THE PREFERENCE OF THE THRIPS COENOSES FOR DIFFERENT ROSE VARIETIES IN THE TOWN OF PITEŞTI (ARGEŞ COUNTY)

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Abstract. The collectings carried out in June-September 2011 regarding the Thysanoptera fauna on red and white varieties of roses from the parks of the town of Piteşti, show a specific diversity of 17 species. White varieties show much greater attractiveness both in terms of number of species and their populations. The floricultural polyphagous *Frankliniella intonsa* has constantly participated in providing the Thysanoptera coenosis, with the highest values of structural indicators and values of relative abundance ranging between 60.97 and 100%. Such studies reveal the importance of ornamental plants, in ensuring and preserving the biodiversity of thrips în parks, as veritable urban oases.

Keywords: Thysanoptera, taxonomic structure, rose varieties, specific diversity, ecological indicators, Piteşti

Abstract. Preferinţa cenozelor de tripşi pentru diferite soiuri de trandafiri din oraşul Piteşti. Cercetări efectuate în perioada iunie-septembrie 2011 privind fauna de tisanoptere de pe trandafiri din două parcuri din oraşul Piteşti, relevă o diversitate specifică de 16 specii. Soiurile albe prezintă o atractivitate mult mai mare atât din punct de vedere al numărului de specii, cât şi al populaţiilor acestora. Polifagul floricol *Frankliniella intonsa* a participat constant la edificarea cenozei de Thysanoptera, având cele mai ridicate valori ale indicatorilor structurali şi valori ale abundenţei relative care variază între 60.97 şi 100%. Astfel de studii relevă importanţa plantelor ornamentale în asigurarea şi conservarea biodiversităţii tripşilor în parcuri, adevărate oaze urbane.

Cuvinte cheie: Thysanoptera, structura taxonomică, soiuri de trandafiri, diversitate specifică, indicatori ecologici, oraşul Piteşti.

INTRODUCTION

The rose has always been considered the queen of flowers, being most frequently cultivated in parks and gardens as a decorative plant. In turn, this species of Rosaceae is the trophic support for a large number of insects, including the delicate Thysanoptera. Many species of thrips have a role in pollination, the small number of pollen grains carried being compensated by the large number of individuals present in flowers (LEWIS, 1973). The commercial importance of the rose determined in the course of time numerous studies on the species of thrips hosted, the harmful potential and developing strategies for the proper control of their populations (BERGH & LE BLANC, 1997; BOLL et al., 2007; GAUM et al., 1994; PIZZOL et al., 2010). In this regard, a baseline study is the one conducted by DAVIDSON & ANDREWARTHA (1948) who have tracked the dynamics of the populations of *Thrips imagines* Bagnall, 1926 of rose flowers for 14 years.

No studies have been done in Romania about the thrips fauna on roses. KNECHTEL (1951) finds the species *Thrips major* Uzel 1895 on *Rosa* sp., and VASILIU-OROMULU (2002) mentions four species on *Rosa canina*: *Frankliniella intonsa* (Trybom 1895), *Thrips fuscipennis* Haliday 1836, *Thrips major* Uzel 1895, *Taeniothrips inconsequens* (Uzel 1895).

The present study completes the list of Thysanoptera species that inhabit the roses from urban parks. It also constitutes a pleading on the importance of cultivating roses in parks, not only for aesthetic reasons, but also to ensure and preserve the biodiversity of Thysanoptera species.

MATERIAL AND METHODS

The observations were carried out during June-September 2011 on roses cultivated in two parks of the town of Piteşti (Argeş County). The following varieties were investigated: Kent and White Morsdag, as white varieties, Crimson Glory and Red Berlin, as red varieties. There are differences between the two parks in terms of diversity of plant species and maintenance works.

Expo Park, located in the center of Piteşti on an area of approx 11.000 sq m is in private management; coordinates: 44.86274 N; 24.87079 E. Herbaceous vegetation is dominated by Poaceae, so the trophic alternative for the thrips species is poorer. Moreover, there is woody vegetation consisting of trees and decorative bushes. It was posible a treatment with insecticides in August.

The varieties of roses observed are: White Morsdag and Red Berlin.

The ADP Park belongs to the local Administration of the city and it benefits from a much diversified vegetation, grassy and woody, being located on the outskirts of the city, near a lot of waste ground with ruderal vegetation, local administration greenhouses and another park, with many woody species (coordinates: 44.85476 N; 24.88421 E). The treatments carried out in greenhouses also concern the decorative species in the park, so that in the months of June-July the roses monitored in this study were treated with Actellic 0.3% (June 14) and Actara 25 WG 0.05% (July 8). The ADP Park has an area of approx 15.000 sq m. Observed varieties: Kent and Crimson Glory.

