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Psyllid Species (*Cacopsylla* spp.) in Pear Orchards of East Sarajevo

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Abstract

Psyllid species (*Cacopsylla* spp.) are the most important pests on pear in all regions where this fruit species is grown. *Cacopsylla* spp. cause direct and indirect damages because they suck the sap and make large amounts of honeydew, which disturbs the normal physiological processes. Some psyllid species vectors of phytoplasma were found (Carraro i sar., 1998). The survey was done in 2011 and 2012 in orchards, in the locations of Vojkovici, Kula, Tilava, Petrovići and Kasindo. In Kula location, survey was done on the following cultivars: Wiliams, General Le Clerc, „Passa Crasana", Abe Fetel and Poire de Curé. In pear orchards of the East Sarajevo area the following were determined: *Cacopsylla pyri* Linne, *Cacopsylla pyrisuga* Foerster and *Cacopsylla pyricola* Foerster. In intensive orchards of Vojkovići and Kula, *C. pyri* was more present compared to *C. pyrisuga,* while in extensive orchards in the location of Kasindo, *C. pyrisuga* was more present. In semi-intensive orchards, Tilava and Petrovići, the most present was *C. pyrisuga,* then *C. pyri* and the least present was *C. pyricola*. In the locality of Kula, the highest percentage of shoots infeted with *C. pyri* was the Poire de Curé, and the smallest was of cultivar Abe Fetel.

Key words: pests, pear, orchards, damage

Introduction

Psyllid species (*Cacopsylla* spp.) are widespread throughout Europe, Asia and North America, in all regions where this fruit is being grown (Pasqualini et al., 2003; Erler, 2004, cit. Jenser et al., 2010). On the whole area of distribution, psyllid species are the most important pests of pears, especially since the mid XX century, when they became a serious problem (Riedl, 1994; Andreies & Erculescu, 2011). The first larger number and harmfulness caused by these pests was at the beginning of the 50´s in the XX century in France and later in other European countries (Bonnemaison & Missonnier, 1955).

Psyllid species the sap suck from leaves, buds and shoots and thus causing direct damages such as drying and falling buds, delay in development and deformation of the attacked plant organs. Also, these species cause indirect damage because they make large amounts of honeydew which cover the plant and which represent a favorable base for the development of the fungus black mould (*Cladosporium* spp., *Alternaria* sp.). All these factors reduce assimilation and transpiration surface of leaves, fruit quality and their aesthetic and market valuation (Medigović et al., 2001; Erler, 2004; Tamaš et al., 2008). Thus, in recent decades, the application of molecular methods confirmed their vector function in the transmission of phytoplasma „*Candidatus* Phytoplasma pyri“ which causes a dangerous disease, “Pear decline“ (PD), and a complete destruction of pears (Carraro et al., 1998).

The distribution of psyllid species, their economic importance and harmfulness in some parts of the world is different. In the Netherlands, for example, *Cacopsylla pyri* and *Cacopsylla pyricola* have the same importance and harmfulness (Trapman & Blommers, 1992). In Spain and Italy, *C. pyri* is the most harmful and then *Cacopsylla bidens* (Sulc, 1907) *C. pyricola* and *C. pyrisuga* (Conci et al., 1993; Civolani, 2012). The harmfulness of *C. pyri* in Greece and Turkey, as well as in other European countries, confirm the data of many authors (Stratopoulou & Kapatos, 1995; Erler, 2004). In the former Yugoslavia since the beginning of the 80´s, *C. pyri* became a serious problem (Krnjaić & Grujić, 1982). From that time until today, this species causes large damages in plantations, especially at low cultivation forms, and it represents a major pest which threatens the survival of pear plantations in all parts of the former Yugoslavia and today's neighboring countries (Milenković et al., 1998; Jerinić-Prodanović, 2010, 2011).

C. pyrisuga and *C. pyricola* have less importance than *C. pyri* and these species are often present in less-mothering orchards.

