

# Insects Feeding on The Sweet Chestnut (*Castanea sativa* Mill.) in Bulgaria

*Dinko Ovcharov, Danail Doychev, Petia Dimitrova*

University of Forestry, Sofia  
10, Kliment Ohridski Blvd., 1576, Sofia, Bulgaria

## ABSTRACT

A total number of 82 species that have trophic links with *Castanea sativa* Mill. were established until now in Bulgaria as a result both of a review of published data and our own research in the period 2002-2005. These species belong to 3 orders (Homoptera, Coleoptera and Lepidoptera) and 25 families. The representatives of Cerambycidae and Curculionidae are the most numerous. Among them, the most important as a pest is *Curculio elephas*, which may damage a great part of the fruit production. Trophic links of 16 species with the sweet chestnut are reported for the first time in Bulgaria. New data for other 4 species were supplemented. The occurrence of the saproxylic beetles *Cerambyx cerdo*, *Rosalia alpina*, *Morimus asper funereus*, *Lucanus cervus*, and *Gnorimus variabilis* is an indicator for the role of these forests for the biodiversity conservation.

**Key words:** insects, *Castanea sativa* Mill., biodiversity of chestnut forests, saproxylic beetles, Bulgaria.

## INTRODUCTION

The stands of *Castanea sativa* Mill. (sweet chestnut) cover about 1 % of the forests of Bulgaria. This tree species occurs mainly in Belasitsa Mt., and also in Slavyanka Mt., Pirin Mt., the West Rhodopes and the West Balkan Range (Bratanova-Doncheva *et al.*, 2002). Its economical significance is relevant to the production both of fruits and wood (Bratanova-Doncheva *et al.*, 2004).

Various insects, some of which are important pests, develop on the sweet chestnut. The study of these insects is necessary for the decision making in the correct management of the chestnut forests.

The aim of the paper is to present a summary of the investigations of the species composition, as well as new data about the insects developing on *C. sativa* in Bulgaria.

## MATERIAL AND METHODS

Publications on the insect pests of *Castanea sativa* in Bulgaria for the period 1932-2004 are used.

New data for insects, feeding as larvae or adults on different parts of *C. sativa* are presented too. The biological material for them was collected during the period 2002-2005 by the following methods: hand collections of adults and larvae on the chestnut trees (in wood, on leaves, twigs, branches etc.); laboratory rearing of adults from damaged cuttings of stems, branches and twigs in plastic containers at room temperature (17-22 °C).

## RESULTS AND DISCUSSION

All insects known until now to have a trophic link with *Castanea sativa* in Bulgaria are presented in the following checklist. The species of which such links are reported for the first time in Bulgaria are marked with an asterisk (\*).

The nomenclature of the taxa is given according to *Fauna Europaea Web Service* (2004). The families, genera, species and subspecies are sorted alphabetically. Species from Curculionidae are given separately for the subfamilies Curculioninae, Scolytinae and Platypodinae, which were viewed as single families until recently.

### Homoptera

#### Coccidae

*Parthenolecanium corni* (Bouche, 1844)

Stefanov, 1949: (sub *Eulecanium corni*). Todorov, 1967. Zashev, 1969: (sub *Eulecanium corni*). Zashev, 1969 a. Ovcharov and Doychev, 2004.

\* *Parthenolecanium rufulum* (Cockerell, 1903)

New data: Belasitsa Mt., above Petrich, 780 m altitude, scales and young larvae on twigs of Chestnut sapling, 01.11.2005, Doychev leg., Trencheva det.

\* *Pulvinaria vitis* (Linnaeus, 1758)

New data: Belasitsa Mt., above Petrich, 680 m altitude, scales on chestnut stem (10 cm diameter at breast height), 26.06.2004, Doychev leg.

### Coleoptera

#### Anobiidae

\* *Hemicoelus costatus* (Aragona, 1830)

New data: Belasitsa Mt., above Petrich, 680 m altitude, 1 ♂ reared from dry chestnut branch, 02.04. - 06.07.2004, Doychev leg.

