ABSTRACT

Keywords: solanaceae vegetables for fruit, useful entomofauna, harmful entomofauna, pest control.

The purpose of researches was the identification of harmful and useful fauna from the solanaceae cultures for fruit (green peppers, eggplants and tomatoes) depending on the chemical treatment applied for pest control.

The objectives envisaged focused on the collection of harmful and useful entomofauna and the comparative study of entomofauna from the treated and untreated cultures.

Researches were conducted in Ezăreni – Iaşi and Vaslui stations for a period of two years (2009 and 2010). To collect the material, we used two methods: Barber's soil traps and frappage. Collections took place every 10 days starting from June until August, inclusively. At every collection, the biological material was labeled by mentioning the station, the culture and collection date. We determined the entomofauna in the lab after the preliminary preparation of samples.

The activities carried out focused on the elaboration of the field work diagrams, the installation of traps in the experimental field and solaria, observations made directly in the field and solaria, the collection of biological material and its preparation in view of entomofauna identification. Subsequently, researches focused on the analysis of the biological material collected and the determination of species, establishing the structure, abundance, and dynamics of collected species and the calculation of the main ecological indicators: abundance (A), dominance (D), constancy (C) and the ecological significance index (W) for the useful and harmful entomofauna. In order to evaluate and characterize the biodiversity, we determined the diversity of species, Simpson, Shannon indices and the equitability index. At the same time, we statistically determined the preference of some species for a certain type of culture by means of the method of correspondence analysis and the effect of the chemical treatments on Coleoptera by means of Student's t-test.

In Ezăreni station, in 2009, by means of Barber's soil traps, we collected a number of 1584 specimens, out of which 647 useful, 676 harmful, 258 decomposers and 3 pollinators. In 2010, we collected 1554 specimens (772 useful, 586 harmful, 189 decomposers and 7 pollinators).

In Vaslui station, in 2009, by the same collection method, we collected a number of 1754 specimens, out of which 764 useful, 926 harmful, 56 decomposers and 8 pollinators. In 2010, we collected a number of 1358 specimens (585 useful, 714 harmful, 44 decomposers and 15 pollinators).

For the tomato culture in solar greenhouses (collection was carried out by Barber's soil traps) from Vaslui station, in 2009, we identified a number of 103 specimens (36 useful and 67 harmful). In 2010, the total number of collected specimens was 62, out of which 23 useful and 39 harmful.

In Ezăreni station, in 2009, by means of frappage method, we collected a number of 250 specimens out of which 231 harmful and 19 useful. In 2010, the entomofauna collected totalized a number of 171 specimens, 156 being harmful and 15 useful.

In Vaslui station, in 2009, by the same method we identified 216 specimens, 204 being harmful and 12 useful. In 2010, the entomofauna totalized a number of 144 specimens, out of which 131 were harmful and 13 were useful.

In Ezăreni station, the number of Coleoptera specimens collected reached 904 in 2009 and 625 in 2010. In 2009, the number of species from *Coleoptera* order was 28 for tomatoes, 23 for green peppers and 18 for eggplants. In 2010, we identified 28 species for the tomato culture, 26 species for the green pepper culture and 24 for the eggplant culture.

In Ezăreni station, in 2009, the distribution of specimens by orders and cultures is as follows: for the tomato culture in the field, the species of the 6 orders totalize 475 specimens distributed as follows: 281 specimens from *Coleoptera* order and 194 specimens from *Diptera*, *Heteroptera*, *Homoptera*, *Hymenoptera* and *Orthoptera* orders, with a minimum number of 5 specimens (*Diptera* order) and a maximum number of 107 specimens (*Hymenoptera* order); for the eggplant culture, out of the 463 specimens collected, 250 belonged to *Coleoptera* order, and 213 specimens belonged to the following 5 orders: *Diptera*, *Heteroptera*, *Homoptera*, *Hymenoptera* and *Orthoptera*, the number of specimens ranging between 8 (*Diptera*) and 109 specimens (*Homoptera*); for the green pepper culture, the species from the 6 orders sum up 646 specimens, out of which 373 belonged to *Coleoptera* order and 273 to *Diptera*, *Heteroptera*, *Homoptera*, *Hymenoptera* and *Orthoptera* orders, with a minimum number of 5 specimens (*Diptera*) and a maximum number of 98 specimens (*Homoptera*).