Except for these species, in Serbia, *C. bidens* was determined in intensive and extensive plantations, and *Cacopsylla melanoneura* Foerster which is primarily a pest of apples (Jerinić-Prodanović, 2010). In Bosnia and Herzegovina there isn't a lot of data about these species and their harmfulness to pear. In the early 80´s, Batinica et al., (1982) cited that species of the genus *Psylla* (the current generation *Cacopsylla*) were constantly present in pear orchards in this area. After this period there had not been a significant study until 2004, when phytoplasmatic disease of pears was discovered and a research was conducted about the role of vector in the spread of phytoplasma. On that occasion the presence of phytoplasma desease was recorded in the Republic of Srpska, "Pear decline"(Trkulja and al., 2004), and Bosnia and Herzegovina (Delić i sar., 2005, 2007).

Materials and Methods

The survey was done in 2011 and 2012 in the field and in the laboratory of the Agriculture Faculty of East Sarajevo and the Agriculture Faculty of Belgrade. A field survey was conducted in intensive orchards, in the locations of Vojkovići and Kula, in the semi-intensive orchards in the locations of Tilava and Petrovići and in extensive orchard in the localition of Kasindo. Using entomological methods, such as visual inspection of trees, taking a sample of infestation plants organs, collecting preimaginal stadium and adult insects, their representation was determined. In the locations of Vojkovići, Kasindo, Tilava and Petrovići, 100 shoots were examined, and in the locality of Kula, the examination included 100 shoots of each cultivar „Viljamovka" (Bartlett/Wiliams), General Le Clerc, „Passa Crasana", Abe Fetel and Poire de Curé. An overview of shoots was performed during the second and third decade of May.

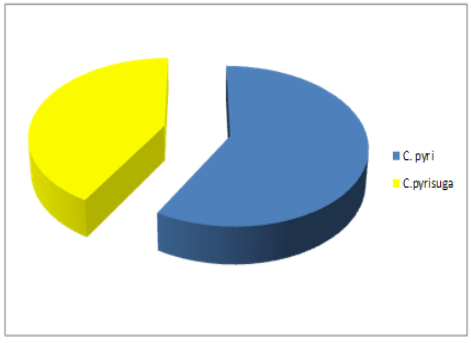
All sampled infested plant material was observed in laboratory. Preimaginal stadium of psylid species were reared to adult stadium. The rearing larvae were in Petri dishes by the method Hodkinson & White, 1979 (cit. Jerinić-Prodanović, 2010). The collected and reared psyllid species were fixed in 70% alcohol. The determination of species was based on morphological characteristic of adults and larvae, such as the appearance of genital and anal complex males and females, and the front nervature skirts, as well as the looks of the fifth larval instar of development. Therefore, temporary and permanent microscopic slides of whole insect body parts important to the determination were made by the method of cold or hot maceration in 10% KOH. Permanent slides were made in Canada balsam by the method Hodkinson & White (1979) and Burckhardt (1989) (cit. Jerinić-Prodanović, 2010).

Results and Discussion

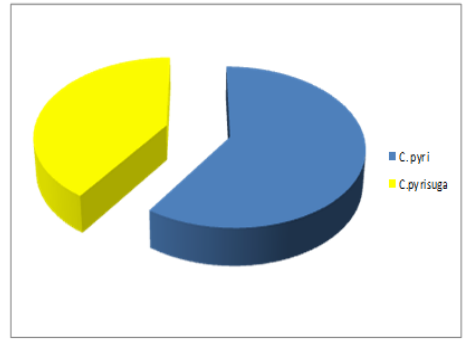
In pear orchards of East Sarajevo, three psyllid species were determined: *C. pyri*, *C. pyrisuga* and *C. pyricola*. An examination of 100 of shoots in the research locations showed a different number of infested shoots. In the intensive orchard in the locality of Vojkovići, during both research years, *C. pyri* was more present compared to *C. pyrisuga*. In 2011, 21% of shoots was infested with larvae of *C. pyri* and 25% in 2012. In 2011, 15% of larvae of *C. pyrisuga* were infested and 17% of shoots in 2012 (Graph. 1, 2). The results of the research were accorded with literature data about significant harmfulness to *C. pyri*, especially in intensive plantations (Petrović-Obradović et al., 2007; Tamaš et al., 2008; Jerinić-Prodanović, 2010, 2011).

In semi-intensive orchards, in the locations of Tilava and Petrovici, and in extensive orchard, the locality of Kasindo, the most present was *C. pyrisuga*, which was in accordance with literature data about lower importance of this species and its greater presence in less-mothering orchards (Almaši et al. 2004; Jerinić-Prodanović, 2010).

