

Hoverflies (*Diptera, Syrphidae*) on Tobacco in the Prilep Region

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Abstract

Predatory hoverflies are very important in biological control of aphids in natural agroecosystems. Investigations were carried out in the region of Prilep in period 2003-2005.

During investigation of fauna species of the Aphididae family, it appeared that tobacco crop was attacked only by *Myzus persicae* Sulzer.

By application of methodological procedures (Methods: survey of 20 tobacco stalks, survey of 100 tobacco leaves, yellow water vessels, mowing with catcher), 13 species of the family Syrphidae were identified: *Sphaerophoria scripta* Linnaeus, *Sphaerophoria rueppelli* Wiedemann, *Scaeva pyrastris* Linnaeus, *Episyrphus balteatus* De Geer, *Eupeodes corollae* Fabricius, *Syrphus ribesii* Linnaeus, *Paragus quadrifasciatus* Meigen, *Paragus testaceus* Meigen, *Pandasyopthalmus tibialis* Fallén, *Melanostoma mellinum* Linnaeus, *Eristalis tenax* Linnaeus, *Eristalis arbustorum* Linnaeus and *Syrirta pipiens* Linnaeus.

S. scripta, *S. rueppelli* and *S. pyrastris* make the main core of the hoverflies in tobacco biocenosis. The most numerous by all methods is the aphidophagous species *S. scripta*.

Six predatory hoverflies feeding on *M. persicae* were found in tobacco: *S. scripta*, *S. rueppelli*, *S. pyrastris*, *E. balteatus*, *E. corollae* and *P. quadrifasciatus*.

Larvae of the aphidophagous species of hoverflies are of major importance in regulation of the number of aphids in tobacco.

Key words: Syrphidae, tobacco, *M. persicae*, aphidophagous hoverflies

Osolike muhe (*Diptera, Syrphidae*) na duhanu u prilepskoj regiji

Sažetak

Predatorske osolike muhe su veoma važne u biološkoj kontroli lisnih ušiju u prirodnim agroekosistemima. Istraživanja su obavljena u Prilepskom području tijekom 2003-2005. godine. Tijekom istraživanja faunističkih vrsta iz porodice *Aphididae*, utvrđen je kod duhana napad vrste *Myzus persicae* Sulzer.

Primjenom slijedećih metoda (pregled 20 stabljika duhana, pregled 100 duhanskih listova, zute vodene posude, kosnja hvatacom-kecerom) identificirano je 13 vrsta iz porodice *Syrphidae*: *Sphaerophoria scripta* Linnaeus, *Sphaerophoria rueppelli* Wiedemann, *Scaeva pyrastris* Linnaeus, *Episyrphus balteatus* De Geer, *Eupeodes corollae* Fabricius, *Syrphus ribesii* Linnaeus, *Paragus quadrifasciatus* Meigen, *Paragus testaceus* Meigen, *Pandasyopthalmus tibialis* Fallén, *Melanostoma mellinum* Linnaeus, *Eristalis tenax* Linnaeus, *Eristalis arbustorum* Linnaeus i *Syrirta pipiens* Linnaeus.

S. scripta, *S. rueppelli* i *S. pyrastris* su glavno jezgro osolikih muha u biocenozi duhana. Najbrojnija vrsta je afidofagna vrsta *S. scripta*.

Kod duhanu utvrđeno je šest predatorskih sifida koje se hrane s *M. persicae* i to: *S. scripta*, *S. rueppelli*, *S. pyrastris*, *E. balteatus*, *E. corollae* i *P. quadrifasciatus*.

Afidofagne larve imaju veliki značaj u regulaciji brojnosti lisnih ušiju kod duhana.

Ključne riječi: Syrphidae, duhan, *M. persicae*, afidofagne osolike muhe

Introduction

Aphids permanently appear in all tobacco producing regions in the Republic of Macedonia and, when in calamity, they cause severe loss in the production of this crop. For environmental protection and management with the dynamics of wild species population, the contemporary system of plant protection suggests integral protection.

Predatory hoverflies preserving their own kind, control the population of phytophagous insects (Karelin, 1980a; Simic, 1987; Simova-Tosic et al. 1989). Aphidophagous syrphides are important natural regulators of aphid population (Radeva, 1984; Vujic, Radenkovic, 1995; Janusevska, 2001; Krsteska, 2007).

Hoverflies appear on tobacco leaves as soon as the initial colonies of aphids emerge. The maximum development of their population is recorded in August. By decreasing the number of aphids, the population of hoverflies is also reduced (Janusevska, 2001; Krsteska, 2007).

Predatory hoverflies are efficient enemies of *M. persicae* on tobacco (Krsteska, 2007).

