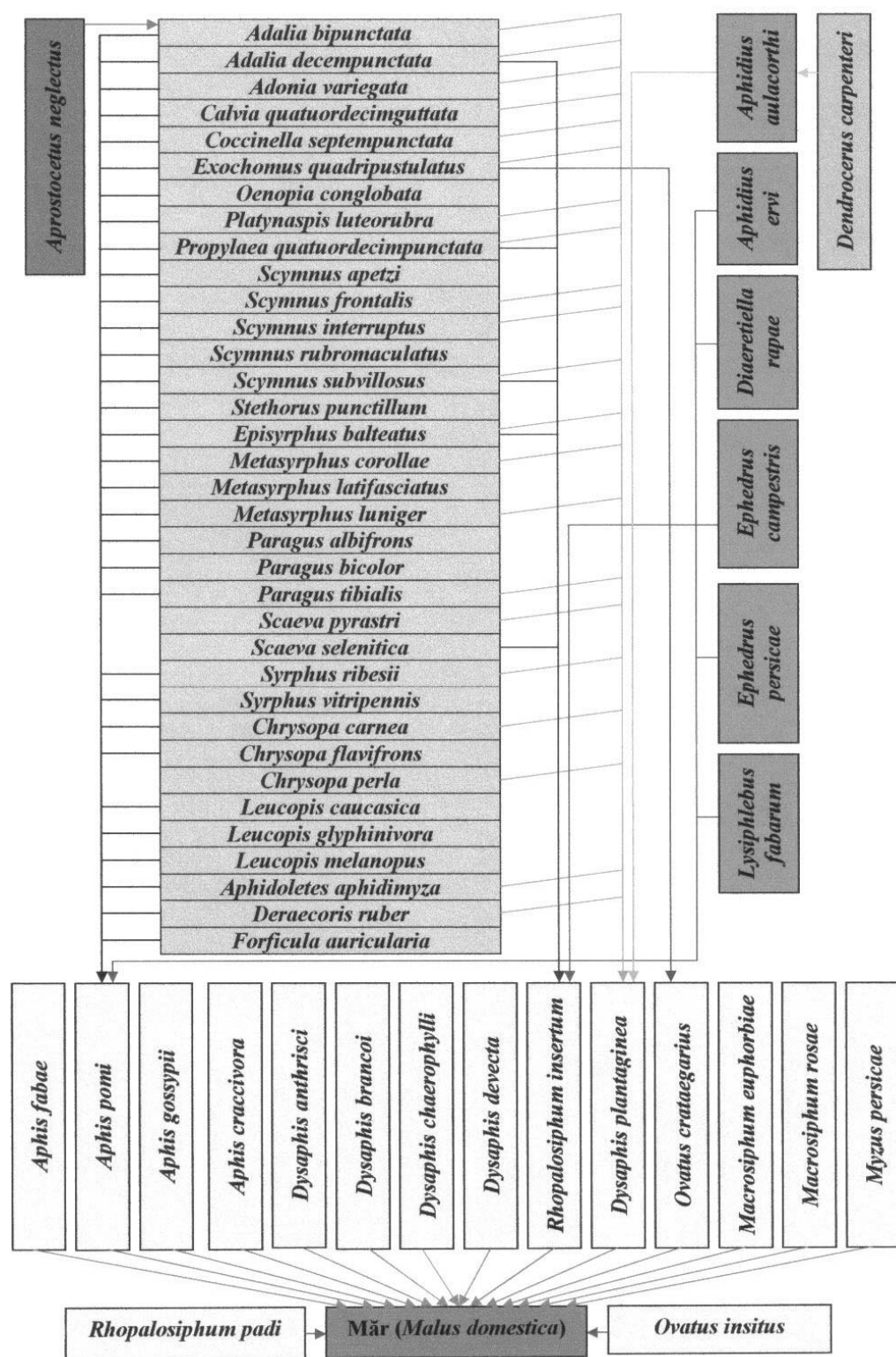


Fig. 1. The trophic network for *Malus domestica* Borkh.

Dysaphis plantaginea Pass. is a heteroecic holocyclic species that migrates from the apple on *Plantago* where it feeds along the nervure, on inferior side of the leaves. *Plantago lanceolata* seems to be the favourite secondary host (Blackman & Eastop, 1985). The predator insects identified in colonies of *Dysaphid plantaginea* Pass. are: *Adalia bipunctata*, *Adalia decempunctata*, *Adonia variegata*, *Calvia quatuordecimguttata*, *Coccinella septempunctata*, *Exochomus quadripustulatus*, *Platynaspis*

luteorubra, *Propylaea quatuordecimpunctata*, *Scymnus frontalis*, *Scymnus interruptus*, *Scymnus subvillosus* (Coccinellidae), *Episyrphus balteatus*, *Metasyrphus corollae*, *Metasyrphus luniger*, *Paragus tibialis*, *Scaeva pyrastris*, *Syrphus ribesii* (Syrphidae), *Chrysopa carnea*, *Chrysopa perla* (Chrysopidae), *Aphidoletes aphidimyza* (Cecidomyiidae) and *Deraecoris ruber* (Miridae). The identified parasitoid species is *Aphidius aulacorthi* (Aphidiidae).