In both parks, the small number of white rose cuttings as compared to the red ones and, respectively, of flowers, allowed the collecting of samples from the white varieties only in June.

The areas with roses from which the samples were collected have close areas, of approx 200 sq m.

Collectings were made during the flowering of roses. There were collected every two weeks ten (10) samples each, except for June, when adverse weather conditions allowed the collecting of samples only in the first decade. A sample consisted of 10 flowers. The thrips species were identified with the following keys of determination: KNECHTEL (1951); ZUR STRASSEN (2003).

RESULTS AND DISCUSSIONS

The data obtained from the current study reveal aspects related to the specific diversity, comparative aspects of the structure of populations from the two parks, on white and red varieties.

a. Specific diversity

According to our observations, the flowers of roses from parks represent a trophic niche for species from *Aeolothrips, Frankliniella, Thrips,* and *Haplothrips* kinds.

The numerical abundance reveals a total of 4,300 adults and 147 larvae - 2,088 adults and 49 larvae în ADP Park, and 2,212 adults and 98 larvae in Expo Park, which belong to 17 species (Table 1). *Frankliniella intonsa, Frankliniella occidentalis, Thrips fuscipennis, Thrips tabaci* are mentioned by RASPUDIC et al. (2009) on *Rosa* sp. The trophic behavior results in the distribution of species into the two modules, primary and secondary consumers, only two species, *Aeolothrips fasciatus* and *A. intermedius*, being zoophagous.

Polyphagous, as a strategy to ensure the trophic resource in living conditions more or less optimal, is found in all identified species. From the ecological point of view, typical floricolous elements are dominant; exceptions are the species *Thrips fuscipennis* and *Thrips tabaci*, both floricolous and folicolous, as well as the arboricolous species *Haplothrips minutus*. Conditions in June, with increased rainfall regime, favor mesophilous species, while in July and August, the xerophilous *Frankliniella intonsa* will generally be the only component of thrips populations on roses (Table 2). Otherwise, it is known the attachment of this species to plant inflorescences, behavior which is also reflected in the name of the species – the thrips of inflorescences.

The same diversity is also noticed in terms of geographical distribution; we find Holarctic, Palaearctic, and West-Palaearctic, Euro-Siberian, European, Cosmopolite and Ponto-Mediterranean. Euro-Siberian elements are dominant, followed by ther Palaearctic and West-Palaearctic ones.

Sex-ratio of thrips species is an expression of female dominance, situation typical to Thysanoptera. The most abundant species of this study, *Frankliniella intonsa*, presents a percentage of females of 93.8% and sex ratio of 0.071.

The stability and dynamics of thrips populations on this host plant is expressed by the presence of larvae of *Terebrantia and Tubulifera.* Corresponding to the higher number of adults, Terebrantia larvae are much more numerous than the Tubulifera ones (Table 1).

Table 1. Specific diversity of the Thysanoptera Order on roses in the two parks.

Suborders	Families	Species	ADP Park	Expo Park
			No. of individuals	No. of individuals
Terebrantia	Aeolo-thripidae	*Aelothrips fasciatus* (Linneaeus 1758)	-	**1**♂
		Aeolothrips intermedius Bagnall 1934	2♀♀	2♀♀; 3♂♂
	Thripidae	*Frankliniella intonsa* (Trybom 1895)	1,905♀♀; 113♂♂	1,924♀♀; 160 ♂♂
		Frankliniella occidentalis (Pergande 1895)	2♀♀	-
		Frankliniella pallida (Uzel 1895)	2♀♀	1♀
		Thrips atratus Haliday 1836	1♀	-
		Thrips fuscipennis Haliday 1836	1 ♀	1 ♀
		Thrips major Uzel 1895	2♀♀	14♀♀
		Thrips physapus Linneaeus 1758	1♀	-
		Thrips pillichi Priesner 1924	2♀♀	2♀♀
		Thrips tabaci (Lindeman 1888)	35♀♀	10♀♀
		Thrips validus Uzel 1985	1♀	-
		Terebrantia larvae	46	90
Tubulifera	Phlaeo-thripidae	*Haplothrips angusticornis* Priesner 1921	-	12♀♀; 9♂♂
		H. leucanthemi (Schrank 1781)	5 ♀♀	8♀♀
		H. reuteri Karny 1907	9♀♀; 5♂♂	26♀♀; 15♂♂
		H. setiger (Priesner 1921)	1♀	1♀
		H. minutus (Uzel 1895)	1♀	20♀♀; 3♂♂
		Tubulifera larvae	3	8

b. Comparative aspects of the structure of thrips populations in the two parks

The analysis of data on thrips populations in the two parks highlights a series of qualitative and quantitative aspects.