Material and methods

Investigations of species of Syrphidae family were made by several standard methods: survey of 20 tobacco stalks, survey of 100 tobacco leaves, yellow water vessels, mowing with catcher.

Investigations were carried out in the region of Prilep in 2003-2005 (mostly in Tobacco Institute Prilep-experimental field with an area of about 31 hectares, also in villages: Belo Pole, Berovci, Borotino, Brailovo, Vrance, Desovo, Dupjacani, Krivogastani, Leniste, Podmol, Pestalevo, Ropotovo, Sarandinovo, Selce, Slaveji, Slepce, Sredorek, Staro Lagovo, Topolcani, Trojkrsti, Crniliste).

Hoverflies were sampled at 10-days interval, starting from June 1, up to the end of September, in each of the three years of investigations.

The field-sampled material was tested in Bio-laboratory, on binocular. Samples from nature and adults from Syrphidae species grown in laboratory were prepared by usual laboratory procedures.

Results and discussion

In investigations the following species were identified: *S. scripta*, *S. rueppelli*, *S. pyrastris*, *E. balteatus*, *E. corollae*, *S. ribesii*, *P. quadrifasciatus*, *P. testaceus*, *P. tibialis*, *M. mellinum*, *E. tenax*, *E. arbustorum* and *S. pipiens* (Table 1).

Nine species of hoverflies are obligate aphidophages: *S. scripta*, *S. rueppelli*, *S. pyrastris*, *E. balteatus*, *E. corollae*, *P. quadrifasciatus*, *P. testaceus*, *P. tibialis*, *S. ribesii* and species *M. mellinum* is facultative aphidophag.

Three saprophagous species of hoverflies were also identified, two of which are aquatic (*E. tenax*, *E. arbustorum*) and one is terrestrial (*S. pipiens*).

Although the ratio between certain species varies from year to year, in the three-year period of investigation *S. scripta*, *S. rueppelli* and *S. pyrastris* make the main core of the hoverflies in tobacco biocenosis.

The most numerous by all methods is the aphidophagous species *S. scripta* (Table 1).

Factors that are optimal for tobacco plant development (temperature, precipitations and insolation) are also favorable for development of aphids, which frequently appear as limiting factor in achieving the planned yield and quality of tobacco.

The hoverflies played an important role as predators of tobacco aphids. The main characteristic of predatory hoverflies are that they completely follows the aphid development in all years of investigation.

Six predatory hoverflies feeding on *M. persicae* were found in tobacco: *S. scripta*, *S. rueppelli*, *S. pyrastris*, *E. balteatus*, *E. corollae* and *P. quadrifasciatus* (Figure 1 and 2).

Crucial moment for the investigated Syrphidae to lay their eggs is the presence of aphid colonies, which supply food available for the young larvae (Karelin, 1980; Simic, 1987; Simova-Tosic et al. 1989; Janusevska, 2001; Krsteska, 2007).

Climate conditions and aphids development affected the number of hoverflies. The increased number of aphids population results in increased population of hoverflies, too.

Predatory hoverflies made an important biological control of *M. persicae*, with a huge number of 2900 individuals of *S. scripta*, 2147 - *S. rueppelli* and 1833- *S. pyrastris* (Table 1).

The most important characteristic of the Syrphidae family is that they occur in biocenose in spring, much earlier than other groups of entomophags, and they are extremely mobile, migrating and resting in the colonies of aphids up to their total extinction.

Aphidophagous species of the Syrphidae family play an important role in biocenose as bioregulators of aphids (Radeva, 1984; Vujic, Radenkovic, 1995; Simova-Tosic et al, 1989; Janusevska, 2001; Krsteska, 2007).

Table 1. Numeric representation of the Syrphidae family on tobacco in 2003-2005

Year Method	2003				2004				2005				Total
	1	2	3	4	1	2	3	4	1	2	3	4	
Melanostoma mellinum	-	-	48	-	-	-	35	-	-	-	18	-	101
Sphaerophoria scripta	544	221	149	19	528	208	208	31	685	217	72	18	2900
Sphaerophoria rueppelli	391	172	25	9	758	275	70	8	335	87	9	8	2147
Scaeva pyrastris	110	37	1	2	661	197	2	7	651	160	2	3	1833
Episyrphus balteatus	94	23	4	1	218	74	3	3	174	49	1	3	647
Eupeodes corollae	32	5	1	2	31	11	1	1	46	13	1	2	146
Paragus quadrifasciatus	62	18	2	-	18	5	1	-	67	10	1	-	184
Paragus testaceus	-	-	2	-	-	-	3	-	-	-	-	-	5
Pandasyophthalmus tibialis	-	-	5	-	-	-	6	-	-	-	8	-	19
Syrphus ribesii	-	-	-	-	-	-	1	-	-	-	1	-	2
Eristalis tenax	-	-	2	5	-	-	2	5	-	-	2	5	21
Eristalis arbustorum	-	-	1	2	-	-	1	1	-	-	1	1	7
Syritta pipiens	-	-	4	-	-	-	7	-	-	-	4	-	15
Total	1993				3380				2654				8027

Method: 1- survey of 20 tobacco stalks, 2- survey of 100 tobacco leaves, 3- mowing with catcher, 4 -yellow water vessels.