\* *Xestobium rufovillosum* (De Geer, 1774)

New data: West Balkan Range, near Berkovitsa, 5 specimens (adults) under bark of dry chestnut stem, 11.10.2002, Doychev and Ovcharov leg. Belasitsa Mt., above Belasitsa Vill., 450 m altitude, 1 larva found in semi-destroyed wood of chestnut stem - 27.06.2004, adult emergence - 2005, exact data unknown, Doychev leg.

### Bostrychidae

*Sinoxylon perforans* (Schrank, 1798)

Keremidchiev, 1977.

New data: Belasitsa Mt., above Petrich, 680 m altitude, 30 specimens reared from dry chestnut branches, 06.05.-31.08.2004, Doychev leg.

*Xylopertha retusa* (Olivier, 1790)

Keremidchiev, 1977: (sub *Xylonites retusus* Oliver). Ovcharov and Doychev, 2004.

### Buprestidae

\**Agrilus laticornis* (Illiger, 1803)

New data: West Balkan Range, near Berkovitsa, 1 ♂ reared from dry chestnut twigs, 11.10.2002 - 05.2003, Doychev and Ovcharov leg. Belasitsa Mt., above Petrich, 680 m altitude, 1 ♂ reared from dry chestnut branch, 02.04. - 06.07.2004, Doychev leg.

*Chrysobothris affinis* (Fabricius, 1794)

Sakalian, 1995.

### Cerambycidae

\**Anaesthetis testacea* (Fabricius, 1781)

New data: Belasitsa Mt., above Belasitsa Vill., 550 m altitude, 1 specimen reared from dry chestnut stems, 03.04.2004 - 08.02.2005, Doychev leg.

*Cerambyx cerdo* Linnaeus, 1758

Todorov, 1967. Keremidchiev, 1977. Ovcharov and Doychev, 2004.

*Cerambyx scopoli* Fuessly, 1775

Keremidchiev, 1977: (sub *Cerambyx scopuli* [sic!] Fussl.). Ovcharov and Doychev, 2004.

New data: West Balkan Range, near Berkovitsa, larva (1 specimen) under bark of chestnut stump, 11.10.2002, Doychev and Ovcharov leg.

\**Chlorophorus figuratus* (Scopoli, 1763)

New data: Belasitsa Mt., near Belasitsa Hut, 680 m altitude, 1 specimen reared from dry chestnut branch, 06.05.04-14.02.2005, Doychev leg.

*Chlorophorus varius* (Müller, 1766)

Keremidchiev, 1977: (sub *Clytanthus varius*).

\**Clytus arietis* (Linnaeus, 1758)

New data: Belasitsa Mt., above Belasitsa Vill., 550 m altitude, 1 specimen reared from dry chestnut stems, 03.04.2004 - 20.01.2005, Doychev leg.

*Clytus rhamni* Germar, 1817

Ovcharov and Doychev, 2004.

\**Exocentrus adpersus* Mulsant, 1846

New data: Belasitsa Mt., above Belasitsa Vill., 550 m altitude, 13 specimens reared from dry chestnut stems, 03.04.2004 - 30.03.2005, Doychev leg. Belasitsa Mt., near Belasitsa Hut, 680 m altitude, 1 specimen reared from dry chestnut stem, 06.05. - 13.09.2004, Doychev leg. Belasitsa Mt., above Belasitsa Hut, 780 m altitude, 2 specimens reared from dry chestnut branches, 02.04. - 06.07.2004, Doychev leg.

*Grammoptera ustulata* (Schaller, 1783)

Ovcharov and Doychev, 2004.