Regarding the number of species, the roses of the ADP Park are inhabited by 15 species, while in Expo Park there are present 14 species of thrips; 11 species are common. This situation is determined by the location and neighborhoods of the two parks.

In the case of the ADP Park, the surrounding diverse vegetation offers trophic support to many species of Thysanoptera, thus some will be temporarily attracted by roses. ADP greenhouses with decorative plants in the immediate vicinity explain the presence of the two females of the invasive species *F. occidentalis*. Moreover, previous studies highlight the *F. occidentalis* species in those greenhouses (BĂRBUCEANU & VASILIU-OROMULU, 2012).

In Expo Park, the location in the very urban center leads to a less diversified vegetation, so that roses represent one of the few options that thrips have, which during collectings in July registered a record density of 1,001 individuals/sample, of which 99.8% belong to the *Frankliniella intonsa* species. To this there are added the maintenance works, periodically carried out, which largely eliminate the inflorescences of spontaneous species. However, the specific diversity is close to the one of the ADP Park. The low trophic offer leads to an aggregation of thrips on the roses, both in terms of the number of species and numerical density.

In both parks, the floricolous polyphagous *F. intonsa* proves attachment for this host plant, having the greatest numerical density of the samples among the collected species, representing 95.4% of thrips populations (Fig. 1, Table 1). The other accidental species reach the rose coming from the surrounding plants.

Nevertheless, the temporal dynamics of *F. intonsa* populations on the red variety registers a different evolution in the two parks, so that it does not provide conclusive data on the biology of this species on roses in those conditions. In the ADP Park, the treatment in June and July maintain the population at a low level, but in the second half of August the numerical abundance doubles, reaching the highest value of the whole monitored period: 518 individuals/sample. In Expo Park, the absence of treatments highlights the highest numerical density, i.e. of 999 individuals/sample in the first decade of July. Subsequently, a sharp decline in the dynamics of individuals is noticed, following a descending line until the end of collections, probably due to the treatments applied in August (Fig. 1).

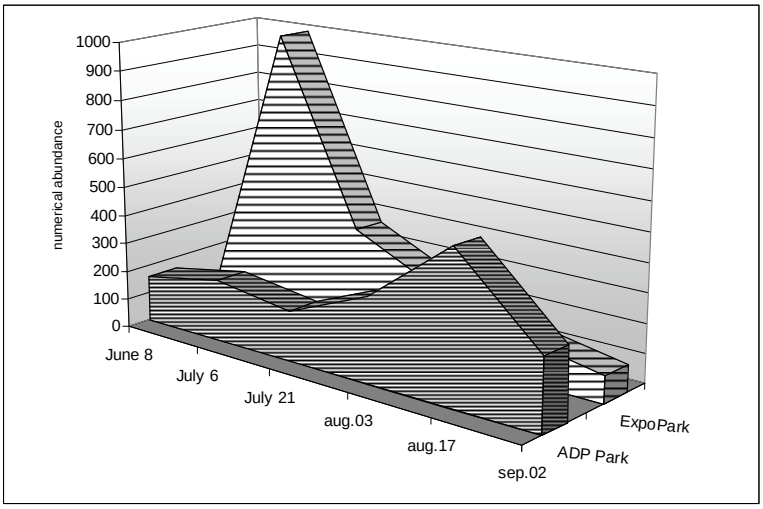


Figure 1. Dynamics of *Frankliniella intonsa* populations on red roses.

c. Comparative aspects of the structure of thrips populations on rose varieties

In the course of time, there have been concerns regarding the preference of thrips for species with a certain color of flowers, aiming at effective control of thrips populations from different cultures. Many of the studies have been focused on *Frankliniella occidentalis*, species present in greenhouses all over the world. Initially, studies on the response to color on different host plants found that white color was more attractive than the yellow one, blue or other colors. According to other studies on roses and carnations, yellow and blue were more attractive than white (LES SHIPP, 1995), while CHYZIK et al. (1995) find the preference of individuals of *Frankliniella occidentalis* on the flowers of gladiolus for lilac color and violet and the least attractiveness for red color. In terms of trap color, MATEUS & MEXIA (1995) notice greater attractiveness of yellow traps for *F. occidentalis* individuals from a culture of roses, compared to the blue or white ones, while other ornamental plants have a different response. Thrips chromatic response is influenced by a series of factors: color, smell and structure of the host plant, characteristics of solar radiation, temperature and humidity (GAUM et al., 1994; MATEUS & MEXIA, 1995).

