# FAUNA OF HOVERFLIES (DIPTERA: SYRPHIDAE) IN TOBACCO BIOCENOSIS

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## ABSTRACT

Larvae of the aphidophagous species of hoverflies are of major importance in regulation of the number of aphids.
The main goal of the investigations was to perform faunistic analysis of the family Syrphidae.
The analyses were carried out in the tobacco biocenosis in the Prilep area. We undertook the following methods: examination of 20 tobacco stalks, the examination of 100 tobacco leaves, the yellow water vessels method, the insect-catcher method and faunistic analyses with parameters: active dominance, active abundance, consistency or frequency.
The quantitative analyses is based on final evaluation of the total number of collected individuals: 2900 of Sphaerophoria scripta L., 2147 of Sphaerophoria rueppelli Wied., 1833 of Scaeva pyrastri L., 647 of Episyrphus balteatus De Geer, 146 of Eupeodes corollae Fab., 2 of Syrphus ribesii L., 184 of Paragus quadrifasciatus Meig., 5 of Paragus bicolor Fab., 19 of Paragus tibialis Fallen, 101 of Melanostoma mellinum L., 21 of Eristalis tenax L., 7 of Eristalis arbustorum L. and 15 of Syritta pipiens L.
S. scripta, S. rueppelli, S. pyrastri and E. balteatus are dominant species. E. corollae, P. quadrifasciatus and M. mellinum are sub-dominant species. Others species have very low dominance and they are sub-recedent species.
S. scripta is the most numerous species in each year of study and by all study methods. S. scripta is euconstant species in 2004 and 2005 and it is constant in 2003. S. rueppelli is constant species during all years. S. pyrastri, E. balteatus and E. corollae are confirmed with less constancy. Other species are accidentally present in tobacco entomocenosis in Prilep.
The increase of larval abundance of aphidophagous hoverflies approximates the period of mass reproduction of aphids in tobacco.
S. scripta, S. rueppelli, S. pyrastri and E. balteatus can be used for biological struggle within the integral protection of tobacco against aphids.
Key Words: tobacco, aphids, Syrphidae, faunistic analyses, aphidophagous hoverflies

## OBJECTIVES

Aphidophagous hoverflies are one of the most important factors decreasing the number of aphid Myzus persicae Sulz. – a main pest of tobacco.
The main goal of the investigations was to perform faunistic analysis of the family Syrphidae in tobacco biocenosis.

## MATERIALS AND METHODS

Investigations were carried on tobacco plants in the area of Prilep. We applied the following methods for hunting hoverflies: the examination of 20 randomly selected tobacco stalks infested with aphids, the examination of 100 randomly selected tobacco leaves infested with aphids, the yellow water vessels method and the insect-catcher method.
Monitoring and collecting of material was performed during the entire tobacco vegetation, from tobacco seedlings, until the end of September, in a period of 10 days.
These four methods of analysis are simple and safe to perform; there is an advantage when the data is collected by one person only. With these methods we can successfully monitor the number and types of composition of the leaf aphids, the qualitative and quantitative representation of hoverflies, and their relationship in tobacco biocenosis.
We conducted the faunistic analyses of Syrphidae family with parameters: active dominance, active abundance, consistency or frequency.

## RESULTS AND DISCUSSION

Tobacco bears great social, economic and traditional significance for our country.
During the vegetation period and due to climate conditions, different number of parthenogenetic generation of aphids develop on the tobacco.
13 species of the family Syrphidae were identified, of which nine species of hoverflies are obligate aphidophages: S. scripta, S. rueppelli, S. pyrastri, E. balteatus, E. corollae, P. quadrifsaciatus, P. testaceus, P. tibialis, S. ribesii, one species M. mellinum is facultative aphidophag, two species E. tenax, E. arbustorum are aquatic saprophag and one species S. pipiens is terrestial saprophag (Photo 1,2,3,4,5,6,7,8,9,10,11,12,13). The ratio between certain species in tobacco biocenosis varies from year to year.
S. scripta is dominant species and it is the most numerous species in each year of study and by all study methods, with 2900 collected individuals. S. scripta is euconstant species in 2004 - 2005 and it is constant in 2003. S. rueppelli is dominant species with 2147 collected individuals and it is constant species during all years. S. pyrastri with 1833 and E. balteatus with 647 collected individuals are dominant species and with less constancy. E. corollae with 146 collected individuals are sub-dominant species and with less constancy. P. quadrifasciatus with 184 and M. mellinum with 101 collected individuals are sub-dominant species. Others species have very low dominance and they are sub-recedent species. They are accidentally present in tobacco entomocenosis in Prilep with total number of collected individuals: 21 of E. tenax, 19 of P. tibialis, 15 of S. pipiens, 7 of E. arbustorum, 5 of P. bicolor and 2 of S. ribesii (Table 1 and 2).
According the faunal analyses S. scripta, S. rueppelli and S. pyrastri make the main core of the hoverflies in tobacco biocenosis, followed by E. balteatus.
The increase of larval abundance of aphidophagous hoverflies approximates the period of mass reproduction of aphids in tobacco (Krsteska 2008, 2014).
Under laboratory conditions the larvae from S. scripta consumed from 300 up to 365 aphids from the species M. persicae (Krsteska, 2008); the larvae from S. rueppelli 280-321 aphids (Krsteska, 2007); the larvae from S. pyrastri 280-563 aphids (Krsteska, 2008) and those of the species E. balteatus 350-370 aphids (Krsteska, 2009) (Photo 14,15,16,17).
These data show their great capacity for eating aphids. The rate of feeding was found to vary greatly among different larval instars, and their voracity increases in the second, and especially in the third larval stage.
Aphidophagous hoverflies with their great voracity, and to preserve their own kind, they control the population of aphids on tobacco, and so have a great impact on the tobacco biocenoses.

