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STUDY ON CICADA AND TRIPS ENTOMOFAUNA IN WINTER VETCH (*VICIA VILLOSA* ROTH.)

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Abstract. In 2007-2010 period was studied the quantitative and qualitative composition of sucking pests from *Homoptera-Auchenorrhyncha* and *Thysanoptera* in winter vetch agrocenosis in the conditions of Pleven region as well as the numerical dynamics of the most economically important species of them. For Pleven region in winter vetch from *Homoptera* order**,** *Auchenorrhyncha* were established cicadas belonging to 5 families, 14 genera и 14 species. Economic importance for winter vetch had *Empoasca pteridis* which was found from the beginning of May to the harvesting of culture as its density increased in the reproductive stages of vetch flowering and beginning seed fill with maximum in the beginning of July.

From *Thysanoptera* order was found trips which belonged to 3 families with 6 species. As important pests were outlined *Thrips tabaci* (53.6%), *Taeniothrips atratus* (15.6%) and *Odontothrips confusus* (15.0%). The density of *Thrips tabaci increased* in May and reached the highest values in the first decade of June as *Taeniothrips atratus* and *Odontothrips confusus* were in higher density from the second half of May to the middle of June.

To useful species related *Aeolothrips intermedius* which because of its high consumptive ability of predatory might control the density of harmful trips in determinate numbers and to contribute for decrease of their density.

Introduction

The winter vetch (*Vicia villosa* Roth.) is one of the forage legumes, which showed great ecological plasticity, great potential in dry regions [HOUEROU, 1985], high protein content, which determined its importance and place in cultivation of forage crops. This species might be serious damaged or to serve as an important host of some harmful species sucking pests as cicadas and trips.

Vicia villosa Roth. had higher density of aboveground arthropods and more – varied taxonomic entomofauna than some other legumes like red clover (*Trifolium incarnatum* L.) [HOUSE and ALZUGARAY, 1989]. The winter vetch is one of preferred hosts of some species phytofagous trips as *Frankliniella fusca* (Hinds), *Frankliniella occidentalis* (Pergande), *Frankliniella tritici* (Fitch) [COWAN et al., 1966; CARTER et al., 1989; CLARK, 2007], *Thrips tabaci* L. [ATAKAN and UYGUR, 2005] and others. In Bulgaria as pests in common vetch were reported pea trips *Kakothrips robustus* Uzel и *Haplothrips angusticornis* Pr. [POPOVA, 1957; GENOV, 1967; DONCHEV, 1968] and from predatory species the massestly was disseminated the species *Aelothrips intermedius* Bagnall [DONCHEV, 1984]. The harmful trips sucking plant juice prevented the plant development and depleted the course of normal physiological processes.

The cicadas are among most common groups insects [WILSON, 2007]. It was described about 20 000 species (Cicadellidae) but the prognosis showed that exist about 100 000 species [DIETRICH, 2005]. The pests causes damages that had been direct (in feeding they suck juice tissues which slows plant growth and development) and indirect (carry virus and mycoplasmal diseases). As pests in vetch were reported *Empoasca fabae* (Harris) [*LAMP et al., 1994*], *Aceratagallia sanguinolenta* (Prov.) (Hannaway and Larson), *Agallia sanguinolenta* [GIBSON, 1916], *Agallia (Anaceratagallia) laevis* (Ribaut), *Empoasca pteridis* (Dahlbom), *Eupteryx atropunctata* (Goeze), *Macrosteles laevis* (Ribaut), *Psammotettix striatus* (Linnaeus) and others [DIMITROV, 2008].

It lacks data about species composition of trips and cicadas in winter vetch in Bulgarian entomological literature.

The objective of present study was to establish the quantitative and qualitative composition of trips and cicadas in winter vetch agrocenosis in Pleven region.

Materials and methods

The studies were carried out during 2007-2010 period in the experimental field of

Institute of Forage Crops. It was used winter vetch variety Asko 1. The sowing was conducted with sowing rate 220 g.s./m^2 with small seeder for precision seed sowing in line spacing 11.5 cm and depth 3-5 cm. During the vegetation was not held chemical control. It was used the method of mowing with an entomological net as the samples were taken once a week. The determination of species was realized by collections determined by assoc.prof. Venelin Pelov (cicadas) and Dr. of Science Kiran Donchev (trips).

