SUMMARY

The doctorate thesis approaches the study of the main harmful and useful insects from the cherry and sour cherry tree plantation from the Eastern part of Romania, following the application of different pest control means, during the research carried out in the period 2008-2009 and 2009-2010. With this, the purpose is to contribute to the study of some harmful and useful species, through their collection, determination and description, and to compare some prevention and control technologies.

The cherry and sour cherry are important fruit bearing species on Earth, with an extremely high number of adverse vegetal and animal organisms that harm them. In this case, it is impossible to grow cherries or sour cherries without sustained efforts for the prevention and control of these pests, in order to lower the losses, obtain rich, constant and quality harvests.

The cherry tree is a species originating from the area between the Black Sea and the Caspic Sea, from where it then spread to Europe and Asia. In the wild, it can still be found in Iran, China, Russia, Asia Minor, Central Asia , North Africa, South and East of Europe.

Among the first fresh fruit of the year, cherries have a high content of vitamins, mineral salts, sugars and are the object of one of the most efficient commercial activity.

The fruit are destined both for fresh consumption and for industrial processing as juices, syrups, stews, jams, comfiture, etc.

From a medical point of view, a cherry and sour cherry diet is recommended by dieticians for weight loss. Infusions obtained from the dried peduncles have positive effects against cough, stomach aches, kidney diseases and diseases of the urinary tract.

The world cherry production (*Prunus avium* L,) and sour cherry production (*Prunus cerasus* L,) is of about 3,0 billion tons, which represents about 0,7% of the total fruit production.

It is known that obtaining higher fruit productions, of higher quality can be insured only by the successful control of various diseases and pests that can otherwise destroy a large part of the harvest.

Analyzing the impact of other factors as well, but especially the attack of harmful insects; we can observe a decrease of the fruit production in cherry tree plantations, which can be registered annually, and even up to 100% in untreated plantations.

The protection of fruit tree plantations against the attack of pests, as well as the protection of the entomofauna, contribute to the insurance of high and quality production.

The main harmful species found in cherry and sour cherry tree plantations, that cause significant damages from an economic point of view are: *Rhagoletis cerasi* L., *Myzus cerasi* F., *Sciaphobus squalidus* Gyll., *Rhynchites aequatus* L, *Caliroa limacina* Ratz, *Quadraspidiotus perniciosus* Comst., *Panonychus ulmi* Koch, *Ceresa bubalus* F., *Rhynchites bacchus* L, *Operophthera brumata* L., *Malacosoma neustria* L., M*elolontha melolontha* L., *Hyphantria cunea* Drury. ,*Ruguloscolytus rugulosus* Ratz.,

Starting from the fact that, in some years, pests produce special damages, numerous researches have been carried out regarding the distribution, description, biology, way the damage occurs, pest prevention and fighting methods on cherry tree and sour cherry tree plantations.

Some of the researches carried out on the world level focus on the most common pest, *Rhagoletis cerasi,* and were produced by researches like: Bartolini P., Zochi R., Russo G., Boller E. F, Vallo V., Remund U., Haisch A. , Katsovannos B. I; Hippec, J. Hurter, Kirsten Köppler, Volker Storch, şi Heidrun Vogt Alston G. Diane, Lindstrom Thor , Timothy J. Smith, Esteban Gutierrez , Annette Herz, Peter Katz , Arne Peters, Borovinova Maria , Sredkov I., Daniel C., Wyss E., and Howard Thistlewood.

Researches that focused on more aspects of the harmful species present in cherry trees and sour cherry trees plantations, have been subjects that have been studied by: Valisnieri, Thompson W. R., Parker H. L., Smith H. D., Balachowsky A., Benassy C., Milaire H., Bianchi H., Bovey R., Dixon A. F. G., Glen D. M., Rubtov , Thiele Hans Ulrich. Bloesch B, Stäubli,
Linder Ch. , Baillod M., Schaub L., Sarah Jansen , Jaastad G..