- Leiopus nebulosus* (Linnaeus, 1758)  
Georgiev *et al.*, 2005.
- Mesosa curculionoides* (Linnaeus, 1761)  
Ovcharov and Doychev, 2004.
- Morimus asper funereus* Mulsant, 1862  
Zashev, 1969: (sub *Morimus funereus*). Ovcharov and Doychev, 2004: (sub *Morinus funereus* Muls.).
- Plagionotus arcuatus* (Linnaeus, 1758)  
Zashev and Keremidchiev, 1968.
- Pogonocherus hispidulus* (Piller et Mitterpacher, 1783)  
Georgiev *et al.*, 2005.  
New data: Belasitsa Mt., near Belasitsa Hut, 680 m altitude, 1 specimen reared from dry chestnut stem, 06.05. - 09.09.2004, Doychev leg. Belasitsa Mt., above Belasitsa Vill., 550 m altitude, 1 specimen reared from dry chestnut stems, 03.04. - 21.09.2004, Doychev leg.
- Pogonocherus hispidus* (Linnaeus, 1758)  
Keremidchiev, 1977.
- Prionus coriarius* (Linnaeus, 1758)  
Zashev and Keremidchiev, 1968.
- Rhagium sycophanta* (Schrank, 1781)  
Ovcharov and Doychev, 2004.
- \**Ropalopus clavipes* (Fabricius, 1775)  
New data: Belasitsa Mt., near Belasitsa Hut, 680 m altitude, 7 specimens reared from dry chestnut branches and stems, 15.10. 2004 - 11.03.2005, Doychev leg. Belasitsa Mt., above Belasitsa Vill., 550 m altitude, 4 specimens reared from dry chestnut stems, 03.04.2004 - 24.03.2005, Doychev leg.
- Rosalia alpina* (Linnaeus, 1758)  
Zashev and Keremidchiev, 1968.
- Rutpela maculata* (Poda, 1761)  
Keremidchiev, 1977: (sub *Strangalia maculata* Poda). Ovcharov and Doychev, 2004.
- Stenopterus rufus* Linnaeus, 1767  
Keremidchiev, 1977.
- Stenurella melanura* (Linnaeus, 1758)  
Keremidchiev, 1977: (sub *Strangalia melanura* L.).
- \**Trichoferus pallidus* (Olivier, 1790)  
New data: Belasitsa Mt., above Belasitsa Hut, 780 m altitude, 1 specimen reared from larva found under the bark of dry chestnut stem, larva - 02.04.04, Doychev leg.

#### Cetoniidae

- Cetonia aurata* (Linnaeus, 1761)  
Ovcharov and Doychev, 2004.
- \**Gnorimus variabilis* (Linnaeus, 1758)  
New data: Belasitsa Mt., above Belasitsa Vill., 450 m altitude, adults (1 ♂, 1 ♀) in semi-destroyed wood of chestnut stump, 27.06.2004, Doychev leg. Belasitsa Mt., above Belasitsa Vill., 550 m altitude, larva (1 specimen, 3<sup>th</sup> instar) in semi-destroyed wood of chestnut stem, 30.10.2005, Doychev leg.

*Valgus hemipterus* (Linnaeus, 1758)  
Adjarov, 1968. Ovcharov and Doychev, 2004.

#### Curculionidae: Curculioninae

- Curculio elephas* (Gyllenhal, 1836)  
Drenski, 1932: (sub *Balaninus elephas* Gyll.). Stefanov, 1949: (sub *Balaninus elephas* Gyll.). Popova, 1960, 1962, 1963. Tsankov and Ovcharov, 1990. Tsankov and Mirchev, 1995. Ovcharov and Doychev, 2004: (sub *Balaninus elephas* Gyll.).
- Otiorhynchus endrödii* Angelov, 1964  
Ovcharov and Doychev, 2004.
- Phyllobius argentatus* (Linnaeus, 1758)  
Ovcharov and Doychev, 2004.
- Polydrusus mollis* (Stroem, 1768)  
Ovcharov and Doychev, 2004: (sub *Polydrosus mollis* Stroem).
- \**Polydrusus picus* (Fabricius, 1792)  
New data: Belasitsa Mt., above Belasitsa Hut, 780 m altitude, adult (1 specimen) nibbled leaf of *C. sativa*, 11.06.2004, Doychev leg.
- \**Polydrusus sciaphiliformis* Apfelbeck, 1898  
New data: Belasitsa Mt., above Belasitsa Hut, 780 m altitude, adults (4 ♂♂, 3 ♀♀) nibbled leaves of *C. sativa*, 11.06.2004, Doychev leg.
- \**Polydrusus thalassinus* Gyllenhal, 1834  
New data: Belasitsa Mt., above Belasitsa Hut, 780 m altitude, adults (3 specimens) nibbled leaves of *C. sativa*, 11.06.2004, Doychev leg.
- Polydrusus viridicinctus* Gyllenhal, 1834  
Ovcharov and Doychev, 2004: (sub *Polydrosus viridicinctus* Gyll.).

