

PRELIMINARY STUDIES ON PLUM PLANTATIONS ENTOMOFAUNA

Gianina BUTNARIU¹, Mihai TĂLMACIU¹, Silvia Brîndușa HAMBURDĂ¹

e-mail: gianina.butnariu@yahoo.com

Abstract

This paper summarizes the literature on entomofauna of plum orchards. The purpose of this paper is to present the state of knowledge on the main pests of plum plantations existing in our country and beyond. The research was made based on comparative studies and case studies data from the literature. The plum, for Romania, is a fruit tree species with ancient resonance. Great adaptability to different climatic and soil conditions made the plum tree to grow and produce spontaneous or cultivated varieties, range and variety being virtually limitless. Worldwide, the plum tree is attacked by over 90 pest species belonging to the following orders: the Acari order: 6 species; the Heteroptera order: 4 species; the Homoptera order: 16 species; the Coleoptera order: 18 species; the Hymenoptera order: 7 species; the Lepidoptera order: 33 species; the Diptera order: 1 species; the Rodentia order: 2 species. As a general conclusion, the plum tree is attacked by a large number of pests, which, depending on region, weather conditions etc., can adversely affect fruit production.

Key words: orchards, damage, production

Pests and diseases affect a significant part of the annual fruit harvest, from a few percent under good protection to compromising crop in favorable conditions for diseases (apple scab) or pests (plum stones wasps). Regardless of the size of the orchard, currently, when the sources of infection with diseases and pests are very high, quality production can not be achieved without plant protection measures. To perform optimally treatments, major diseases and pests must be known, as well as their biology (Baohong H. et al, 2005, Huang B. et al., 2005).

The most important diseases affecting trees and fruit production, and which can be combated directly, are caused by fungi and bacteria. In addition, there may be a number of viruses and mycoplasmosis, but in this case curative measures can not occur, only preventive ones (Ulea E., 2003).

Among pests, the ones that cause the greatest damage are insects and mites that attack the stem and its components and nematodes that affect roots. Less important in general, but with major implications in particular cases, is the damage caused by birds and rodents (mice, rabbits, deer) (Minaud J., 1980).

For our country, plum fruit tree is a species with ancient resonance. Characterized as the tree of life or hope, it is spread from the plains to the Carpathian hills and sometimes up to the foothills. Over the years, the plum and its products ensured peasants' sustenance, while contributing to the

country's reputation. Durability of the trees and their location on the same land for decades make the fight against pathogens and pests harder, compared to annual agricultural crops, where crop rotation is a very effective combat method (Vincent C. et al, 1999).

The large number of diseases and pests that attack the plum tree makes the organization for fighting them to occupy a significant amount of time and concern for the growers. Protection, at the current requirements, does not refer only to save the harvest, but the fight is necessary to achieve an increased percentage of quality, perfectly healthy fruits, with no accumulation of toxic residues in fruits and their preparations (University of California, 1999).

MATERIAL AND METHOD

This paper summarizes the knowledge of entomofauna of plum orchards, based on an extensive bibliography from our country and abroad. The biological material is the plum species (*Prunus domestica* L.). As working methods, we used comparative analysis and case study based on existing information in the literature, given the possible attack thresholds, in the ecological circumstances in our country. The number of pest species and orders to which they belong have been highlighted. This analysis takes into account the quantity and quality of the harvest, as well as its economic efficiency.

¹ University of Agricultural Sciences and Veterinary Medicine, Iasi

RESULTS AND DISCUSSIONS

Plum trees requires a large number of treatments to prevent and combat diseases and pests, especially since the absence or insufficiency of treatments may lead to the compromise of 50-70% of the crop of plums (*table 1*) (Tălmaciu M., 2009).

In many works of entomology, there are cases of occurrence of insect pests in crops raised multiple issues for science and practice of plant protection. In recent years, an unusual propagation of pests in plum plantations has been noticed, such as plum pips wasp (*Eurytoma schreineri* Schr.), plum black wasp and plum yellow wasp (*Hoplocampa minuta* Christ. and *Hoplocampa flava* L.), plum worm (*Grapholitha funebrana* Tr.), tested lice (*Quadraspidiotus perniciosus* Const., *Parthenolecanium corni* Bche.), aphids (*Hyalopterus pruni* Geoffr.), mites (*Tetranychus urticae* Koch., *Panonychus ulmi* Koch., etc.) (Koves D.S. et al, 2002; Tălmaciu N. et al., 2006 a, b, c, d).

In addition to animal pests, damage from pathogens is also reported, as follows: *Plum pox virus* (plum pox), *Pseudomonas syringae* pv. *mors-prunorum*, *Taphrina pruni*, *Podosphaera tridactyla* and *Polystigma rubrum*.