In the present study, the observations were carried out on white and red varieties of roses. Comparative analysis of data from the first decade of June reveals greater specific diversity and abundance of thrips on white variety, in both parks (Fig. 2, Table 2).

Thus, in the ADP Park, 10 thrips species manifest attractiveness for the white variety, with a numerical density of 478 individuals/sample. *Frankliniella intonsa* species expresses the highest attachment to the flowers of rose, with 423 individuals/sample and dominates the other species in a ratio of 88.49%.

The Thysanoptera association on the red variety consists of 8 species whose populations present a numerical density of 168 individuals/sample. In this case, the *F. intonsa* species also dominates with a relative abundance of 93.5%. Only three species are common to both varieties.

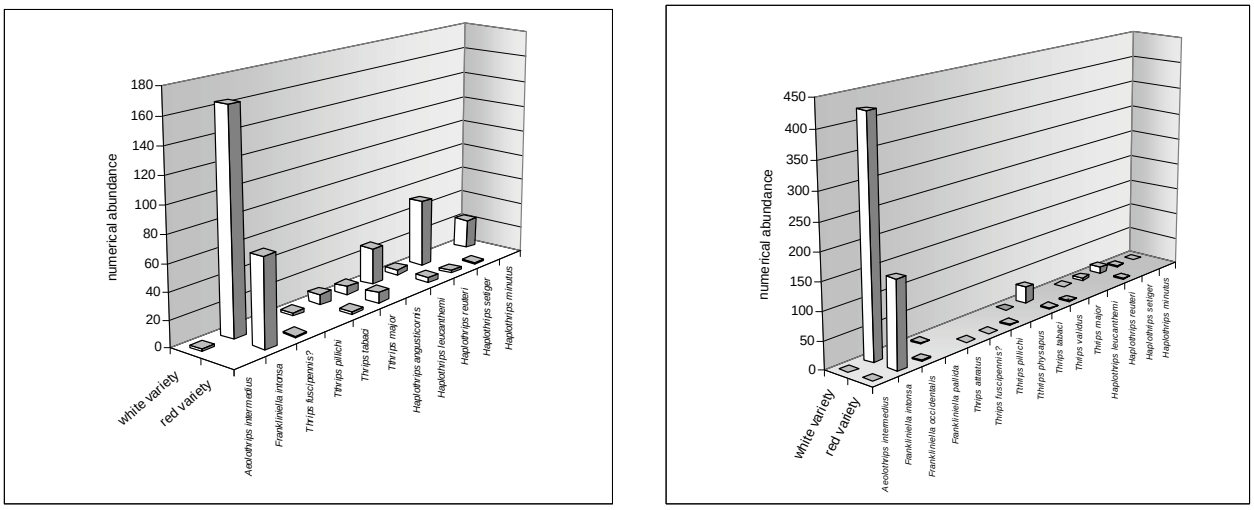
Table 2. The structural indicators of the thrips populations in two parks and on varieties of roses in the town of Pitești.