In our country , the focus of scientists on the most common pests present in cherry tree and sour cherry tree plantations and the control methods applied to limit the damages they cause, has materialized in the publishing of the studies and results of: Al. Lazar, Iriciuc V. Peiu M., Baicu T., Săvescu A., Şuta Victoria , Gheorghe Mustață , Ioan Borcea , Knechtel W. K, Andriescu Elena, Balaj D., Andriescu I. , Sauciniteanu V., Ciochia V., Doina Ciochia, Filipescu C., Fabritius K., Mog1an I., Pătrascanu Anton Elena, Varvara M., Tomescu N., Lăcătuşu Matilda, Pisică C., Georgescu T., Davidescu D., Petrescu C., Chira A., Amzăr Valentina, Cârdei E., Corneanu G., Ramona Humă , Şerboiu Albertina , Ionela Dobrin, Beatrice Iacomi, Brudea V., Roşca I., Talmaciu M., Tălmaciu Nela, Diaconu A., Teodorescu Georgeta
Gava Adina, Amzăr Valentin .

The present study aims to bring a significant contribution of scientific data obtained following the carry out of own researches that target the harmful and useful entomofauna in some cherry and sour cherry tree plantations following the application of various control methods.

1. Knowing the current status of the researches regarding the harmful and useful fauna from cherry and sour cherry tree plantations from Moldova.

2. Identification and presentation of the main characteristics of the species belonging to the useful and harmful species from cherry and sour cherry tree plantations.

3. Identification of the useful coleopteran species from the cherry and sour cherry tree plantations.

4. Comparative study of the useful coleopteran fauna depending on the pest control technology applied.

5. Calculation of some ecological parameters for each species belonging to the Coleoptera order that has been collected from the cherry and sour cherry tree plantations. These parameters are: abundance (A), constancy (C), dominance (D), ecological significance index (W) etc.

6.The calculation of the fruit production and its correlation with the negative action of the harmful species considered for the study.

7. Calculation and analysis of the variation for the fruit production obtained in the research stations.

The collection of the entomological material will be made using more methods, namely: with the help of earth traps type Barber, with the help of entomological nets and the help of adhesive traps. At the same time various direct observations will be carried out in the field, for the plantations.

The harvesting of the material will be carried out periodically, at intervals of 7 to 14 days for Barber type traps and in case of the shaking method, and for the adhesive chromatic traps, the readings were made every 2 days. For each harvest, the harvesting of biological material from the traps will be labelled, and the labels will specify: the plantation, harvest date, sample no., and means of plantation exploitation (chemical or biological). The material harvested in such a way will be brought to the lab, properly prepared and then determined.

The status regarding the collection of entomological material is presented as follows:

During the research period 2008-2009 and 2009-2010 for stations were prepared in order to carry out the researches, as follows:

- for Iasi district, in the three stations: Vasile Adamachi farm, Rediu farm and Miroslava farm belonging to SCDP Iaşi .
- Vaslui district in one station represented by SC Loturi Service SRL Deleşti farm.

Regarding the number of harmful species is presented as follows:

Following the collections carried out by the shaking method, for the collection of ***Sciaphobus squqlidus* Gyll**. Adults, in the two years observed, the situation on stations is as follows:

In Vasile Adamachi Iaşi station, for the duration of the two years observed, the Sciaphobus squalidus Gyll species has registered a total number of 682 individuals, in Rediu Iaşi stationary, a total number of 554 individuals, in Miroslava Iaşi station a number of a 426, in Deleşti Vaslui station a total number of 236 individuals.