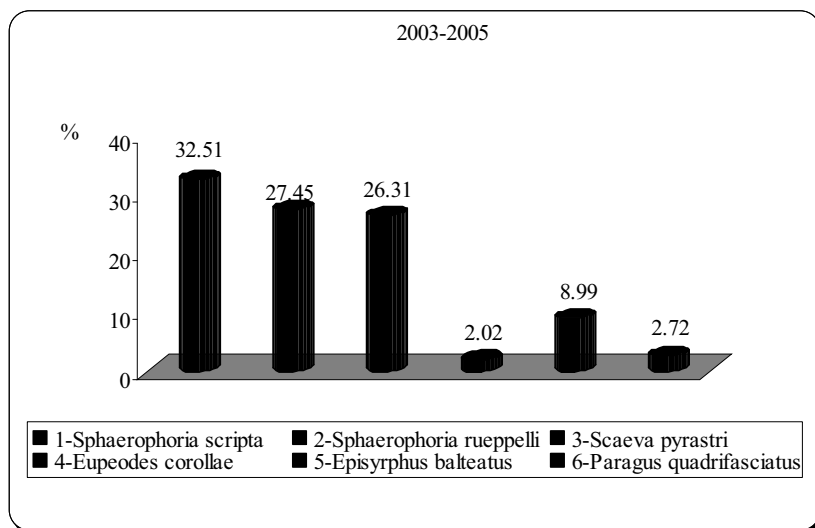


Fig. 1. Representation of predatory hoverflies. Method: check of 20 stalks

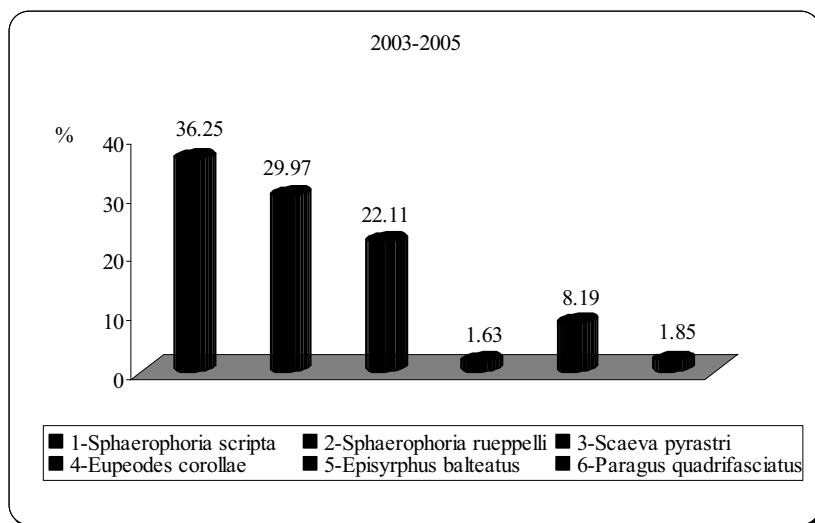


Fig. 2.
Representation of predatory
hoverflies. Method: check of
100 leaves

Conclusion

In our investigations the following species were identified: *S. scripta*, *S. rueppelli*, *S. pyrastris*, *E. balteatus*, *E. corollae*, *S. ribesii*, *P. quadrifasciatus*, *P. testaceus*, *P. tibialis*, *M. mellinum*, *E. tenax*, *E. arbustorum* and *S. pipiens*.

S. scripta, *S. rueppelli* and *S. pyrastris* make the main core of the hoverflies in tobacco biocenosis. The most numerous by all methods is the aphidophagous species *S. scripta*.

Aphidophags of the Syrphidae family are being recognised as important natural enemies of the aphid *M. persicae* on tobacco, and important agents for use in biological control of these pests.

The main characteristic of the fauna of Syrphidae family is that it completely follows the aphid development in all years of investigation.

Six predatory hoverflies feeding on *M. persicae* were found in tobacco: *S. scripta*, *S. rueppelli*, *S. pyrastris*, *E. balteatus*, *E. corollae* and *P. quadrifasciatus*.

The hoverflies played an important role as predators of tobacco aphids.

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