In Ezăreni station, in 2010, the distribution of specimens by orders and cultures is as follows: for the tomato culture in the field we identified 483 specimens from 6 orders, *Coleoptera* order with a total number of 189 specimens being the best represented and *Diptera* order, with a total number of 8 specimens being the weakest represented; for the eggplant culture, the identified species summed up 556 specimens from 6 orders, the number of specimens ranging between 5 specimens (*Diptera* order) and 282 specimens (*Hymenoptera* order); for the green pepper culture, the species from the 6 orders summed up 515 specimens, out of which 274 belonged to *Coleoptera* order and 241 specimens to *Diptera*, *Heteroptera*, *Homoptera*,

Hymenoptera and *Orthoptera* orders, with a minimum number of 6 specimens (*Diptera*) and maximum number of 90 specimens (*Hymenoptera*).

In Vaslui station, Coleoptera summed up 710 specimens in 2009 and 517 in 2010. For the tomato culture in solar greenhouses, we identified 42 specimens in 2009 and 26 in 2010. The situation of species from *Coleoptera* order for 2009 is as follows: for the tomato culture we identified 26 species, for eggplant culture 20 species, and for green pepper culture 18 species. In 2010, we collected 32 species in tomatoes, 23 species in eggplants and 22 species in green peppers.

In Vaslui station, in 2009, the distribution of specimens by orders and cultures is as follows: for tomato culture in the field, out of the 747 specimens collected 269 belonged to *Coleoptera* order, and 478 specimens belonged to the following 5 orders *Diptera*, *Heteroptera*, *Homoptera*, *Hymenoptera* and *Orthoptera*, the number of specimens ranging between 22 specimens (*Diptera*) and 192 specimens (*Homoptera*); for the eggplant culture, out of the 458 specimens 206 belonged to *Coloptera* order, and 252 specimens to the other 5 orders, with a minimum number of 13 specimens for *Diptera* order and a maximum number of 128 for *Homoptera* order; for the green pepper culture, the total number of specimens was 549, out of which 235 were *Coleoptera* specimens and 314 belonged to the other 5 orders, with a minimum number of 28 specimens (*Diptera*) and a maximum number of 128 specimens (*Homoptera*).

In Vaslui station, in 2010, the distribution of specimens by orders and cultures is as follows: for tomato culture, the species from the 7 orders summed up 556 specimens, out of which 189 belonged to *Coleoptera* order and 367 specimens to *Diptera*, *Heteroptera*, *Homoptera*, *Hymenoptera*, *Orthoptera* and *Thysanoptera* orders, with a minimum number of 3 specimens (*Thysanoptera*) and a maximum number of 138 specimens (*Hymenoptera*); for the eggplant culture, the 6 orders summed up 404 specimens, out of which 176 represented *Coleoptera* order and 228 specimens represented the other 5 orders: *Diptera*, *Heteroptera*, *Homoptera*, *Hymenoptera* and *Orthoptera*, with a minimum number of 14 specimens from *Diptera* order and a maximum number of 98 specimens from *Homoptera* order; for the green pepper culture, we identified 398 specimens from 6 orders, *Coleoptera* order, with a total number of 152 specimens being the best represented and *Diptera* order with a total number of 19 specimens being the weakest represented.

For the tomato culture in solar greenhouses in 2009, the identified species summed up 103 specimens from 6 orders. The number of specimens ranged between a minimum of 1 specimen (*Hymenoptera* order) and a maximum of 47 specimens (*Orthoptera* order). In 2010, we identified 62 specimens. The best represented was *Orthoptera* order, with 29 specimens, and the order having the least representatives was *Hymenoptera* order (1 specimen).

Unlike the method of Barber's soil traps, where *Coleoptera* order was the best represented, by the frappage method, the beast represented order was *Homoptera*, except for the eggplant culture in the field, in both stations, where the most abundant species was *Leptinotarsa decemlineata* Say. If in the field culture the dominating order was *Coleoptera*, for the culture in solar greenhouses the best represented order was *Orthoptera*.

In Ezăreni station, for the cultures under study in the two years of research, the species (families) having the highest abundance values were: *Formicidae*, *Cicadellidae*, *Harpalus pubescens* Müller, *Anthicus antherinus* L., *Macrosiphum solani* Kittel, *Pyrrhocoris apterus* L. and *Coccinella septempunctata* L.; small values were registered by *Athous niger* L., *Amara similata* Gyllenhal, *Harpalus griseus* Panzer, *Eurydema oleracea* L. and *Tettigonia caudata* Charpentier.

In Vaslui station, the most abundant species (families) were *Macrosiphum solani* Kittel, *Formicidae*, *Harpalus pubescens* Müller, *Cicadellidae*, *Pyrrhocoris apterus* L., *Aphthona euphorbiae* Schrank; the species (families) registering the lowest abundance values were *Philonthus quisquiliarius* Gyllenhal, *Phyllodecta vitellinae* L. and *Stratiomyidae*.