Following the collections carried out with the help of PAL type traps for the collection of adult ***Myzus cerasi* F**. in the two observation years, the situation per stations is as follows:

In Vasile Adamachi Iaşi station, the *Myzus cerasi* F. species, has registered 510 individuals in 2009, and 27 individuals were collected in year 2010. In Rediu Iaşi stationary, the species *Myzus cerasi* F. has registered 523 individuals in 2009, and 857 individuals were collected in year 2010. In Miroslava Iaşi station, the species *Myzus cerasi* F. has registered a number of 136 individuals in 2009 and 119 individuals were collected in year 2010. In the Deleşti Vaslui station, the *Myzus cerasi* F. species has registered 148 individuals and 86 individuals were collected in 2010.

Following fruit collections carried out in order to ascertain the arrack level of the species ***Rhagoletis cerasi* L**., during the two observation years, the situation per stations is as follows:

In Vasile Adamachi Iaşi station, species Rhagoletis cerasi L , during the observation period has registered an attack average of 27,2. In Rediu Iaşi station, the species Rhagoletis cerasi L. during the research period has registered an attack average of 25,4%. In Miroslava Iaşi station, species Rhagoletis cerasi L has registered an attack average of 9,9 %. In Deleşti Vaslui station, species Rhagoletis cerasi L has registered, during the research period, an average of the attack level of 3,7 %;

Regarding the biodiversity of the species collected in the four stations, studies through the two methods, this is presented as follows:

►in Vasile Adamachi Iaşi station, in year 2009 with the Barber type traps method, a number of 18 useful species and 19 harmful species were collected, and in year 2010, a number of 10 useful species and 11 harmful species were collected. The total number of individuals collected during the two observation years was 291.

►in Vasile Adamachi Iaşi station in year 2009 with the shaking method we have collected a number of 21 useful species and 12 harmful ones, and in year 2010 we have collected 16 useful species and 14 harmful ones.

►in Rediu Iaşi station, in year 2009 through the Barber type traps method, a number of 10 useful species and 8 harmful ones were collected and in year 2010, 10 useful species and 19 harmful ones were collected. The total number of individuals collected during the two observation years was 303.

► in Rediu Iaşi station, in year 2009 through the shaking method, we have collected a number of 17 useful species and 15 harmful ones, and in year 2010 16 useful species and 19 harmful ones.

►in Miroslava Iaşi station, in year 2009 with the Barber type method, we have collected a number of 23 useful species and 9 harmful ones, and in year 2010 we have collected a number of 7 useful species and 9 harmful ones. The total number of individuals collected during the two observation years was 170.

► in Miroslava Iaşi station, in year 2009 through the shaking method 15 useful species have been collected and 10 harmful ones, and in year 2010 8 useful species were collected and 7 harmful ones.

►in Deleşti Vaslui station, in year 2009 there have been no Barber type traps installed and in year 2010 a number of 13 useful species and 8 harmful species were collected. The total number of individuals collected was 45.

►in Deleşti Vaslui station, in year 2009 through the shaking method a number of 18 useful species and 20 harmful species were collected and in year 2010 a number of 11 useful species and 9 harmful species were collected.

The treatments carried out in order to fight the main pests and pathogen agents, in the four stations were:

In year 2009 in Vasile Adamachi station there have been applied a number of 4 treatments, as follows: the first treatment to control *Monilia laxa*, *Blumeriella jaapii*, and *Rhagoletis cerasi* L, using the products: Dithane, Bravo (0,2%) and Decis WG (0,03%). The second treatment to control the pests *Rhagoletis cerasi* L. and *Myzus cerasi F*.cât şi pentru *Stigmina carpophila*, using the products Bravo (0,2%) and Reldan (0,15%). The third treatment against the pathogen *Monilia laxa*, the pests: *Adoxophyes reticulana* Hb, *Rhagoletis cerasi* L and *Myzus cerasi F*. with products Bravo and Reldan with dosage of 0,2% respectively 0,15%. The fourth treatment to control *Rhagoletis cerasi* L to prevent the attacks coming from *Stigmina carpophila*, using the products: Folpan (0,2%) and Decis (0,03%).