#### Curculionidae: Scolytinae

- Dryocoetes villosus minor* Eggers, 1908  
Keremidchiev, 1977: (sub *Dryocoetes villosus* F.). Ovcharov and Doychev, 2004.
- Xyleborinus saxesenii* (Ratzeburg, 1837)  
Ovcharov and Doychev, 2004: (sub *Xyleborus saxesenii* Ratz.).
- Xyleborus dispar* (Fabricius, 1792)  
Kovachevski *et al.*, 1949: (sub *Anisandrus dispar* F.). Lazarov, 1949: (sub *Anisandrus dispar* F.). Stefanov, 1950: (sub *Anisandrus dispar* F.).
- Xyleborus monographus* (Fabricius, 1792)  
Adjarov, 1968: (sub *Bostrychus monographus*). Ovcharov and Doychev, 2004.

#### Curculionidae: Platypodinae

*Platypus cylindrus* (Fabricius, 1792)  
Adjarov, 1968.

#### Lucanidae

*Lucanus cervus* (Linnaeus, 1758)  
Keremidchiev, 1977.

**Lymexyliidae**

*Hylecoetus dermestoides* (Linnaeus, 1861)  
Zashev and Keremidchiev, 1968.

**Melandryidae**

\**Hypulus quercinus* (Quensel, 1790)  
New data: Belasitsa Mt., above Belasitsa Vill., 450 m altitude, 1 larva found in semi-destroyed wood of chestnut stem - 27.06.2004, adult emergence - 2005, exact data unknown, Doychev leg.

**Melolonthidae**

*Melolontha hippocastani* Fabricius, 1801  
Adjarov, 1968.

*Melolontha melolontha* (Linnaeus, 1758)  
Adjarov, 1968: (sub *Melolontha vulgaris* E). Ovcharov and Doychev, 2004.

**Lepidoptera**

**Bucculatricide**

*Bucculatrix thoracella* (Thunberg, 1794)  
Tomov and Trenchev, 1999.

*Bucculatrix ulmella* Zeller, 1848  
Tomov and Trenchev, 1999.

**Cossidae**

*Cossus cossus* (Linnaeus, 1758)  
Adjarov, 1968: (sub *Cossus ligniperda* L.). Zashev, 1969.

**Geometridae**

*Alsophila aescularia* (Denis and Schiffermüller, 1775)  
Zashev and Keremidchiev, 1968.

*Operophtera brumata* (Linnaeus, 1758)  
Zashev and Keremidchiev, 1968.

**Gracillariidae**

*Phyllonorycter messaniella* (Zeller, 1846)  
Tomov and Trenchev, 1999.

**Incurvariidae**

*Incurvaha masculella* (Denis and Schiffermüller, 1775)  
Tuleshkov, 1958: (sub *Incurvaria muscalella* F.).

**Lasiocampidae**

*Malacosoma neustria* (Linnaeus, 1758)  
Ovcharov and Doychev, 2004.

**Limacodidae**

- Apoda limacodes* (Hufnagel, 1766)  
Tuleshkov, 1958: (sub *Cochlidion limacodes* Hufn.).