Ovatus crataegarius Walk. is a heteroecic holocyclic species that migrates from Pomoideae on Labiatae in temperate regions (Blackman & Eastop, 1985). In colonies of this aphid we identified only one predator species: *Exochomus quadripustulatus* (Coccinellidae).

Rhopalosiphum insertum Walk. is a heteroecic holocyclic species. The primary host plant is represented by wild and cultivated species of *Malus*, *Pyrus*, *Cotoneaster*, *Crataegus*, *Sorbus* and sometimes on *Cydonia* and *Mespilus*. It migrates on the underground parts of different species of Gramineae (Blackman & Eastop, 1985). The predator insects that we identified in colonies of *Rhopalosiphum insertum* are: *Adalia decempunctata*, *Propylaea quatuordecimguttata*, *Scymnus subvillosus* (Coccinellidae), *Episyrphus balteatus* și *Scaeva selenitica* (Syrphidae). From parasitoid species we identified only one species: *Ephedrus campestris* (Aphidiidae).

From pupae of *Adalia bipunctata* L. collected from an apple tree that exhibited attack with *Aphis pomi* Deg. we obtained a parasitoid species: *Aprostocetus neglectus* Dom. (Eulophidae).

From mummies of *Aphis pomi* Deg. (parasitized individuals) and *Rhopalosiphum insertum* Walk. taken into laboratory emerged only primary parasitoids. From mummies of *Dysaphis plantaginea* Pass. we obtained a species of primary parasitoid (*Aphidius aulacorthi* Starý). This species was parasitized by *Dendrocerus carpenteri* Curt. which acts in this case as secondary parasitoid (hyperparasitoid).

The most predator species were noted in colonies of *Aphis pomi* Deg. and *Dysaphis plantaginea* Pass. The 5 parasitoid species also were obtained from mummies of *Aphis pomi* Deg. (4 species) and *Dysaphis plantaginea* Pass. (1 species).

If we consider that *Aphis pomi* Deg. was the eudominant species in collected samples and *Dysaphis plantaginea* Pass. had a significant abundance, too, we can sustain that the number of the predator and parasitoid species depend on the abundance of the species of aphids. It seems that the species of aphids with great abundance will be controlled by a greater number of predator and parasitoid species.

CONCLUSIONS

As a consequence of the research 16 species of aphids were identified that feed on leaves and offshoots of apple (*Malus domestica* Borkh.).

Predators and parasitoids were identified only in colonies of 4 species of aphids (*Aphis pomi* Deg., *Dysaphis plantaginea* Pass., *Ovatus crataegarius* Walk. and *Rhopalosiphum insertum* Walk.).

In colonies of *Aphis pomi* Deg. 32 species of predator insects (Coccinellidae, Syrphidae, Chrysopidae, Chamaemyiidae, Cecidomyiidae, Miridae and Forficulidae) and 4 species of parasitoid insects (Aphidiidae) were identified. From pupae of *Adalia bipunctata* L. (collected from an apple

attacked by *A. pomi*) we obtained *Aprostocetus neglectus* Dom. species.

As predators for *Dysaphis plantaginea* Pass. we identified 21 species of predator insects and one species as primary parasitoid (*Aphidius aulacorthi* Starý). This was parasitized by *Dendrocerus carpenteri* Curtis (secondary parasitoid).

Rhopalosiphum insertum Walk. was attacked by 5 predator species and one parasitoid species (*Ephedrus campestris* Starý).

Exochomus quadripustulatus L. was the only species identified in colonies of *Ovatus crataegarius* Walk.

REZUMAT

Prezentăm în această lucrare speciile de afide dăunătoare mărului de grădină (*Malus domestica* Borkh.) dar și insectele prădătoare și parazitoide identificate în coloniile respectivelor afide. Pe baza relațiilor trofice stabilite între speciele de afide și insectele prădătoare și parazitoide pe care le-am semnalat hrănindu-se în coloniile acestora, am reușit să realizăm o rețea trofică foarte edificatoare. Este o rețea trofică foarte semnificativă care arată complexitatea relațiilor stabilite într-un ecosistem în care nu s-a făcut combatere chimică și în care nu s-au realizat lucrări de întreținere fitosanitară.

THANKS

We thank Prof.dr. Ionel Andriescu for the identification *Aprostocetus neglectus* Dom. species.

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