Reserch on the current spread of the hairy beetle Epicometis (Tropinota) Hirta Poda (chafer beetle, aleculid beetle or blossom feeder beetle) and on the degree of approach in the speciality works of this damaging agent, the main damaging beetle in the Csekonics orchard from Jimbolia* (*the object case study in the doctoral thesis RESEARCH ON PHARE CBC PROJECTS IMPLEMENTATION IN THE WEST AREA OF ROMANIA)

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Abstract:
The practical case study is represented by a orchard of trees now in their 4th year of growth. The orchard was established in 2008 on a piece of land located in outside Jimbolia, Timis county, with funds obtained through the contract EN 2005/017-538.01.01.10, bearing the denomination: "Cross-border cooperation for learning and applying agricultural biotechnology and establishing an information center specialized in fruit growing. " The agricultural management plan of this investment was invalidated by the emergence of a virulent attack of the orchard by pest Epicometis Hirta Poda - the hairy beetle, which almost totally destroyed the flowers of the fruit trees right from their first year of maturity. The pest did not respond to biological pest control, specific to the plantation's character, nor to stronger methods of chemical control. Its origin is undetermined, but the presence of canola crops near the orchard favors the cluster spread of bugs during the attack, as the bugs are present on the canola flowers, where their damage is yet lower in proportion, given the higher number the inflorescences, and flee from there on the trees flowers. As the initial step of the case study, we investigated the degree of studying and the evolution of research on this pest, which are mostly sporadic and undifferentiated, although its damages prove fatal to the fruit production in orchards. Its geographical spread in countries less efficient in the research, the unsteady nature of the attacks may be an explanation of these findings, as well as the enrollment of the hairy beetle in Cetoniidae family, which leads to a group approach in terms of features and the fighting methods.
Corroborating materials found in the specialty literature, be it in books, in magazines or online, one can see that indeed the research on the biology, ecology, distribution and control of the hairy beetle, is made in most cases on larger groups that include this species, the cases where Epicometis Hirta is nominated as a singular subject being more rare.

Keywords: Epicometis Hirta Poda, orchard, hairy beetle, virulent attack, Phare CBC project, agricultural management

Introduction

In the Timis County, more exactly in the Jimbolia town, an orchard of 6,000 fruit trees, planted since 2009, suffered a massive attack of Epicometis Hirta Poda beetle (hairy beetle).
References to the hairy beetle in the Romanian specialized literature are rather limited, confined to the standard description of its appearance, biology, ecology, and the common methods of pest control, similar to those applied against other pests. Also in the international literature, the texts that deal exclusively with Epicometis hirta are rare, but the texts dealing with the Cetoniidae family generally are useful, as the hairy beetle is one of its members, that the renowned European scarabeolog Miksa claimed that are sun-loving beetles, present on flowers, ripe fruit and sweet sap.

The geographical distribution area of the Blossom feeder beetle is the region of Palearctic steppe and the steppe zones in general. In Romania, the species is widespread throughout the country. The Blossom feeder beetle is listed as harmful to the flora of Australia, North America, China, Malaysia, Egypt, Arab countries, Belarus, etc., and in Europe in: Hungary, Croatia, Bulgaria, France, Germany, Italy, Romania.

As of its spread of the flora, the targets attacked by this pest are plants of the *Rosaceae* family: the apple (*Malus communis*), the pear (*Pyrus communis*), the quince (*Cydonia oblonga*), the plum (*Prunus domestica*), the apricot (*Prunus armeniaca*), the cherry (*Prunus avium*); also plants from the *Cruciferae* family: the canola (*Brassica napus*), the mustard (*Sinapis alba*), the cabbage (*Brassica oleracea*), the cauliflower (*Brassica oleracea botrytis*); the *Gramineae* family: the wheat (*Triticum aestivum*) and the rye (*Secale cereale*); and also from the *Asteraceae* family: the dandelion (*Taraxacum officinale*), coltsfoot (*Tussilago windbag*). The period of the attack is at the blossoming time.

In other parts of the world the hairy beetle is known to attack the citrus, the almond (*Prunus dulcis*), rose of oil producing varieties (e.g. in Bulgaria), the fennel (*Carum carvi*), the peach (*Prunus persica*).

The secondary host plants are wheat, barley, lupine, black currant, tulip, daffodil, and hemp broomrape (*Orobanche ramosa*).

In a Croatian article about the fauna of the *Cetoniidae* family, the species of hairy beetle pest is also reported on the almond tree (*Prunus amygdalus*), on the peach tree (*Prunus persica*), on the lupine plant (*Lupinus sp*.), on the cherry tree (*Prunus avium*), on the citrus (*Citrus spp*), on the fennel plant (*Carum carvi*) and on the strawberry (*Fragaria vesca*).