**Lymantriidae**

- Euproctis chrysorrhoea* (Linnaeus, 1758)  
Ovcharov and Doychev, 2004.  
*Calliteara pudibunda* (Linnaeus, 1758)  
Adjarov, 1968: (sub *Dasichira pudibunda* L.).  
*Lymantria dispar* (Linnaeus, 1758)  
Adjarov, 1968: (sub *Liparis dispar* L.). Ovcharov and Doychev, 2004.

**Nepticulidae**

- Ectoedemia albifasciella* (Heinemann, 1871)  
Tomov and Trenchev, 1999.  
*Stigmella basiguttella* (Heinemann, 1862)  
Tomov and Trenchev, 1999.  
*Stigmella ruficapitella* (Haworth, 1828)  
Tomov and Trenchev, 1999.  
*Stigmella samiatella* (Zeller, 1839)  
Tomov and Trenchev, 1999.

**Noctuidae**

- Agrotis segetum* (Denis and Schiffermüller, 1775)  
Adjarov, 1968.  
*Catocala promissa* (Denis and Schiffermüller, 1775)  
Zashev and Keremidchiev, 1968.  
*Euxoa temera* (Hübner, 1808)  
Buresch *et al.*, 1950: (sub *Agrotis temera* Hb.).  
*Moma alpium* (Osbeck, 1778)  
Buresch and Tuleschkow, 1932: (sub *Diptera alpium* Osbeck).

**Nolidae**

- Pseudoips prasinana* (Linnaeus, 1758)  
Tuleshkov, 1958: (sub *Hylophila prasinana* L.).

**Thaumetopoeidae**

- Thaumetopoea processionea* (Linnaeus, 1758)  
Adjarov, 1968: (sub *Cnetocampa processionea*).

**Tischeriidae**

- Tischeria ekebladella* (Bjerkander, 1795)  
Tomov and Trenchev, 1999.  
*Tischeria decidua* Wocke, 1876  
Tomov and Trenchev, 1999.  
*Tischeria dodonaea* Stainton, 1858  
Tomov and Trenchev, 1999.

### Tortricidae

*Cydia amplana* (Hübner, 1800)

Tsankov and Ovcharov, 1990. Tsankov and Mirchev, 1995. Ovcharov and Doychev, 2004: (sub *Laspeiresia amplana* Hb.).

*Cydia splendana* (Hübner, 1799)

Adjarov, 1968: (sub *Carpocapsa splendana*). Tsankov and Ovcharov, 1990. Tsankov and Mirchev, 1995.

*Pammene fasciana* (Linnaeus, 1761)

Tsankov and Ovcharov, 1986, 1987, 1990. Tsankov and Mirchev, 1995. Ovcharov and Doychev, 2004.

*Tortrix viridana* Linnaeus, 1758

Ovcharov and Doychev, 2004.

A total number of 82 species which have trophic links with *Castanea sativa* Mill, are established until now in Bulgaria. They belong to 3 orders (Homoptera, Coleoptera and Lepidoptera) and 25 families. The representatives of Cerambycidae (23 species) and Curculionidae (13 species) are the most numerous.

The mass of the shown insects feed (as larvae or adults) on the leaves or the stems and branches of the chestnut. However, *Curculio elephas* (Curculionidae) the most important as a pest is, and it together with *Cydia splendana* (Tortricidae), may damage, a big part of fruit production.

*Cydia fagiglandana*, a tortricoid moth, caught by traps together with *C. splendana* and *Pammene fasciana* in the chestnut stands in Belasitsa Mt. (Tsankov *et al.*, 1996), is not included in the list because of its unproved trophic link with the sweet chestnut in Bulgaria.

For 16 species, trophic links with the sweet chestnut are reported for the first time in Bulgaria. New data for other 4 species are supplemented.