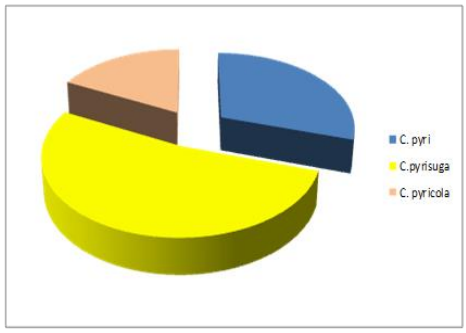
In the locality of Tilava, *C. pyrisuga* infested 30% of shoots, *C. pyri*, 17%, while *C. pyricola* infested 10% of the shoots. In the locality of Petrovići, *C. pyrisuga* was present on 28% of shoots, *C. pyri* to 11%, while the *C. pyricola* was the least present with 7% of infested shoots (Graph. 3, 4). In the extensive orchard, in the locality of Kasindo, *C. pyri* infested 19% and *C. pyrisuga*, 34% of shoots (Graph. 5).



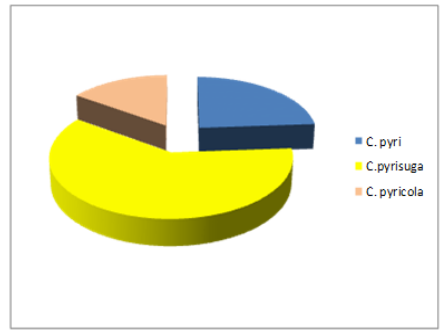
Graph. 1. The presence of psyllid species in the locality of Vojkovići in 2011
Присуство лисних бува на локалитету Војковићи у 2011.



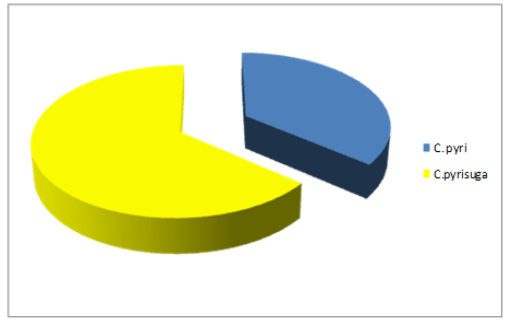
Graph. 2. The presence of psyllid species in the locality of Vojkovići in 2012
Присуство лисних бува на локалитету Војковићи у 2012.



Graph. 3. The presence of psyllid species in the locality of Tilava in 2012.
Присуство лисних бува на локалитету Тилава у 2012.



Graph. 4. The presence of psyllid sp. the locality of Petrovići-2012
Присуство лисних бува на локалитету Петровићи у 2012.

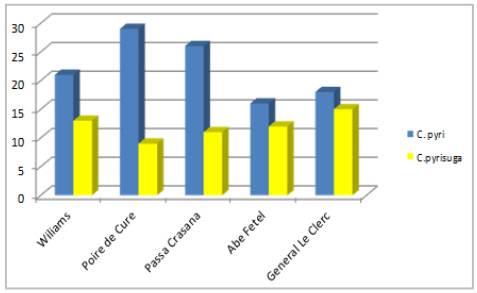


Graph. 5. The presence of psyllid species in the locality of Kasindo in 2012
Присуство лисних бува на локалитету Касиндо у 2012.

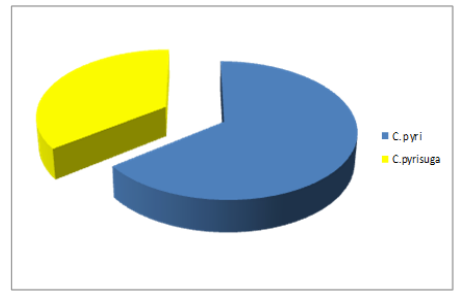
In the locality of Kula, in all cultivars of pear, a larger number of shoots was infested by *C. pyri* compared with *C. pyrisuga.*

Out of the 100 of shoots examined of each cultivars of pear, larvae *C. pyri* infested the smallest number of shoots on cultivar Abe Fetel, 16%, while the most infested shoots, 29%, were on cultivar Poire de Curé. The research results are consistent with published data about sensitivity of this cultivar to *C. pyri*, with the intensity of the attack from 27 to 38% (Stamenković et al., 2012). According to the same author, in terms of sensitivity, cultivar Wiliams follows, with the intensity of the attack from 20 to 29%, which is consistent with our research where the intensity of the attack was 22%. The lowest sensitivity was manifested in cultivar Abe Fetel with the intensity of the attack from 23 to 29%, as confirmed by our research which showed the intensity of attack by 16%.

