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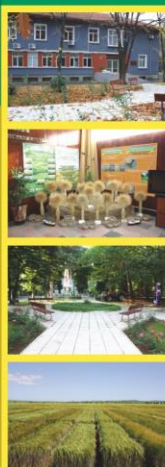
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APHIDS (HOMOPTERA: APHIDIDAE) AND THEIR PREDATORS, IN
WHEAT (*TRITICUM AESTIVUM*) AND IN THE WEEDS FROM
POACEAE FAMILY IN THE STRUMICA REGION

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Abstract

During the 2012 and 2013 researches are conducted on the leaf aphids (Homoptera: Aphididae) and their predators in wheat (*Triticum aestivum* L.) and weeds from Poaceae family. Four aphid species were determined in the wheat, including: *Sitobion avenae* Fabr., *Metopolophium dirhodum* Walk., *Shizaphis graminum* Roud. and *Ropalosiphum padi* L. in both years of examinations. On the weed vegetation from Poaceae family, in 2012 and 2013 the same aphids species are found, except *Metopolophium dirhodum* Walk., that was not registered in 2013. Five predator species in colonies of leaf aphids in wheat, over two years of research were identified: *Coccinella septempunctata* L. (Coccinellidae, Coleoptera), *Adonia variegata* Gz. (Coccinellidae, Coleoptera), *Adalia bipunctata* L. (Coccinellidae, Coleoptera), *Chrysopa carnea* Steph. (Chrysopidae, Neuroptera) and *Scaeva pirasti* L. (Syrphidae, Diptera). On the weed vegetation, from predators, only *Coccinella septempunctata* L. was registered, and only on two weed species from Poaceae family: *Lolium* sp. in 2012 and *Poa* sp. in 2013.

Key words: wheat, weeds, aphids, predators, Poaceae

INTRODUCTION

Wheat (*T. aestivum* L.) is the most important bread plant because wheat grain has a dominant role in human nutrition worldwide, especially in developing countries, where wheat bread is the main food. Due to the rapid development of mill processing and food industry nowadays there are a wide range of products that as raw material use wheat grain.

Despite the increase in yields, the monocultural growing of wheat implies a number of changes in the entomofauna of the culture, increasing the number of the harmful insect species and emphasizes the negative consequences of them. The modern method of cultivation of wheat and the use of chemicals, often disrupt the natural balance, destroying beneficial insect species, predators and parasites. Although the use of pesticides is not on so high level as in vegetable and fruit growing and in viticulture, however it consists of using soil insecticides before sowing the wheat, use of herbicides in early spring, and usually, application of insecticides in the milk maturity stage of wheat against the cereal leaf beetle (*Lema melanopus* L.).

With the increasing use of insecticides for cereals (which adversely affects the natural enemies of pests) they cease to be crops that established balance on plowed land, that was disrupted by usage of pesticides on other field crops (Čamprag, 1995). Therefore, there is a need of other methods of eradication, without using of insecticides that will minimize the use of insecticides on wheat. Thereby the wheat will remain a place of concentration of predators and parasites (Čamprag, 1995a).

Trying to preserve useful entomofauna, and at the same problems with the damaging species to be solved in the most efficient way, the modern system of plant protection proposes integrated protection. Particularly importance in integral protection has biological control. For this purpose, it is necessary greater participation of indigenous useful species, but if there is a need, new species can be introduced.

Therefore, as a main object we set research of the leaf aphids (Homoptera: Aphididae) and their predators of wheat and the weeds from Poaceae family, which belong to the same family with the wheat.

MATERIAL AND METHODS

Studies for realizing the objectives are carried out during 2012 and 2013, on two winter wheat varieties (*T. aestivum* L.), Mila and Bargala. During cultivation of wheat normal agro-technical measures are applied, including the use of fertilizers. The examinations for determining the leaf aphids and their predators are performed by appropriate methods in field and laboratory conditions.

Field studies

The field studies were performed in the experimental field of the Faculty of Agriculture in Strumica, "Goce Delchev" – University – Stip. The field studies included:

Method of examination of 20 wheat plants

The determination of the presence of leaf aphids (Homoptera: Aphididae) and their predators of the wheat, was conducted between 5th of May and 20th of June, in both years of examinations, at an interval of seven days.

Twenty wheat plants from the three points of the experimental plot, beginning, middle and end, diagonally, were taken, meaning 60 plants weakly. For one year of examinations a total of 400 plants were taken, or a total, for the two years studied, 800 plants.

