The most significant pests of apple in the area of East Sarajevo

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Abstract

Insect pests on apples in the region of East Sarajevo have been studied during 2007. and 2008. year in three locations. In two locations, Kasindo and Pale, examination has been done in extensive plantations over 40 years old, in location Kula, in intensive plantation. Total number of determined species is 36, in extensive plantations were affirmed 33 species, accordingly 25 species and in intensive plantation 18 species were affirmed.

According to the size, intensity and finding frequency, the most important insect pests on apples in East Sarajevo are: Cydia pomonella Linne, Anthonomus pomorum Linne, Aphis pomi De Geer, Dysaphis plantaginea, Callisto denticulella Thunberg, Lithocolletis blancardella Fabricius, Lithocolletis corylifoliella, Stigmella malella Stainton, Leucoptera malifoliella Costa (1836)) and Lyonetia clerkella Linne.

Key words: insect pests, apple, East Sarajevo

Introduction

During a growing season, an apple is exposed to many pests attacks, where important place belongs to insects. Some insect species are present on apples during whole year, where hibernate in all different stages, while some occur only in a certain period of vegetation, depending on developmental stages of a plant and insect species bionomics. Feeding by different plant parts, insects cause physiological weakening of a plant, deformation of plant organs, reduced fruiting or defoliation, while species that damage crops often can cause their early decline, reducing the market value, and sometimes even complete destruction of the plant.

In countries around the world, some species have special economic importance, among which stands C. pomonella, which is the most dangerous pest in the whole area of distribution with harmfulness up to 100% but only in plantations where they do not implement appropriate measures.

In area of Sarajevo and BiH, there is no enough literature about harmful fauna in apple. The most important pests during mid 60’s were studied in detail such as leaf miners (Dimić, 1964) and some kind of the moth (Batinica, 1966).

The area which East Sarajevo includes is part of Sarajevo region, and there is no any research about harmful insect pests on an apple on that area.

Since a satisfactory yield can be achieved only by conducting the appropriate protection measures, including chemical control of harmful species, it is necessary to identify and know the composition of the harmful insect pests on apples in this area and define the most common and economically important species, which was the aim of this study.

Materials and methods

Insect pests of apple in East Sarajevo, are studied in orchards near the location Kasindo, Pale and Kula. Extensive planting characters are present in sites of Kasindo and Pale, while in the area of Kula intensive way of apple growing is present where chemical control measures are escorted to combat insect pests, and disease causes.

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During the growing season, since the swelling and opening of the buds to the harvesting and leaf falling, in intervals of 10-15 days, orchard patrolling has been done, apple tree examination because of presence of harmful insects and their collection in different development stages. By visual examination method of randomly selected trees, was accompanied presence of harmful insects, infestation degree, the intensity of attacks and damage symptoms.

By method of sampling of 100 different plant organs (leaf buds, flower buds, leaves, fruits) with a randomly selected trees in each orchard, was carried out examination of insect pests to determine developmental stage, the intensity of the attacks of certain harmful species and analyzed the symptoms of damage.

In laboratory conditions, was carried out cultivation of materials that included detailed examination of insects collected by hits and by sampling infested plant parts, growing larvae stages of insect collecting, preserving in 70% alcohol.

Results and discussion

The region of East Sarajevo is determined and total number of species of insect pests is 36, in extensive plantations were affirmed 33, accordingly 25 species and in intensive orchards 18 species.

According to the size, intensity of attacks and finding frequency, are defined ten the most important species of insects in this area. Their origin is different by insect orders. In the order of Hemiptera were found two species that belong to the suborder Sternorrhyncha and fam. Aphididae. These are *Aphis pomi* de Geer and *Dysaphis plantaginea* Linne, which in the literature cited as important pests of apple (Petrović-Obradović, 2003; Lazarev, 1972). In the order Coleoptera, the most harmful species was *Anthonomus pomorum* Linne and the order Lepidoptera has the largest number of harmful insects. It was determined 7 species among which are dominated leaf miners of the family Lithocolletidae (*Callisto denticulella* Thunberg, *Lithocolletis blancardella* Fabricius and *Lithocolletis corylifoliella* Haworth), fam. Lyonetidae (*Leucoptera malifoliella* (Costa (1836)), *Lyonetia clerkella* Linne) and fam. Nepticulidae with the type of *Stigmella malella* Stainton.

From fam. Tortricidae, was particularly harmful *C. pomonella*.

Visual inspection of randomly selected trees, as well as leaf examination, in all orchards during both years, there is an *A. pomi* moving there from May to August (Kasindo, Kula) moving there from May to August (Kasindo, Kula) and the month of July (Pale). It was particularly present in June and July and then it formed numerous colonies of winged and wingless individuals in all cultures.

Less time presented during the growing season was a *D. plantaginea*, whose colonies were observed in early April, and there it was by mid-June, when she left an apple, and crossed to the *Plantago* sp. as a secondary host.