Result and disscusion

Factors which influenced on the appearance, spread and population density of studied sucking pests in winter vetch are air temperature and rainfall during vegetation as well as in winter period. The meteorological condition during the period of studying were different which determined the difference in quantitative and qualitative composition of those insects. The total numbers of cicadas and trips varied by years. In 2009 it was the greatest which in definite degree owed to more favorable conditions for development and multiplication of studied insects in that crop *(Table 1)*.

Table 1.

Meteorological characteristic of Pleven region

Година/Месец Year/month	X	XI	XII	I	II	III	IV	V	VI	VII
Температура / Temperature, (^{0}C)										
2007/2008	11.8	4.2	-0.3	-2.6	3.8	9.8	13.7	17.9	22.3	23.9
2008/2009	13.6	7.2	2.5	-0.2	1.9	6.7	13.1	19.1	21.9	24.1
2009/2010	12.7	8.9	1.8	-2.4	0.7	6.7	12.9	18.1	21.3	23.6
Валежи / Rainfall, (mm)										
2007/2008	73.6	82.7	73.2	62.2	3.2	20.8	78.1	57.8	31.1	31.5
2008/2009	62.3	9.3	30.4	39.9	98.7	40.1	22.3	31.5	58.4	95.5
2009/2010	56.4	10.7	63.9	42.2	74.1	78.8	60.5	95.3	61.2	110.0

In result of done studying in Pleven region in winter vetch from *Homoptera* order**,** *Auchenorrhyncha* were collected 607 cicadas belonging to 5 families, 14 genera и 14 species *(Table 2)*.

The distribution of species by families was as followed: *Aphrophoridae* - 1 (6.5% numeral participation to total complex cicadas), *Cicadellidae* – 9 (87.7%), *Cercopidae* – 1 (3.1%), *Cixiidae* – 2 (1.5%) и *Delphacidae* – 2 (1.2%).

The most numerous were the species from family *Cicadellidae*. The species from remaining families were in significant degree not numerous. The analysis of data (Table 1) showed that only one species in winter vetch was found at the greatest density. The rest were comparatively rarer and much rare species.

Economic importance for winter vetch had *Empoasca pteridis* (family *Cicadellidae*) with 55.4% participation from total cicada entomofauna for the study period. The species was reported in Bulgaria for first time by Kovachevski *et al*. (1964).

The most frequently occurring species and at the greatest numbers with strong pronounced polyphagia. Damages on spring vetch, lucerne, sainfoin, clover, cereal, vegetable, technical, ornamental, essential oiled and other crops [PELOV, 1968; BAIRYAMOVA, 1976; BAIRYAMOVA, 1982; DONCHEV, 1978; DIMITROV, 2008].

The species from genus *Empoasca* (especially *Empoasca fabae* Harris) were reported as constantly present in vetch agrocenosis by many foreign researchers [LAMP et al., 1994; JOHNSON; HANNAWAY and LARSON].

Earlier appearance of the species in vetch stand in 2009 and 2010 in the beginning of May explained with higher average daily air temperature in first decade of May (15.8 and 18.2^0 respectively) which activated earlier the adult insects. In 2008 were given an account lower daily air temperature during this period (14.1^0) and it was established later appearance of the insects in the stand (in the end of May). The highest was the numbers of *Empoasca pteridis* in the last studying year (67.5 number/100m^2), followed by 2009 (45.4 number/100m^2).

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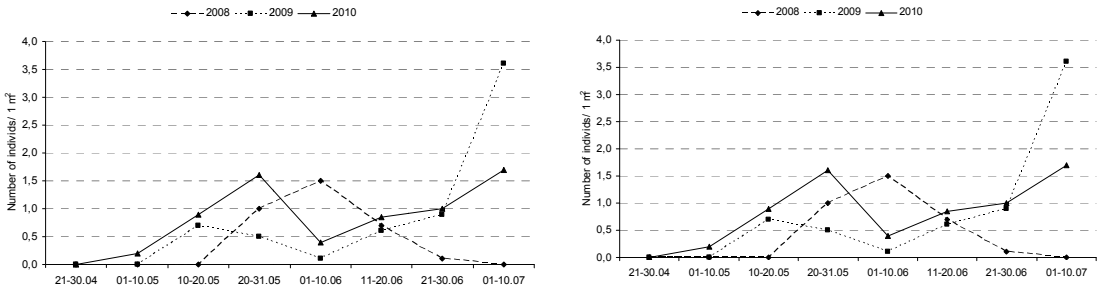
Table 2.