In year 2010 in Vasile Adamachi station, there have been applied a number of 4 treatments as follows: the first one to fight *Monilia laxa*, *Blumeriella jaapii*, aphids and *Rhagoletis cerasi* L.,

using the products: Bravo , Reldan, Topsin M70 . The second treatment for riddling, *Adoxophyes reticulana* Hb, *Rhagoletis cerasi* L and *Myzus cerasi F*., using the products Folpan (0,2%) and Decis (0,03%); the third treatment against the pathogen *Monilia laxa*, *Rhagoletis cerasi* L and aphids, treatments using products such Dithane and KarateZeon with dosages 0.2% and 0,015% were applied. The forth treatment was applied to fight the *Stigmina carpophila*, *Monilia laxa* and *Blumeriella japii* pathogens using the products Dithane (0,2%) and Calypso (0,02%)

In year 2009 in Miroslava station, there have been 5 treatments applied, as follows: the first one for the control of the *Monilia laxa* pathogen using the Kocide (0,2%) products; the second treatment to control *Monilia laxa*, *Blumeriella jaapii* and *Myzus cerasi F*., using Folicur Solo (0,05%) , Decis 25WG(0,003%) products; the third treatment to control the fungus *Monilia laxa* and the pest *Rhagoletis cerasi* L using Folicur Solo (0,05%), Calypso (0,02%) products; the forth treatment to control the fungus *Monilia laxa*, and the pest *Rhagoletis cerasi* L using the products Folicur Solo (0,05%),and Decis25WG(0,003%). The fifth treatment to control the pest *Rhagoletis ceras* L and for *Myzus cerasi F* using the products Funguran 0,2% and Calypso (0,02%).

In year 2010 in Miroslava station a number of 4 treatments have been applied as follows: the first one to control fungus and bacterial diseases using the product: Funguran-OH (0,3 %); the second treatment was to control the fungus *Monilia laxa* , *Blumeriella jaapii* and the pest *Myzus cerasi F* using the products: Folicur Solo (0,05%), and Decis 25WG (0,003%). The third treatment to control the pathogen *laxa*, and *Rhagoletis cerasi* L using the products: Signum and Decis 25 WG with dosages of 0,0375% and 003%; The fourth treatment to fight the fungus *Monilia laxa*, and the pest *Myzus cerasi F* and *Rhagoletis cerasi* L, using the products Folicur Solo(0,1%) Decis 25 WG (0,003%).

In year 2009 in the Deleşti station there have been seven treatments applied, as follows: the first treatment against fungus and bacterial diseases using Funguran-OH.; the second treatment for the control of pathogens: *Monilia laxa* and *Stigmina carpophila* using the Dihane products; the third product against the fungus *Monilia laxa*, for *Cherry leaf roll, Stigmina carpophila*, *Blumeriella jaapii* the products Score, Topsin, Decis EC have been applied; the fourth treatment to control the *Moniliniei laxa* fungus, leaf cysts, *Stigmina carpophila*, *Myzus cerasi F*, using Score and Actara products. Treatment number five against moniliasis, fungus and bacterial diseases, *Myzus cerasi F*, *Rhagoletis cerasi* L, treatments with Chorus 75, Funguran and Actara have been applied. Treatment number six to control the fungus *Monilia laxa*, *Stigmina carpophila*, and the pests *Rhagoletis cerasi* L, and *Myzus cerasi F* using the products Score and Actara. Treatment number seven against the

fungus *Monilia laxa*, *Rhagoletis cerasi* L and against the pest *Myzus cerasi F* with products Calypso (0,02%),Chorus 75 WG(0,02%), Folicur Solo (0,1%), Karate Zeon (0,015%).