With emergence of flower buds, there was a large number of unopened flowers which where gradually got brown. By their opening at the bottom of flower boxes, larvae of *A. pomorum* were found, which, according to the literature are considered to be one of the most important pests of flower buds.

Overview of flower buds was performed two times during the growing season, and the total number of examined buds is 200 in each year (Table 1).

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<thead>
<tr>
<th>Table 1. Number of mined leaves in sites</th>
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<tr>
<td>Localities</td>
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<tr>
<td>Kasindo  Pale  Kula</td>
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<tr>
<td>The number of damaged position from A.pomorum</td>
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<tr>
<td>% of damaged fruit from A. pomorum</td>
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</tbody>
</table>

Throughout the growing season, from May to October, were found blown leaves and mines with caterpillars, but also empty, already abandoned mines.

Leaf review is performed nine times during the growing season in two years of research. Every time 100 leaves were sampled, and total number of examined leaves was 900 in each year. Total number of upbringed species is 6, which are determined by the appearance of damage, ie. types of mines and morphological characteristics of adults. These are: *C. denticulella*, *L. blancardella*, *L. corylifoliella*, *L. malifoliella*, *L. clerkella* and *S. malella* (Tab.2).
Table 2. Number of mined leaves in localities

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<tbody>
<tr>
<td>Callisto denticulla</td>
<td>235</td>
<td>336</td>
<td>152</td>
<td>204</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Lithocoletis blancardella</td>
<td>87</td>
<td>61</td>
<td>84</td>
<td>57</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Lyinetia clerkella</td>
<td>42</td>
<td>50</td>
<td>55</td>
<td>51</td>
<td>41</td>
<td>62</td>
</tr>
<tr>
<td>Stigmela malella</td>
<td>21</td>
<td>26</td>
<td>25</td>
<td>15</td>
<td>10</td>
<td>40</td>
</tr>
<tr>
<td>Lithocoletis corylifoliella</td>
<td>13</td>
<td>11</td>
<td>20</td>
<td>25</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Leucoptera malifoliella</td>
<td>13</td>
<td>8</td>
<td>3</td>
<td>4</td>
<td>47</td>
<td>10</td>
</tr>
</tbody>
</table>

The total number of mined leaves 411 49 339 356 109 122
Expression of the% 45,66 54,66 37,66 39,55 12,11 13,55

The highest percentage of mined, from total number of pages viewed during both years was the site of Kasindo (45 in 2007. and 54.66 in 2008.), slightly lower in the locality of Pale (37.66 in 2007. and 39.55 in 2008.), while the lowest leaf was mined in the locality Kula (12.11 in 2007. and 13.55 in 2008.) which can be explained by using chemical protection measures against pests and disease causing (Table 2).

According to the literature, the species of leafminers are important pests of apple whose larvae, feeding by the parenchyma tissue causes mines of various forms of assimilation and thus reduce transpiration on leaf area (Stamenković, 2000; Dimić, 1964; Almaši et al., 2004).

When it comes to pests of apple fruit, in all localities, the greatest damage caused C. pomonella, who according to the literature is considered one of the most important pests of apple in the world (Chapman & Lienka, 1971; Chapman, 1973; Barnes, 1991, cit. Mansour, 2007).

Overview of fruit was perfomed six times during the growing in all localities, and in each year was examined 600 products of the tree, and 600 fallen products.

A much higher percentage of damaged fruits of C. pomonella is present in extensive plantations which is consistent with published data, according to which the percentage crvljivosti fruit is up to 82.3% in plantations where there is no chemical control measures to combat, or 42.3% of the plantations with the use of chemical control (Stamenković et al., 1995; Graora and Jerinić-Prodanović, 2005; Nikolić, 2006).

Table 3. The percentage of damaged fruits of C. pomonella

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<tbody>
<tr>
<td>% of damaged fruit from C. pomonella</td>
<td>45,25</td>
<td>50,75</td>
<td>39,69</td>
<td>42,33</td>
<td>28,87</td>
<td>30,93</td>
</tr>
</tbody>
</table>

According to the data of foreign authors, C. pomonella can damage or destroy and up to 100% of embroyis in the absence of any control measure, or up to 10% in plantations there where there is no population control and chemical control measures of protection (Talhouk, 1954; Chapman, 1973; Barnes, 1991, cit. Mansour, 2007).

Conclusion

Total number of determined harmful insect species in East Sarajevo is 36, in extensive plantations 33 and 25 and in intensive plantations 18 species. According to their number, attack intensity and finding frequency, the most important types are: Cydia pomonella Linne, Anthonomus pomorum Linne, Aphis pomi De Geer, Dysaphis plantaginea, Callisto denticulella Thunberg, Lithocolletis blancardella Fabricius, Lithocolletis corylifoliella, Stigmella malella Stainton, Leucoptera malifoliella Costa (1836)) and Lyonetia clerkella Linne.

References

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