**Table 1. Representation of Syrphidae by various methods and the level of dominance**

| Species | 20 tobacco stalks | 100 tobacco leaves | Yellow-water vessels method | Insect-catcher method | Total | Active dominance % |
|---|---|---|---|---|---|---|
| *S. scripta* | 1757 | 646 | 68 | 429 | 2900 | 36,13 |
| *S.rueppelli* | 1484 | 534 | 25 | 104 | 2147 | 26,75 |
| *S. pyrastri* | 1422 | 394 | 12 | 5 | 1833 | 22,84 |
| *E. balteatus* | 486 | 146 | 7 | 8 | 647 | 8,06 |
| *E. corollae* | 109 | 29 | 5 | 3 | 146 | 1,82 |
| *S. ribesii* | - | - | - | 2 | 2 | 0,03 |
| *P. quadrifasciatus* | 147 | 33 | - | 4 | 184 | 2,29 |
| *P. testaceus* | - | - | - | 5 | 5 | 0,06 |
| *P. tibialis* | - | - | - | 19 | 19 | 0,24 |
| *M. mellinum* | - | - | - | 101 | 101 | 1,26 |
| *E. tenax* | - | - | 15 | 6 | 21 | 0,26 |
| *E. arbustorum* | - | - | 4 | 3 | 7 | 0,09 |
| *S. pipiens* | - | - | - | 15 | 15 | 0,19 |

**Table 2. Faunistic analyses of Syrphidae**

| Species | Year | Active dominance | Active abundance | Consistency or frequency |
|---|---|---|---|---|
| | | % | % | % |
| *S. scripta* | 2003 | 46,81 | 16,66 | 69,64 |
| | 2004 | 28,85 | 17,41 | 76,79 |
| | 2005 | 37,38 | 17,71 | 75,00 |
| *S. rueppelli* | 2003 | 29,95 | 10,66 | 55,36 |
| | 2004 | 32,87 | 19,84 | 66,07 |
| | 2005 | 16,54 | 7,84 | 50,00 |
| *S. pyrastri* | 2003 | 7,53 | 2,68 | 28,57 |
| | 2004 | 25,65 | 15,48 | 44,64 |
| | 2005 | 30,75 | 14,57 | 32,14 |
| *E. balteatus* | 2003 | 6,12 | 2,18 | 23,21 |
| | 2004 | 8,82 | 5,32 | 32,14 |
| | 2005 | 8,55 | 4,05 | 28,57 |
| *E. corollae* | 2003 | 2,01 | 0,71 | 14,29 |
| | 2004 | 1,30 | 0,79 | 25,00 |
| | 2005 | 2,34 | 1,11 | 19,64 |
| *S. ribesii* | 2003 | - | - | - |
| | 2004 | 0,03 | 0,02 | 1,79 |
| | 2005 | 0,04 | 0,02 | 1,79 |
| *P. quadrifasciatus* | 2003 | 4,11 | 1,46 | 16,07 |
| | 2004 | 0,71 | 0,43 | 12,50 |
| | 2005 | 2,94 | 1,39 | 16,07 |
| *P. testaceus* | 2003 | 0,10 | 0,04 | 3,57 |
| | 2004 | 0,09 | 0,05 | 3,57 |
| | 2005 | - | - | - |
| *P. tibialis* | 2003 | 0,25 | 0,09 | 5,36 |
| | 2004 | 0,18 | 0,11 | 8,93 |
| | 2005 | 0,30 | 0,14 | 8,93 |
| *M. mellinum* | 2003 | 2,41 | 0,86 | 17,86 |
| | 2004 | 1,04 | 0,63 | 17,86 |
| | 2005 | 0,68 | 0,32 | 7,14 |
| *E. tenax* | 2003 | 0,35 | 0,13 | 8,93 |
| | 2004 | 0,21 | 0,13 | 8,93 |
| | 2005 | 0,26 | 0,13 | 8,93 |
| *E. arbustorum* | 2003 | 0,15 | 0,05 | 3,57 |
| | 2004 | 0,06 | 0,04 | 3,57 |
| | 2005 | 0,08 | 0,04 | 3,57 |
| *S. pipiens* | 2003 | 0,20 | 0,07 | 5,36 |
| | 2004 | 0,21 | 0,13 | 8,93 |
| | 2005 | 0,15 | 0,07 | 7,14 |


Photo 1. S. scripta ♀


Photo 2. S. rueppelli ♀


Photo 3. S. pyrastri♂


Photo 4. E. balteatus ♀


Photo 5. E. corollae ♂


Photo 6. S. ribesii ♂


Photo 7. P. quadrifasciatus♀


Photo 8. P. testaceus♀


Photo 9. P. tibialis♂


Photo 10. M. mellinum ♂


Photo 11. E. tenax♀


Photo 12. E. arbustorum♂


Photo 13. S. pipiens♀


Photo 14. S. scripta L3


Photo 15. S. rueppelli L2


Photo 16. S. pyrastri L2


Photo 17. E. balteatus L2

## CONCLUSIONS

**According the faunal analyses S. scripta, S. rueppelli and S. pyrastri make the main core of the hoverflies in tobacco biocenosis, followed by E. balteatus. They can be used for biological struggle within the integral protection of tobacco against aphids. Their bio-regulatory function in tobacco-biocenosis should be taken into consideration.**

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