In year 2010 in Deleşti station there have been 6 treatments applied, as follows: the first treatment to control fungus and bacterial diseases using the product Funguran-OH (0,065%); the second treatment to control *Monilia laxa*, *Blumeriella jaapii* şi *Stigmina carpophila*, and for *Myzus cerasi F* and *Rhagoletis cerasi* L using the product Dithane 0,25%; treatment number three to fight fungus and bacterial diseases, the red staining of leaves, *Stigmina carpophila* and for *Myzus cerasi F* using the products: Funguran(0,065%), Actara(0,01%), and Score (0,02%); Treatment number four to fight the fungus *Monilia laxa*, *Blumeriella japii*, *Stigmina carpophila*, *Myzus cerasi F* and for *Rhagoletis cerasi* L, using the products: Chorus 75 WG(0,02%), Funguran(0,065%), Actara(0,01%), Seizer 10EC (0,04%).Treatment number five to control *Monilia laxa*, *Stigmina carpophila*, *Rhagoletis cerasi* L, by using the products Score and Actara; treatment number six to control *Rhagoletis cerasi* L, for *Myzus cerasi F* and *Monilia laxa* fungus using the products: K Kocide (0,2%), Dithane 0,25%.

The values of the ecological parameters calculated for the coleopteran species collected are the following:

► In Vasile Adamachi Iaşi station, the highest **abundance** was that of the species *Brachysomus echinatus* Bonsdorff. with a number of 99 individuals, followed by species *Cymindis humeralis* Fourc. with a number of 26 de individuals. **Constancy** has had values between 0,76 and 9,92. Considering its value, all the 55 species collected are entered in the accidental species category. The values of the **Dominance** have classified the collected species in five categories, as follows: 2 species are eudominant: *Brachysomus echinatus* Bonsdorff*., Dermestes* laniarius; 5 species are dominant: *Harpalus aeneus, Harpalus distinguendus, Mordella fasciata, Otiorrynchus ovatus, Otiorrynchus raucus*; 5 species are subdominant *Harpalus aeneus, Harpalus distinguendus, Mordella fasciata, Otiorrynchus ovatus, Otiorrynchus raucus*;7 species are receding *Pterostichus niger, Psylliodes chrysocephala* L.*, Meligethes aeneus* F.*, Leptinotarsa decemlineata* Say*, Cryptophilus obliteratus, Calathus fuscipes Goeze., Attagenus piceus Olivier*;-38 species are sub-receding, they have values under 1,1%; Through the calculation of the **ecologic significance index** we have classified the 55 species in two categories: accessory species, among which we can mention *Brachysomus echinatus* Bonsdorff, *Cymindis humeralis* Fourc., *Dermestes laniarius, Harpalus calceatus, etc*.; and accidental species, among which we can mention *Amara eurynata* Duft., *Attagenus piceus* Olivier. *Calathus fuscipes* Goeze., *Carabus violaceus* L., *Drilus concolor* Ahrens., *Murmidius ovalis* Beck., *Omias rotundatum* F..

► in Rediu Iaşi stationary, the highest **abundance** was that of the species *Silpha carinata* Herbst. with a number of 102 individuals, followed by species *Attagemus pigeus* Oliv. with a number of 79 individuals. **Constancy** had values between 1 and 13, so that all the 43 species collected are entered in the category of accidental species. The values of the **dominance** have allowed the classification of the collected species into four categories, as follows: 3 species are eudominant, these are: *Silpha carinata*, *Rhinoncus pericarpius* L., *Attagemus pigeus*;5 species are subdominant *Harpalus aeneus, Harpalus distinguendus, Mordella fasciata, Otiorrynchus ovatus, Otiorrynchus raucus* ;8 species are receding *Pseudophonus rufipes, Murmidius ovalis* Beck., *Melanotus rufipes, Cymindid humeralis, Cortinicara gibbosa, Calathus metallicus, Apion longirostre, Ceutorrynchus rapae*;32 species are sub-receding with values under 1,1%. By calculating the receding **ecological significance index** the 43 species can be classified in two categories: accessory species, which include a single species: *Silpha carinata* Herbst.; and accidental species among which:*Rhinoncus pericarpius* L, *Harpalus aeneus, Harpalus distinguendus* Duft., *Otiorrynchus ovatus, Otiorrynchus raucus, Attagemus pigeus*.