The damages caused by the feeding of the hairy beetle are therefore resulting from the specimens eating the flower parts, the stamina and stigmata, or only the pistil or fruit in its early stages, after which the affected flower withers and falls. These actions were described in earlier literature by the authors Gyôrfy, 1934, 1935; Szilády, 1941; Kadocsa, 1947; and Martinovich, 1962. The beetle begins to feed on the flowers positioned below, especially eating the pollen anthers, the pistils and then it causes the flowering floral to fall at the end of the flowering period.

The pest management in the case of this particular beetle is generally difficult and risky, because E. Hirta attacks during flowering, when the agronomist should protect the useful insect fauna. Insecticides are to be applied so as not to harm other necessary organisms, or even alternative biological methods are to be used. It is recommended the preventive digging of the soil around the trunk of fruit trees, the visual check for the presence of beetles on trees regularly and the manual shaking of the discovered bugs in the morning (when they are numb). These methods are laborious and repetitive and prove useless in the case of a viral attack, with swarms of beetles, regrouping on other host plants in order to continue the decimation of flowers (as it is the case in the case study orchard from Jimbolia).

If the Epicometis beetle infestation is detected, the grower has the option between organic methods of pest control and classical chemical methods, depending on preference, cost, and size of plantation, the stage of attack detection, location, etc. for the affected culture. Unusual links between fauna and flora condition and the attack have also been tackled, with vague results, but there are articles suggesting that a much too sterile medium or newly created varieties of trees might be the cause for an encouragement of the attacks, for example Arabian studies on orchards in artificial oasis in the middle of the desert. In other cases, nutritional disorders were determined through leaf and soil analysis and the farmers were afterwards guided in the application of proper fertilizers. Insectivore animals also are thought to play an important role by allegedly eating the

larvae and pupae whilst in the soil of the orchard, therefore their natural presence in the area should be encouraged instead of removed.

Materials and Methods

The 6000 trees in the orchard are the object of the study, by the method of 5 percents. Each fifth tree from every fourth row is examined in what concerns the affected flowers, the period of attack and the remains of fertile flowers at the end of the blossoming period. The health of its trunk, a couple of its thicker branches and its leaves is also followed.

We followed the stages of project implementation back and forth in time (in the first year of study the orchard was in its second fertile year), the beneficiary rights and obligations as they were translated into reality, the unpredictable environmental problem that until now prevented the expected profits to be obtained by the recipient. We will try to issue a relevant conclusion and an estimate of the development plantation in question, in connection with the degree of materialization of the project scope.

For these activities, we visited the orchard situated in Jimbolia, took pictures of the beetles during the attack, noted the methods for pest control used by the owner and their efficacity. The trees were wrapped in improvised nets in order to keep the beetles away, and this method proved to be slightly helpful, although was implemented too late during the period of attack, at a time when most of the earlier blossoming trees were already damaged completely of in proportion of 80%.

The CBC project that lead to the installment of the plantation is also an issue of research in what regards the liability in case of major damage to the crop and the problems faced by the beneficiary in the case of total lack of profit.

The data gathered in the previous stages of the research will be corroborated towards the final of the doctoral stage in order to try and depict the links between the applicable legislation and rules in the field of CBC projects and the realities that are met by the case study project. The conclusions are aimed at summarying what went wrong and can be prevented by those interested in other similar cases.

Results: the situation of recent approaches on the theme of the spread and pest control in the case of Epicometis Hirta

The most recent and cited articles belong to the group of researchers from the Plant Protection Institute of the Hungarian Academy of Sciences in Budapest, Hungary, coordinated by Miklos Toth, which conducts research and field studies in the area of pheromone traps. At the end of the article “Improving the Floral attractant to lure Epicometis hirta Poda”, published in 2009 by the team composed of József Vuts, István Szarukán, Mitko Subchev, Theodora Toshova and Miklós Tóth is also mentioned the involvement in financing by the National Scientific Research Fund of Bulgary. The owner of the orchard from Jimbolia tested some experimental pheromone traps during the period of attack of E. Hirta, traps made by the Cluj Institute. Yet the attack was too massive and, even though some beetles were lured into the traps, the number of beetles rendered inefficient by theme was too low compared to the visible number of still active beetles. He also used sticky traps, which proves equally insufficient.

Figure 1 - Experimental pheromone trap

Bulgaria has a strong interest in developing methods to combat the hairy beetle because it causes damage at the species of roses that produce oils (Rosa damascena Mill), grown in Bulgaria, Turkey, Greece, Italy, Spain and France (in the European region).
During 1993-1996, the Research Bulgarian Institute for Roses, Herbs and Medicinal plants from Kazanlik, Bulgaria, conducted field research and gathered observations made on experimental fields, which cover damage and the ways to deal with the hairy beetle.

An article from Bulgaria about pest control method for cherry trees recommends the application of Bensultap insecticide against the hairy beetle, a nereistoxin analogue insecticide used to control large crop pests including Lepidoptera and Coleoptera, with contact and ingestion action, affecting the central nervous system of the insects. However, this insecticide is not universally accepted, for example, it is not certified in the UK. In our case study, the owner used more insecticides currently on the market, after trying to fight the pest with biological methods, such as mixtures of chilly peppers and garlic sprayed on the trees. However, the chemical medium created by the use in maximum concentration of the following insecticides Fastac, Pyrex, Atara, Decismega, Calypso, Reldan, Wantek disturbed the beetles too little, as they seemed to adapt and thrive in this condition too.