Starting from the fact that pests, in some

years, produce great damage, a lot of research has been done on pests prevalence, description and biology, prevention and combating measures for pests in orchards (Olsen J.L. *et al.*, 2011; Page P., 2003; Patch E.M., 1915).

The research on pests in plum plantations showed that they represent a large number and which, depending on the area, weather conditions, etc., may adversely affect fruit production. Worldwide, the plum tree is attacked by over 90 pest species belonging to the following orders: the Acari order: 6 species; the Heteroptera order: 4 species; the Homoptera order: 16 species; the Coleoptera order: 18 species; the Hymenoptera order: 7 species; the Lepidoptera order: 33 species; the Diptera order: 1 species; the Rodentia order: 2 species. (Minaud J., 1980; Tălmaciu M. et al. 2004).

Concerning plum plantations in Iasi county, frequent species that produce significant damage are: *Grapholitha molesta* Busck.; *Euproctis chrysorrhoea* L.; *Aporia crataegi* L.; *Lymantria dispar* L.; *Scolitus mali* Bechst.; *Rugidoscolytus rugulosus* Ratz.; *Parthenolecanium corni* Bché.; *Bryobia rubrioculus* Scheut.; *Quadraspidiotus perniciosus* Comst.; *Hoplocampa minuta* Christ.; *Hoplocampa flava*; *Eurytoma schreineri* Schr., etc. (Tălmaciu M. et al, 2007).

Table 1

Plum pests plantations classification (Tălmaciu Nela, 2009)

Species classification	Scientific name	Species classification	Scientific name
Major pests	<i>Tetranychus urticae</i> Hoch.	Secondary pests	<i>Bryobia rubrioculus</i> Scheut.
	<i>Hyalopterus pruni</i> Geoffr.		<i>Eriophyes phloeocoptes</i> Nalepa
	<i>Quadraspidiotus perniciosus</i> Const.		<i>Hyphantria cunea</i> Drury.
	<i>Parthenolecanium corni</i> Bche.		<i>Hyponomeuta padella</i> L.
	<i>Hoplocampa minuta</i> Christ.		<i>Operoptera brumata</i> L.
	<i>Hoplocampa flava</i> L.		<i>Lymantria dispar</i> L.
	<i>Grapholitha funebrana</i> Tr.		<i>Euproctis chrysorrhoea</i> L.
	<i>Eurytoma schreineri</i> Schr.		<i>Sciaphobus squalidus</i> Gyll.
			<i>Rhynchites bacchus</i> L.

The first treatment to prevent plum disease and pests should be applied from January to February, when the tree fully bathes. The day chosen for spraying must be one with temperatures above zero degrees, with a non-existent or very low risk of precipitations and weak wind (Kaufman D.S. et al., 2004).

The following splashes occur in spring, after budding, applying treatments against plum diseases and pests, such as *Monilinia laxa*, red and brown spider and fungal screening. Plum splashes are recommended before the opening of the petals, preferably on a wet, rainy day. At this stage, treatment is aimed at preventing and combating *Monilinia laxa*, fungal disease and

mites. A mandatory spring treatment is applicable after the shaking of petals, as it covers a wide range of diseases and pests. During the summer, there will be warning splashing for a variety of pests, such as *Quadraspidiotus perniciosus* and plum worm, but also for *Monilinia laxa* disease. Treatments are applied regularly at a distance of 2-3 weeks of each other (Kaufman D.S. et al., 2004).

Last splash of the season takes place in November and it is aimed at treating the bark and the wood, especially in old orchards (Kaufman D.S. et al., 2004).

All these pests can be controlled by various methods, but the most desirable is the biological one (Wiackowski S.K., 1971).

International Organization for Biological Fight (OILB) defined biological control as a use of living organisms and products of their biological purpose of regulating pest populations. Through these, it is stressed, on one side, the conscious use of natural enemies of pests, and on the other hand, the products of their metabolism in order not to eradicate, destroy all pests, but only to adjust their density. Extending biological pest control methods is one of perspective directions of development of plant protection, especially to reduce and eliminate pollution phenomena that can produce chemicals (Wiackowski S.K., 1971).

The basic principle of the concept of biological control is the biocenotic balance, that the population of a species (prey, host) is subject to other species (predators, parasites, pathogens). This balance, however, is oscillating, is dynamic and can be disturbed by some agronomic and plant protection practices. Therefore, it is necessary to create favorable conditions to entomophages (Wiackowski S.K., 1971).

CONCLUSIONS

Plum is attacked by a large number of pests which, depending on region, weather conditions etc., can adversely affect fruit production. From the study of bibliography results, we notice not only the importance of knowing plum plantations pests, but also controversial or unresolved issues, which will have to be the highest priority for research units in order to improve integrated protection strategy.