Species composition and entomofauna abundance of *Homoptera* order**,** *Auchenorrhyncha* and *Thysanoptera* order in winter vetch, number/100 m^2

Разред/семейство/вид Order/family/species	**2008**	**2009**	**2010**	**Общо**
Homoptera-Auchenorrhyncha				
Сем./Fam. *Aphrophoridae*				
Aphrophora spp.	0.0	13.2	2.0	15.2
Сем./Fam. *Cicadellidae*				
Agallia ribauti Oss.	0.0	0.7	0.0	0.7
Empoasca pteridis Dhlb.	16.2	45.4	67.5	129.1
Erythroneura ribauti Oss.	0.1	0.0	0.0	0.1
Erythroneura ventralis	0.0	2.1	2.0	4.1
Euscelis plebejus Fall.	0.0	12.1	0.0	12.1
Eupteryx atropunctata Goeze	0.1	1.4	8.1	9.6
Peragallia sinuata M.R.	0.0	10.7	2.0	12.7
Phlepsius intricatus H.S.	0.3	2.1	3.0	5.4
Phlepsius spp.	0.0	1.4	12.0	13.4
Psammotettix striatus L.	1.3	15.7	0.0	17.0
Сем./Fam. *Cercopidae*				
Cercopis sanguinolenta Scopoli	0.0	2.1	5.0	7.1
Сем./Fam. *Cixiidae*				
Hyalesthes obsoletus Sign.	0.0	2.1	1.0	3.1
Reptalus panzeri P. Lőw	0.4	0.0	0.0	0.4
Сем./Fam. *Delphacidae*				
Asiraca clavicornis Eabr.	0.0	0.0	2.0	2.0
Tettigometra sulphorea M.	0.0	0.7	0.0	0.7
Общо	**18.4**	**110.1**	**104.6**	**233.1**
Thysanoptera				
Сем./Fam. *Aeolothripidae*				
Aeolothrips intermedius Bg.	1.9	32.5	6.0	40.4
Сем./Fam. *Phloeothripidae*				
Haplothrips niger Osborn	0.4	14.6	0.0	15.0
Сем./Fam. *Thripidae*				
Odontothrips confusus Priesner	0.0	61.8	6.0	67.8
Sericothrips gracilicornis Williams	0.4	8.9	0.0	9.3
Taeniothrips atratus Haliday	1.0	41.4	27.8	70.2
Thrips tabaci Lindeman	35.6	155.0	51.0	241.6
Неизвеснти	0.0	4.6	2.0	6.6
Общо	**39.3**	**318.9**	**92.8**	**451.0**

In winter vetch the cicada was found from the beginning of May to harvesting of the culture as its density increased in the reproductive stages of vetch flowering and beginning seed fill with maximum in the beginning of July *(Figure 1).*



Auchenorrhyncha *Empoasca pteridis* Dhlb.

Figure 1. Number dynamics of cidadies in winter vetch

Psammotettix striatus L. was other species by family *Cicadellidae*, which participated with 7.3% from total cicada fauna in winter vetch. Освен по фия вреди и по люцерна, еспарзета, цвекло, житни култури и др. [БАЙРЯМОВА, 1982; ДОНЧЕВ, 1978; ДИМИТРОВ, 2008]. Среща се в по-висока плътност през втората половина на юни и началото на юли. It damaged not only vetch but lucerne, sainfoin, beet, cereals and others [BAIRYAMOVA, 1982; DONCHEV, 1978; DIMITROV, 2008]. It was found in higher density in the second half of June and the beginning of July.

The numbers of the rest species was about 5 and under 5% which showed that they had no economic importance for the crop in ecological conditions in Pleven region.