The pests from *Coleoptera* order identified in the solanaceae cultures for fruits from the field and solar greenhouses in the two stations were: *Leptinotarsa decemlineata* Say, *Opatrum sabulosum* L., *Phyllotreta atra* Fabricius, *Phyllotreta vittata* Fabricius, *Phyllotreta nemorum* L., *Longitarsus ballotae* Marsham, *Longitarsus absinthii* Kutschera, *Longitarsus tabidus* Fabricius, *Athous mutilatus* Rosenhauer, *Hypnoidus pulchellus* L. and *Adrastus limbatus* Fabricius.

The pests from other orders encountered in the green pepper, eggplant and tomato cultures were: *Macrosiphum solani* Kittel, *Pyrrhocoris apterus* L., *Gryllotalpa gryllotalpa* L., *Gryllus campestris* L., *Thrips tabaci* Lindeman and *Anthomyiidae*, *Chloropidae*, *Miridae* and *Cicadellidae* families.

As important predators we identified the Coleoptera *Amara aenea* De Geer, *Coccinella septempunctata* L., *Harpalus pubescens* Müller, *Harpalus aeneus* Fabricius, *Harpalus azureus* Fabricius, *Harpalus distinguendus* Duftschmid, *Harpalus tardus* Panzer, *Pterostichus cupreus* L., *Pseudophonus rufipes* De Geer, *Staphylinus caesareus* Cederhjelm. The predatory hymenoptera belonged to *Formicidae* family.

The more important parasites from the solanaceae vegetable cultures for fruit were the hymenoptera from the following families: *Braconidae*, *Chalcididae*, *Ichneumonidae*, *Proctotrupidae*, *Torymidae* and *Scelionidae*.

In Ezăreni station, diversity quantified by the diversity index had higher values as compared to Vaslui station. If we compare diversity in the two years of research in terms of species diversity, this was higher in 2010.

For the tomato culture in solar greenhouses we did not find insects from W_1 class, where as in the field cultures, the species were distributed in all classes. By comparison, between the two collection methods, in the entomofauna collected in Barber's soil traps we identified insects from all classes, whereas in the insects collected by frappage method we did not identify species (families) from D_1 and W_1 classes.

In the area of activity of Iaşi Phytosanitary Unit, in 2009 and 2010, they issued 6 and respectively 4 warnings against pathogen agents and pests from the solanaceae vegetable cultures. In the area of activity of Vaslui Phytosanitary Unit, both in 2009 and in 2010, they issued 6 warnings for each year.

The treatments applied in each of the two years of researches in Vaslui station complied with the recommendations from the warnings issued by Vaslui Phytosanitary Unit. Thus, in 2009, for the tomato culture in the field, we effectuated a number of 7 treatments and in 2010 a number of 6 treatments. The number of chemical treatments applied to green pepper and eggplant cultures reached 6 treatments in 2009 and 5 in 2010. In Ezăreni station, we did not apply chemical treatments for pest control.

In the two years of research, the influence of chemical treatments on Coleoptera species was significant ($p < 0.05$). The Student's t-test demonstrated the very good efficiency of the products used against pests and their selectivity for the useful entomofauna.

To determine the preference of Coleoptera species for a certain habitat, we used the statistic method called correspondence analysis. Following the introduction of the two variables (culture and Coleoptera species identified) into the statistic calculus, we confirmed the existence of a significant association from the statistic viewpoint as follows: **in Ezăreni station**, for tomato – *Anthicus antherinus* L., *Idiochroma dorsalis* Pontoppidan, *Propylaea quatordecimpunctata* L., *Otiorrhynchus fuscipes* Gyllenhal; for eggplant – *Haltica palustris* Weise, *Otiorrhynchus geniculatus* Germar; for green pepper – *Harpalus tardus* Panzer, *Hippodamia variegata* Goeze; **in Vaslui station**, for tomato in solar greenhouses – *Pterostichus niger* Schaller, *Brachyderes incanus* L., *Athous mutilatus* Rosenhauer, *Pterostichus lepidus* Leske; for tomato in the field – *Adrastus limbatus* Fabricius, *Chilopora longitarsis* Erichson, *Elater nigrinus* Herbst, *Philonthus quisquiliarius* Gyllenhal; for eggplant– *Leptinotarsa decemlineata* Say, *Pseudophonus rufipes* De Geer and for green pepper – *Ophonus sabulicola* Panzer.