The Institute for Plant Protection from the Minsk Region (Belarus) is also considering how to better control the hairy beetle, called by them "Rose Chafer", as in their case the pest was discovered in the presence of crops of winter rye.

An article from Portugalia in 2005 provides new data on the distribution of eight species of Scarabeidae, among which Tropinota (Epicometis) Hirta (Poda, 1761), normally considered rare in the Iberian Peninsula, according to Baraud's comment from 1992 cited in the article. It is mentioned the tendency to confuse the hairy beetle with Tropinota (s.str.) Squallida (Scopoli, 1763), but the author lists a number of specimens personally observed in Portugal and Spain, stating that the presence of the hairy beetle is larger than the 2002 table of Mico and Galante would lead to believe.

Other articles presenting results of different researches are mentioning auxiliary the hairy beetle with the occasion of statistics. For example, an article resulting from a Hungarian-Chinese-Brazilian collaboration indicates that Epicometis hirta Poda causes similar damage to those caused by Melolontha hippocastani and Popillia japonica Phyllopertha in what regards the fall of flowers and fruit.

Most recent articles mentioning the hairy beetle as a pest have certain crops as their main focus, and the hairy beetle belongs to the target groups pests that are studied, among which

Epicometis hirta Poda is reflected. This way the mentions of Epicometis Hirta poda are few or limited. To begin with, the correct identification of the hairy beetle is necessary, a subject which is debated by the private agronomists, and for which is used for example the Baraud key, at least in the area influenced by the French specialty works.

Such an article in Syria, addressing the most important species of Scarabeidae in the orchards from the mountains Al-Arab and the evaluation of traps by which the species Epicometis Hirta Suturalis Reitter can be controlled, notes that this particular species is in their case the most common and the most widespread.

Similar passenger mentions can be found in articles from Spain or Germany.With regard to our country, an article published in Romania under the auspices of the University of Craiova, addressing the spectrum of arthropod fauna in a local plantation examined, found that various species of beetles are present, including Epicometis hirta.

In a paper from 2007 on the diversity of insect species present in rapeseed crops in western Romania, published under the auspices of USAMVBT (University of Agricultural Sciences and Veterinary Medicine Banat), the authors concluded that among the major pests of canola is also found the hairy beetle. The conclusion is based on experimental results obtained in the fields of USAMVBT in 2005 and 2006.

In conclusion, research on the biology, ecology, distribution and pest control of the hairy beetle, in most cases is made on groups that include this species, the cases where Epicometis Hirta is nominated as a singular subject being very rare. The progress on methods of fighting this beetle is in line with the overall development of pest control methods for the Scarabeidae family.

Figure 2 - Different types of improvised netting of the small trees affected

This pest is not receiving a particular singular attention also because it seems to be considered as having a minor or medium damaging effect. Yet in our case study orchard, one could notice its devastating effect on the fruit crop, and we have had notice that similar cases were to be found in the Eastern Romania, in the region of Moldova. Yet such viral attacks do not have the due echo, be it because the agricultural regional warning bulletins insufficiently reflect the field situation or because such devastating effects only take place in crops were a sum of medium conditions are gathered and the beetles particularly thrive.

The case study from Jimbolia indeed meets a sum of factors: the orchard is comprised of young trees (peach-*Prunus persica,* pear-*Pyrus comunis*, apple-*Malus domestica,* cherry-*Prunus*

avium, sour cherry-*Prunus cerasus*), all of them new varieties of the species, initiated on a field on the outskirts of the city, in the vicinity of a rapeseed large crop (which also attracts the beetles). There is no older flora in the vicinity (older trees, natural herbs), the moles and the hedgehogs were submitted to repelling methods, and the biological and chemical methods of fighting the beetles were many and even overlapping one another. The meteorological conditions from the years with a high number of beetles may also have played an essential role in the raised population of E. Hirta.

From what we have seen in the other articles mentioning the hairy beetle, a relatively normal size of its population was met amongst other species of pests, a condition that did not outline in any particular way the attack of this beetle on some cultures with such a damaging effect as in our case. The conclusion can be that the natural factors usually regulate what could be a very destroying beetle; therefore, the agricultural pest management indications are scarce and disparate in the specialty texts. It remains to be seen if the particular factors in our case study are repetitive enough to be determined, in order to establish a link between them and the unusual high number of beetles that could be useful in the preparatory stage of agricultural management for other projects (e.g. things to consider when choosing a piece of land or a certain location).

Figure 3 – Epicometis Hirta beetles eating the rapeseed

Figure 4 – Epicometis Hirta beetle during the attack on a cherry tree

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