The total cicada fauna in vetch stand had greater quantitative participation in third decade of May and first decade of June as was observed maximum in the beginning of July (Figure 1). In the studying period was observed nearly one and the same tendency independently of different numbers in years. The existing deviation in 2008 was determined by climatic factors.

From *Thysanoptera* order in the study period were collected total 1911 individuals. The trips which were established in winter vetch belonged to 3 families with 6 species. As important pests were outlined *Thrips tabaci* (53.6%), *Taeniothrips atratus* (15.6%) and *Odontothrips confusus* (15.0%). The total numbers of species varied by years as it was the greatest in 2009 when existed favorable climatic conditions for their multiplication (Table 1).

With the highest percentage participation was *Thrips tabaci*. It was a polyphag which had ubiquitous spread and it is considered as one of economic harmful insects in культурните растения [LIU and SPARKS 2003]. The species was found in 29 plant families [RASPUDI and IVEZI, 1999]. The damage was done by adults and larvae which sucked plant juice from leaves, flowers and green pods.

Early in the spring the wintering trips left the sites of wintering and passed on weeds and crops with early vegetation. They migrated in vetch stands in the second half of April *(Figure 2)*. Significantly the greater amount of rainfall in April 2008 (78.1mm) determined the absence of that species in the month. The studies on numerical dynamics of pest showed that gradually its density increased in May and reached the highest values in the first decade of June (3.9; 6.7 and 0.9 number/m^2, respectively for 2008, 2009 and 2010). Depending on the climatic conditions in 2010 that maximum was observed in the second decade of June.

Taeniothrips atratus and *Odontothrips confusus* presented permanently but in low numbers in comparison with tobacco trips in winter vetch stands. They established in higher density from the second half of May to the middle of June.

It is considered that the trips damages were not minor but so far they were not studied deeply [ČAMPRAG et al., 1996].

The numerical dynamics of harmful insects of *Thysanoptera* order showed that they were found in vetch agrocenosis from the middle of April to harvesting of culture as it was observed significantly increase of the density from the second decade of May to the second decade of June with maximum in the first half of June *(Figure 2)*.

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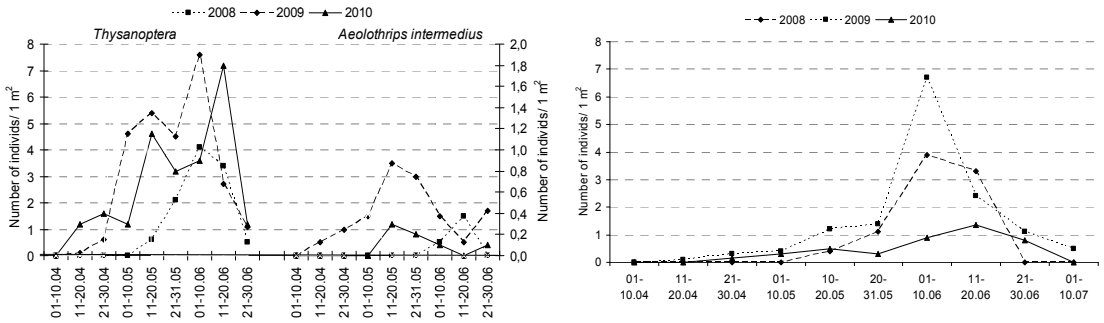

Thysanoptera *Thrips tabaci* Lindeman

Figure 2. Numerical dynamics of thrips in winter vetch

To useful species related *Aeolothrips intermedius* which occupied 9.0% of total density of trips. Higher density was found and in the second and third of May when the phytophagous trips were found in high numbers. Because of their high consumptive ability the predatory trips might control the density of harmful trips in determinate numbers and to contribute for decrease of their density.

Conclusions

For Pleven region in winter vetch from *Homoptera* order**,** *Auchenorrhyncha* were established cicadas belonging to 5 families, 14 genera и 14 species. Economic importance for winter vetch had *Empoasca pteridis* which was found from the beginning of May to the harvesting of culture as its density increased in the reproductive stages of vetch flowering and beginning seed fill with maximum in the beginning of July.

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