Five species, *Cerambyx cerdo*, *Rosalia alpina*, *Morimus asper funereus* (Cerambycidae), *Lucanus cervus* (Lucanidae) and *Gnorimus variabilis* (Cetoniidae), known as saproxylic beetles, are interesting not as pests but mainly in terms of the biodiversity conservation of the sweet chestnut ecosystems. The first four of these species, which are included in Directive 92/43/ EEC, have conservation status and the preservation of their natural habitats must be stipulated in the strategies for management of the sweet chestnut forests in Bulgaria.

**Acknowledgements:** We would like to thank Ass. Prof. Katya Trencheva (University of Forestry, Sofia) for the determination of Coccidae species.

The work was supported by the CAST Project of the National Forestry Board, № 184/08.10.2002.



## References

- Adjarov N. 1968. *The Chestnut culture*. Sofia, Zemizdat, 32 p. (In Bulgarian).
- Bratanova-Doncheva S., V. Velev, M. Lyubenova, M. Atanasova. 2002. Eco- Biological and Phytocenological Characteristics of *Castanea sativa* Mill. in Bulgaria. - In: *Multifunctional, close-to-nature and sustainable forest management in Bulgaria*. Bulgarian-Swiss Forestry Programme, Sylvica Foundation, Sofia, 218 — 230. (In Bulgarian).
- Bratanova-Doncheva S., N. Chipev. 2004. Ecosystem approach to sustainable management of forests. - *Journal of Forest Ideas*, 6.
- Buresch I., A. Lazarov, A. Balevski, V. Bogdanov, I. Zhelev. 1950. The Spring gray worm, *Agrotis temera* Hb. (Lep., Noct.) during 1948 in Bulgaria. Sofia (BASc Publ.), 102 p. (In Bulgarian).
- Buresch I., K. Tuleschkow. 1932. Die horizontale Verbreitung der Schmetterlinge in Bulgarien. III (1). Tiel: Noctuiiformes. - *Mitteilungen aus den Koniglichen Naturwissenschaftlichen Instituten in Sofia - Bulgarien*, 5: 67 - 144 (In Bulgarian, abstract in German).
- Drenski P. 1932. Kleine entomologische Mitteilungen. II. - *Mitteilungen der Bulgarischen Entomologischen Gesellschaft in Sofia*. Band VII: 62 - 77 (In Bulgarian).
- Georgiev G., N. Simov, A. Stojanova, D. Doychev. 2005. New and Interesting Records of Longhorn Beetles (Coleoptera: Cerambycidae) in Some Bulgarian Mountains. - *Acta zoologica bulgarica*, 57 (2): 131 - 138. (In English, abstract in Bulgarian).
- Keremidchiev M. 1977. Insect Pests Declined the Health Status of the Chestnut. - *Gorsko Stopanstvo*, № 4: 32 - 34. (In Bulgarian).
- Kovachevski I., A. Lazarov, V. Bogdanov, A. Hristov, A. Balevski, S. Martinov. 1949. A guide of plant protection of diseases and pests. - Zemizdat. Sofia, 424 p. (In Bulgarian).
- Lazarov A. 1949. The insect pests in the fruit cultures in Bulgaria and their control. - *Izdanie na BAN, Nauchno-populyarna reditsa, Sofia*, № 8, 328 p. (In Bulgarian).
- Ovcharov D., D. Doychev. 2004. Differences in the attacks by insect pests on the Chestnut (*Castanea sativa* Mill.) in Belasitsa Mountain depending on the age of the forests. - *Forestry ideas*, № 1 (29): 121 - 127 (In Bulgarian, abstract in English).
- Fauna Europaea Web Service. 2004. *Fauna Europaea version 1.1*, Available online at <http://www.faunaeur.org>
- Popova I. 1960. Sorts of chestnut trees, stable on chestnut weevil. - *Rastitelna zashtita*, № 3: 69 - 71. (In Bulgarian).
- Popova I. 1962. Biological features of the chestnut weevil *Curculio (Balaninus) elephas* Gyll. Biology and methods of its control. - *Izvestia na Instituta za zashtita na rastyeniyata*, № 2 (In Bulgarian, abstracts in English and Russian).
- Popova I. 1963. Relative resistance of Chestnut (*Castanea sativa* Mill.) to Chestnut weevil - *Curculio (Balaninus) elephas* Gyll. - *Izvestia na Instituta za zashtita na rastyeniyata*, № 4: 159— 168 (In Bulgarian, abstracts in English and Russian).
- Sakalian V. 1995. Buprestidae (Coleoptera) Pests in Bulgaria. - In: *Treta natsionalna nauchna konferentsia po entomologiya, 18-20.IX, Sofia*: 25 - 30. (In Bulgarian, with English abstract).