ADP Park Crimson Glory (red variety), 08.06.2011	**No.ind./ sample**	**x**	**s^2**	**STDEV**	**s'**	**mg.dry matter/m^2**	**A%**	**C%**
Frankliniella intonsa	157	15.7	81.8	9.0	0.90	15.70	93.5	100
Frankliniella occidentalis	2	0.2	0.2	0.4	0.04	0.20	1.2	20
Thrips atratus	1	0.1	0.1	0.3	0.03	0.10	0.6	10
Thrips fuscipennis	1	0.1	0.1	0.3	0.03	0.10	0.6	10
Thrips pillichi	2	0.2	0.4	0.6	0.06	0.20	1.2	10
Thrips tabaci	2	0.2	0.4	0.6	0.06	0.20	1.2	10
Thrips validus	1	0.1	0.1	0.3	0.03	0.10	0.6	10
Haplothrips reuteri	2	0.2	0.2	0.4	0.04	0.20	1.2	20
Σ	**168**	17	82.4	9.1	0.91	**16.80**	100.0	
Kent (white variety), 8.06.2011								
Aeolothrips intermedius	1	0.1	0.1	0.3	0.03	0.10	0.21	10
Frankliniella intonsa	423	42.3	602.2	24.5	2.45	42.30	88.49	100
Frankliniella pallida	***2***	0.2	0.4	0.6	0.06	0.20	0.42	10
Thrips physapus	1	0.1	0.1	0.3	0.03	0.10	0.21	10
Thrips tabaci	30	3.0	12.9	3.6	0.36	3.00	6.28	50
Thrips major	2	0.2	0.2	0.4	0.04	0.20	0.42	20
Haplothrips leucanthemi	5	0.5	1.6	1.3	0.13	0.50	1.05	20
Haplothrips reuteri	12	1.2	1.3	1.1	0.11	1.20	2.51	60
Haplothrips setiger	***1***	0.1	0.1	0.3	0.03	0.10	0.21	10
Haplothrips minutus	1	0.1	0.1	0.3	0.03	0.10	0.21	10
Σ	478	48	690.6	26.3	2.63	**47.80**	100.00	
Expo Park Red Berlin (red variety), 8.06.2011								
Frankliniella intonsa	66	6.6	153.6	12.4	1.24	6.60	78.6	100
Thrips fuscipennis	1	0.1	0.1	0.3	0.03	0.10	1.2	10
Thrips tabaci	2	0.2	0.2	0.4	0.04	0.20	2.4	20
Thrips major	8	0.8	1.1	1.0	0.10	0.80	9.5	50
Haplothrips leucanthemi	4	0.4	1.6	1.3	0.13	0.40	4.8	10
Haplothrips reuteri	2	0.2	0.2	0.4	0.04	0.20	2.4	20
Haplothrips setiger	1	0.1	0.1	0.3	0.03	0.10	1.2	10
Σ	**84**	8.4	171.5	13.1	1.31	**8.40**	100.0	
White Morsdag (white variety), 08.06.2011								
Aeolothrips intermedius	2	0.2	0.2	0.4	0.04	0.20	0.74	10
Frankliniella intonsa	164	16.4	13.6	3.7	0.37	16.40	60.97	80
Tthrips pillichi	2	0.2	0.2	0.4	0.04	0.20	0.74	10
Thrips tabaci	8	0.8	0.6	0.8	0.08	0.80	2.97	40
Thrips major	6	0.6	0.7	0.8	0.08	0.60	2.23	20
Haplothrips angusticornis	21	2.1	6.1	2.5	0.25	2.10	7.81	50
Haplothrips leucanthemi	4	0.4	0.3	0.5	0.05	0.40	1.49	40
Haplothrips reuteri	***39***	3.9	21.7	4.7	0.47	3.90	14.50	50
Haplothrips minutus	23	2.3	5.6	2.4	0.24	2.30	8.55	60
Σ	269	27	105.4	10.3	1.03	**26.90**	100.00	

In the Expo Park, the flowers of the white variety are inhabited by 9 species of thrips which reach densities of 261 individuals / sample, *Frankliniella intonsa* dominating the other species by 60.97%. The red variety is preferred by 7 species, having a numerical density of 84 individuals/sample, of which 66 individuals/sample belong to the *F. intonsa* species; five species are common.

The size of the biomass with which thrips participate in the biocoenosis biomass and implicitly the size of their value within the trophic modules thereof vary, depending on variety and the collecting place between 8.40 and 47.80 mg. dry matter/m^2.

Although the observations concern the data from a single collecting, thrips preference for white varieties of rose versus red ones is obvious. It is also noted the preference of Tubulifera species for the flowers of the white variety (Table 2). Observations performed by ELIMEM & CHERMITI (2012) on greenhouse roses note a greater attractiveness of *F. occidentalis* individuals to white-cream as compared to the red one.



a b

Figure 2. Numerical abundance of thrips populations, June 2011
(a- Expo Park; b - ADP Park)

CONCLUSIONS

The component populations of the Thysanoptera association on roses consist of 4,100 individuals and belong to 17 species, which proves a rich diversity of the coenosis.

The study revealed a greater specific diversity and abundance of thrips populations on white varieties, in both parks.

The species constantly participating in the coenosis structure is *Frankliniella intonsa* with the highest values of ecological indicators and a relative abundance varying between 60.97 and 100%.

Cultivation of roses on limited areas in parks does not allow the thrips attached to this trophic substrate to develop potentially major pest populations, respectively to cause damage to inflorescences and transmission of viruses to these plants.

Our research completes the list of species of Thysanoptera which inhabit the flowers of roses; study case, roses from Pitesti parks.

Such studies reveal the importance of flowering plants – as trophic niche in ensuring and preserving the biodiversity of species of this order of insects, even in small parks located in urban centers.

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