►in Miroslava Iaşi station, the highest **Abundance** was that of species Dermestes laniarius with a number of 50 individuals, followed by species Carabus violaceus L. with a number of 26 individuals. **Constancy** has had values between 0,99 and 11,88 so that all 55 species collected are entered in the category of accidental species. The **Dominance** values allow the classification of the collected species in five categories, as follows: 2 species are eudominant *Dermestes laniarius, Carabus violaceus* L.;3 species are dominant *Harpalus calceatus, Mylacus rotundatus, Dermestes lardarius.*; 6 species are subdominant *Amara aenea,Psylliodes chrysocephala* L., *Otiorrynchus raucus, Omias rotundum, Longitarsus tabidus, Harpalus tardus;*5 species are receding *Calathus fuscipes, Cantharis fusca, Otiorrynchus ovatus, Microlestes minutulus, Harpalus azureus*; 26 species are sub-receding, with values under 1,1%; By calculating the **Ecological significance index** the 42 species have been classified in two categories: 7 species are accessory species (*Dermestes lardarius, Harpalus calceatus, Longitarsus tabidus, Mylacus rotundatus, Psylliodes chrysocephala* L, *Carabus violaceus* L , *Dermestes laniarius*), and the rest are accidental, of which we can mention: *Adalia bipunctata* L., *Amara fasciata, Brachinus crepitans, Cymindis humeralis, Cymindis vaporariorum , Halyzia 12 gutatta, Harpalus distinguendus, Harpalus griseus, Mirmidius ovatus*, O*pathrum sabulosum, Phyllotreta atra, Psylliodes cuprea, Propilea quatuordecimpunctata,* etc;

►in Deleşti Vaslui stationary, the highest **abundance** was that of species *Harpalus distinguendus* with a number of 6 de individuals. **Constancy** had values between 2,04 and 8,16. so that all 27 species collected are entered in the accidental species category. **Dominance** values have

allowed the classification of the collected species in five categories: one species is eudominant *Harpalus distinguendus* Duft.;7 species are dominant *Calathus fuscipes, Carabus coriaceus, Coccinella 7 punctata, Harpalus calceatus, Harpalus tardus, Melighetes maurus, Otiorrynchus obvatus*; 4 species are subdominant, *Amara crenata, Harpalus aeneus, Leistus seminigrita, Notiophilus palustris*;15 species are receding, among which *Acupalpus floricolis, Amara similata, Apion apricans, Ceutorrynchus pyrrhorhynchus, Drilus concolor, Harpalus pubescens, Ontophagus taurus, Otiorrynchus ligustici, Oxypora alternans, Podonta nigrita, Pterostichus niger, Trox sabulosus,* etc. The values of the **ecological significance index** have allowed the classification of collected species in two categories: accessory species: there are ten, as follows: *Calathus fuscipes, Carabus coriaceus, Coccinella 7 punctata, Harpalus calceatus, Harpalus dstinguendus, Harpalus tardus, Leistus seminigrita, Melighetes maurus, Notiophilus palustris, Otiorrynchus obvatus* and accidental species, these are 17 species among which: *Harpalus aeneus, Drilus concolor, Amara similata, Amara crenata, Ontophagus taurus, Harpalus pubescens, Oxypora alternans, Pterostichus niger, Trox sabulosus,* etc;

By calculating the variation and analysing the variation, the following have been observed:

►For the results obtained in year 2009, by determining the level of significance we have noticed that in relation to the average of variants, the Bing race stood out as having significant results, while Stela race stood out as having insignificant results.

►Analyzing the data from year 2009, it is observed that good results with positive differences have been obtained for Bing and Van race that have stood out with high yield in comparison with the average of the other four races, and the races: Boambe de Cotnari and Stela have presented negative differences in comparison with the average.