- Stefanov D. 1949. Forest protection. Protection of the forest nurseries, cultural and windbreaks from pests and diseases. Zemizdat, Sofia, 151 p. (In Bulgarian).
- Stefanov D. 1950. Forest protection. *Lectures for the forth years students of forestry in the Agricultural Academy "Georgi Dimitrov", Sofia*. - Darjavno izdatelstvo "Nauka i izkustvo". Sofia, 846 p. (In Bulgarian).
- Todorov T. 1967. The Bercovian Chestnut must be saved. - *Gorsko stopanstvo*, 8: 24 - 26. (In Bulgarian).
- Tomov R., G. Trenchev. 1999. Leafminers (Lepidoptera), damaging nuts fruit trees in Bulgaria. - *Higher School of Agriculture - Plovdiv, Scientific Works*, vol. XLIV, book 2: 47 - 54.
- Tsankov G., D. Ovcharov. 1986. The Chestnut fruit worm (*Pammene fasciana* Steph.) - a new pests on the Chestnut fruits in Bulgaria. - *Gorskostopanska nauka*, № 5: 41 - 45. (In Bulgarian).
- Tsankov G., D. Ovcharov. 1987. Possibilities for using of microbiological means for control of *Pammene fasciana* Steph. (Lep., Tortr.). - In: *Mejdunarodniy nauchnoy simpozium 17 — 23. VI. 1985. Sbornik dokladov, Sofia, BAN*: 93 - 98. (In Russian).
- Tsankov G., D. Ovcharov. 1990. Insect pests on the fruits of Sweet Chestnut (*Castanea saliva* Mill.) growing in Belasitsa, and means of controlling them. - In: *Roliata na polezashtitnite poiasi za povishavane na dobiva na selskoslopanските kulturi i opazvane na prirodната среда, Sofia, SUB*: 19 - 62 (In Bulgarian).
- Tsankov G., P. Mirchev, R. Giacometti. 1996. Tortricoid moth males caught by baited with synthetic attractants set in sweet chestnut stands in the Belasitsa Mountain (Bulgaria). - *Bolletino del Laboratotio di Eniologia Agraria "Filippo Silvestri"*, 51 (1996): 127 - 136.
- Tsankov G., P. Mirchev. 1995. Damages dynamics and snout beetle to cankerworms frequence ratios for Sweet Chestnut (*Castanea sativa* Mill.) fruits of Belasitsa Mountain. - In: *"The 70" Anniversary of the Establishment of the Higher Institute of Forestry and Forest and Industries, Sofia*", 3: 185 - 190 (In Bulgarian, abstract in English).
- Tuleshkov K. 1958. The Bulgarian Butterflies (Short Review). "Nauka I izkustvo", Sofia, 344 p. (In Bulgarian).
- Zashev B. 1969. Studies on the reasons for dying of the Chestnut in Berkovitsa environs. - *Nauchni trudove na VLTI, gorsko stopanstvo*, XVIII: 73 - 80. (In Bulgarian).
- Zashev B. 1969 a. The Chestnut beside Berkovitsa may no to die. - *Gorsko stopanstvo*, 2: 40 - 44. (In Bulgarian).
- Zashev B., M. Keremidchiev. 1968. An Atlas of the Forest Insects. - Zemizdat, Sofia, 274 p. (In Bulgarian).