Method of examinations of the weed vegetation

The determination of the presence of leaf aphids and their predators were carried on the following weed species of Poaceae family: *Lolium* sp. L., *Apera spica venti* L., *Alopecurus miosoruides* Huds., *Bromus* sp. Scop, *Avena* sp. L., *Setaria* sp. P. Beauv., *Poa* sp. L., and *Dactylis* sp. L. The examination was conducted of weeds in and around the experimental plot, between 15th of April and 04th of June, in both studied years, at an interval of 7 days.

Laboratory tests

Material collected from the field was preserved in 75 % alcohol and stored in sealed glass containers. Triage was performed on the material and examination under a microscope and binocular. During the triage of material all species were allocated. Determination of the studied species is performed in Laboratory of Entomology in Strumica, at the Department of Plant Protection and Environment, Faculty of Agriculture.

RESULTS AND DISCUSSION

During two years of research of the wheat (*T. aestivum* L.) and weeds from Poaceae family, the presence of four leaf aphid species was established: *Sitobion avenae* Fabr., *Metopolophium dirhodum* Walk., *Shizaphis graminum* Roud. and *Ropalosiphum padi* L.

In both years the surveys (2012 and 2013) all identified aphid species (Aphididae) were found in both wheat varieties, Mila and Bargala (Table 1 and 2).

Table 1. Leaf aphids and their predators on the wheat and the weeds from Poaceae family in 2012 in Strumica region

Leaf aphids and their predators	Plants
<i>Sitobion avenae</i> Fabr.	Wheat (Mila, Bargala), <i>Poa</i> sp., <i>Setaria</i> sp., <i>Lolium</i> sp.
<i>Metopolophium dirhodum</i> Walk.	Wheat (Mila, Bargala), <i>Dactylis</i> sp.
<i>Shizaphis graminum</i> Roud.	Wheat (Mila, Bargala), <i>Setaria</i> sp.
<i>Ropalosiphum padi</i> L.	Wheat (Mila, Bargala), <i>Dactylis</i> sp.
<i>Coccinella septempunctata</i> L.	Wheat (Mila, Bargala), <i>Lolium</i> spp.
<i>Adonia variegata</i> Gz.	Wheat (Mila, Bargala)
<i>Adalia bipunctata</i> L.	Wheat (Mila, Bargala)
<i>Chrysopa carnea</i> Steph.	Wheat (Mila, Bargala)
<i>Scaeva pyrastris</i> L.	Wheat (Mila, Bargala)

Table 2. Leaf aphids and their predators on the wheat and the weeds from Poaceae family in 2013 in Strumica region

Leaf aphids and their predators	Plants
<i>Sitobion avenae</i> Fabr.	Wheat (Mila, Bargala), <i>Poa</i> sp., <i>Setaria</i> sp., <i>Lolium</i> sp.
<i>Metopolophium dirhodum</i> Walk.	Wheat (Mila, Bargala)
<i>Shizaphis graminum</i> Roud.	Wheat (Mila, Bargala), <i>Setaria</i> sp.
<i>Ropalosiphum padi</i> L.	Wheat (Mila, Bargala), <i>Dactylis</i> sp.
<i>Coccinella septempunctata</i> L.	Wheat (Mila, Bargala), <i>Poa</i> sp.
<i>Adonia variegata</i> Gz.	Wheat (Mila, Bargala)
<i>Chrysopa carnea</i> Steph.	Wheat (Mila, Bargala)
<i>Scaeva pyrastris</i> L.	Wheat (Mila, Bargala)

These aphid species were determined on the weed vegetation of Poaceae family, but with different qualitative composition.

In 2012, the leaf aphid *S. avenae* Fabr. was determined at the weeds *Poa* sp. L., *Setaria* sp. P. Beauv. and *Lolium* sp. L., at the weed *Dactylis* sp. L. the aphids *M. dirhodum* Walk., and *R. padi* L. were determined, and at the weed *Setaria* sp. P. Beauv., the leaf aphid *S. graminum* Roud. (Table 1).

In 2013 (Table 2) representation of the leaf aphids (Aphididae) in the weeds of Poaceae family, is as follows: *S. avenae* Fabr. is determined at weeds *Poa* sp. L., *Setaria* sp. P. Beauv. and *Lolium* sp. L., at the weed *Dactylis* sp. the aphid *R. padi* L., was determined and at the weed *Setaria* sp. P. Beauv. the aphid *S. graminum* Roud. In the 2013, the aphid *M. dirhodum* Walk. was not registered in any weeds from Poaceae family.