Cultivar Poire de Curé had the least shoots infested with larvae of *C. pyrisuga*, 9%, and the most infested was cultivar General Le Clerc with 15% of infested shoots (Graph. 6).



Graph. 6. Percentage of infested shoots by psyllid species on cultivars of pears
Просјечан број изданака заражених лисним бувама-сорте крушке



Graph. 7. Total presence of psyllid species in the locality of Kula in 2012
Укупно присуство лисних бува на локалитету Кула у 2012.

Also, in relation to the total number of examined shoots in all cultivars, *C. pyri* infested a larger number of shoots than *C. pyrisuga*, and it was more present (Graph.7). The result of research was an agreement with published data about *C. pyri* who is the most important pest in pear orchards throughout Europe (Kocourek and Stará, 2005; Conci et al., 1993), as well as in the former Yugoslavia and in the neighboring countries where it is especially harmful in intensive plantations (Petrović-Obradović et al., 2007; Tamaš et al., 2008; Jerinić-Prodanović, 2010, 2011). In our research, *C. pyri* was also the most present in intensive plantations in the locations of Vojkovići and Kula. The other two species, *C. pyrisuga* and *C. pyricola* were more present in semi-intensive and extensive orchards, according to literature data about the species that are more present in orchards where the measures of care are irregularly applied (Almaši et al., 2004; Jerinić-Prodanović, 2010).

Conclusion

In pear orchards in the area of East Sarajevo, three psyllid species were found: *Cacopsylla pyri*, *Cacopsylla pyrisuga* and *Cacopsylla pyricola*.

All these species were determined only in the semi-intensive orchards in which *C. pyrisuga* was more present than *C. pyri*, while *C. pyricola* was the least present compared to the other two species. In the extensive orchard, in the locality of Kasindo, *C. pyrisuga* was more present with regards to *C. pyri*.

In intensive orchards, Vojkovići and Kula, *C. pyri* infested a larger number of shoots compared to *C. pyrisuga*. In the locality of Kula, *C. pyri* infested the highest percentage of shoots on cultivar Poire de Curé, and the lowest percentage on cultivar Abe Fetel.

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Појава лисних бува (*Cacopsylla* spp.) у засадима крушке у Источном Сарајеву

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Сажетак

Лисне буве (*Cacopsylla* spp.) су најзаступљеније штеточине крушке у свим областима производње. *Cacopsylla* spp. наносе директне и индиректне штете јер се хране биљним соком и производе велике количине "медне росе" која нарушава природне физиолошке процесе код биљака. Неке врсте лисних бува су пронађени као вектори фитоплазми (Carraro i sar., 1998). Истраживање је спроведено у 2011 и 2012 години у воћњацима, на локацијама Војковици, Кула, Тилава, Петровићи и Касиндо. На локацији Кула истраживање је вршено на сљедећим сортама крушке: *Wiliams, General Le Clerc, Passa Crasana, Abe Fetel* и *Poire de Curé*. У засадима крушке на подручју Источног Сарајева детерминисане су: *Cacopsylla pyri* Linne, *Cacopsylla pyrisuga* Foerster и *Cacopsylla pyricola* Foerster. У воћњацима са интезивном производњом Војковићи и Кула, *C. pyri* је имала веће присуство у поређењу са *C. pyrisuga,* док је у воћњаку са екстезивном производњом, на локалитету Касиндо, *C. pyrisuga* имала веће присуство. У воћњацима са полу-интезивном производњом (Тилава и Петровићи), врста *C. pyrisuga* је имала највеће присуство, а затим врсте *C. pyri* и *C. pyricola*. На локалитету Кула, највећи проценат изданака инфицираних *C. pyri* имала је сорта *Poire de Curé*, а најмањи сорта *Abe Fetel*.

Кључне ријечи: штеточине, крушка, воћњаци, штета

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