ACKNOWLEDGMENTS

This paper was published under the frame of European Social Fund, Human Resources Development Operational Programme 2007-2013, project no. POSDRU/159/1.5/S/132765.

REFERENCRES

- Baohong H., Yunding Z.O.U., Shoudong B.I., Hengkui, L. I., & Qiaoli, Z. H. U., 2005 - *Characteristics, dynamics and niche of insect community in plum orchard.*[J]. *Chinese Journal of Applied Ecology*, 2, 021.
- Huang B., Zou Y., Bi S., Li H., Zhu Q. 2005 - *Characteristics, dynamics and niche of insect community in plum orchard.* Ying yong sheng tai xue bao= The journal of applied ecology/Zhongguo sheng tai xue xue hui, Zhongguo ke xue yuan Shenyang ying yong sheng tai yan jiu suo zhu ban, 16(2). 307-312.
- Kaufman E., Eihe M., 2004 - *Plum pest and diseases and their control.* Agro Tops (Latvia).
- Koveos D.S., Katsoyannos B., Broufas G.D., 2002 - *First record of Eurytoma schreineri Sch. (Hymenoptera - Eurytomidae) in Greece and some observation on its phenology.* Journal of Applied Entomology, no.4, p.186-187.
- Minaud J., 1980 - *Principal enemies of the plum [pest, disease, control].*Jardins de France (France).
- Olsen J.L., Pscheidt J.W., Peachey R.E., 2011 - *prune and plum pest management guide for the Willamette Valley.* Corvallis, Or.: Extension Service, Oregon State University.
- Page P., 2003 - *Southeastern Peach, Nectarine and Plum Pest Management and Culture Guide.*
- Patch E.M., 1915 - *The Pond-Lily Aphid as a Plum Pest.* Science. 42(1074), 164-164.
- Tălmăciu M., Tălmăciu Nela., Georgescu T., 2004 - *Structura, dinamica și abundența speciilor de coleoptere colectate din plantațiile de prun, în condițiile Stațiunii Didactice Iași, jud. Iași.* Lucrări științifice, vol.47, Seria Horticultura, Analele U.S.A.M.V. Iasi, p.1183-1186.
- Tălmăciu Nela, Tălmăciu M., Diaconu A., 2006 - *Observații privind biologia și ecologia speciei Eurytoma schreineri Schr. (Hymenoptera - Eurytomidae) din plantațiile de prun, în perioada 2002–2003.* Lucrări științifice, Seria Horticultură, p. 1061-1066 , ISSN 1454-7376.
- Tălmăciu Nela, Tălmăciu M., Georgescu T., Diaconu A., 2006 - *Observations concerning the efficiency of some insecticides products, used for controlling the Grapholitha funebrana Tr. pest and Eurytoma Schreineri Schr. pest, from the plum plantations.* Rev. Cercetări agr. în Moldova, vol 4 (128), p.17-24, ISSN 0379-5837.
- Tălmăciu Nela, Tălmăciu M., 2006 - *Structure, abundances, dynamics and parameter ecological of the carabid fauna (Coleoptera – Carabidae) from plum plantations.* ESNA, XXXVI Annual Meeting Iasi-Romania, ISBN (10) 973-7921-81-X ; ISBN (13) 978-973-7921-81-9.
- Tălmăciu Nela, Tălmăciu M., 2006 - *Observations regarding the measures of preventing and control the species Eurytoma Schreineri Schr. pest, from the plum plantations.*ESNA, XXXVI Annual Meeting Iasi - Romania, ISBN(10) 973-7921-81-X; ISBN (13)978-973-7921-81-9.
- Tălmăciu Nela, Diaconu A., Tălmăciu M., Ulea E., 2007 - *Observations concernant la faune des carabides dans les vergers des pommiers situes au nord est de la Roumanie.* Lucr. Șt. Vol.39, partea a II-a.Ed.Agroprint Timișoara, pag. 441-447.ISSN 1221-5279.
- Tălmăciu Nela, 2009 - *Dăunătorii din plantațiile de prun.*Editura Performantica, Iași. ISBN: 978-973-730-593-0.
- Ulea E., 2003 *Fitopatologie horticolă.* Editura "Ion Ionescu de la Brad", Iași. p. 155-166.
- Vincent C., Chouinard G., Hill S.B., 1999 - *Progress in plum curculio management: a review.* Agriculture, ecosystems & environment, 73(2), 167-175.
- Wiackowski S.K., 1971 - *Biological control of harmful plants.* Postepy nauk rolniczych: 18 (3) 61-69.
- *** - *University of California, 1999 - Integrated Pest Management for Stone Fruits. Volumul 3389 din Publication (University of California (System). Division of Agriculture and Natural Resources)).* UCANR Publications. 264 p.