During our research the presence of the following species of predators were established: *Coccinella septempunctata* L. (Coccinellidae, Coleoptera), *Adonia variegata* Gz. (Coccinellidae, Coleoptera), *Adalia bipunctata* L. (Coccinellidae, Coleoptera), *Chrisopa carnea* Steph. (Chrysopidae, Neuroptera), *Scaeva pirasti* L. (Syrphidae, Diptera).

During 2012 all predators were found on aphid colonies at the two winter wheat varieties, Mila and Bargala (Table 1). In the weed vegetation only the species *C. septempunctata* L. was found at the weed *Lolium* sp. L., while at the other weed species the presence of predators was not determined (Table 1).

In 2013, the following predators were registered on the aphid colonies at the two winter wheat varieties: *C. septempunctata* L., *A. variegata* Gz., *C. carnea* Steph., *S. pirasti* L. (Table 2). In weed vegetation, only the species *C. septempunctata* L. was found at the weed *Poa* sp. L., while at the other weed species the presence of predators was not determined (Table 2).

Number of leaf aphids on wheat usually do not passes the threshold of damage (Tomanović & Petrović, 1995). Therefore the application of insecticides to combat them is minimized and the presence of indigenous predators is enough to maintain the balance in the system.

The results of our research show that at wheat and the weeds Poaceae family meet the same pests from Aphididae, with that, at the wheat they are much more prevalent and form typical colonies on the wheat classes. At the weeds, leaf aphids (Aphididae), are also present, but in much smaller numbers and do not form colonies, on which is probably due the lower representation of predators, unlike their presence in wheat.

The results show that the predators of leaf aphids are established, more prevalent in wheat than at the weed vegetation. This probably is correlated with greater representation of leaf aphids in wheat than in weeds, and predators are more found where they have more food. The presence of five indigenous species of predators solves the problem with the presence of aphids in wheat. Therefore, the use of chemicals for protection of wheat from leaf aphids is reduced to a minimum.

CONCLUSIONS

Based on the results, we can conclude the following:

– Over two years of research, the presence of four aphid species was established at the wheat (*T. aestivum*) and weeds from Poaceae family: *Sitobion avenae* Fabr., *Metopolophium dirhodum* Walk., *Shizaphis graminum* Roud. and *Ropalosiphum padi* L.

– All identified aphid species (Aphididae) were found in both wheat varieties, Mila and Bargala (Table 1 and 2), in both years of research (2012 and 2013).

– All identified aphid species were found on weed vegetation from Poaceae family, but with different qualitative composition.

– In 2012, the leaf aphid *S. avenae* Fabr. was determined at the weeds *Poa* sp. L., *Setaria* sp. P. Beauv. and *Lolium* sp. L., at the weed *Dactylis* sp. L. the aphids *M. dirhodum* Walk., and *R. padi* L. were determined, and at the weed *Setaria* sp. P. Beauv., the leaf aphid *S. graminum* Roud.

– In 2013 *S. avenae* Fabr. is determined at weeds *Poa* sp. L., *Setaria* sp. P. Beauv. and *Lolium* sp. L., at the weed *Dactylis* sp. the aphid *R. padi* L., was determined and at the weed *Setaria* sp. P. Beauv. the aphid *S. graminum* Roud.

– In the 2013, the aphid *M. dirhodum* Walk. was not registered in any weeds from Poaceae family.

– During our research the presence of the following species of predators were established: *Coccinella septempunctata* L. (Coccinellidae, Coleoptera), *Adonia variegata* Gz. (Coccinellidae, Coleoptera), *Adalia bipunctata* L. (Coccinellidae, Coleoptera), *Chrisopa carnea* Steph. (Chrysopidae, Neuroptera), *Scaeva pirasti* L. (Syrphidae, Diptera).

– During 2012 all predators were found on aphid colonies at the two winter wheat varieties, Mila and Bargala.

– In 2012, in the weed vegetation only the species *C. septempunctata* L. was found at the weed *Lolium* sp. L., while at the other weed species the presence of predators was not determined.

– In 2013, the following predators were registered on the aphid colonies at the two winter wheat varieties: *C. septempunctata* L., *A. variegata* Gz., *C. carnea* Steph., *S. pirasti* L.

– In 2013, in weed vegetation, only the species *C. septempunctata* L. was found at the weed *Poa* sp. L., while at the other weed species the presence of predators was not determined.

– The presence of indigenous predators reduces the use of chemical plant protection from leaf aphids.

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