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## **The Occurrence of some Lepidopterous species on the horse chestnut (*Aesculus hippocastanum* L.) at Istanbul-Belgrad Forest in Turkey**

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### **ABSTRACT**

The occurrence of some Lepidopterous species was determined between 2004 and 2005 on the horse chestnuts of Istanbul-Belgrad Forest in Turkey. The following eleven pests of the horse chestnut were recorded: *Cameraria ohridella* (Deschka & Dimic, 1986) (Gracillariidae), *Archips crataegana* (Hübner, 1799), *A. podana* (Scopoli, 1763), *A. xylosteana* (Linnaeus, 1758) (Tortricidae), *Crocallis elinguaris* (Linnaeus, 1758), *Ennomos quercaria* ([Hübner], [1812]), *E. quercinaria* (Hufnagel, 1767), *Erannis defoliaria* (Clerck, 1759), *Operophtera brumata* (Linnaeus, 1758), *Pachycnemia hippocastanaria* (Hübner, 1799) (Geometridae) and *Amphipyra pyramidea* (Linnaeus, 1758) (Noctuidae).

**Key words:** Lepidoptera, horse chestnut, pests, Istanbul, Turkey.

### **IZVLEČEK**

#### **POJAV NEKATERIH VRST LEPIDOPTER NA DIVJEM KOSTANJU (*Aesculus hippocastanum* L.) V GOZDU ISTANBUL-BELGRAD V TURČIJI**

V letih 2004 in 2005 je bil ugotovljen pojav vrst Lepidopter na divjem kostanju v gozdu Istanbul-Belgrad v Turčiji. Ugotovljenih je bilo naslednjih enajst škodljivcev: *Cameraria ohridella* (Deschka & Dimic, 1986) (Gracillariidae), *Archips crataegana* (Hübner, 1799), *A. podana* (Scopoli, 1763), *A. xylosteana* (Linnaeus, 1758) (Tortricidae), *Crocallis elinguaris* (Linnaeus, 1758), *Ennomos quercaria* ([Hübner], [1812]), *E. quercinaria* (Hufnagel, 1767), *Erannis defoliaria* (Clerck, 1759), *Operophtera brumata* (Linnaeus, 1758), *Pachycnemia hippocastanaria* (Hübner, 1799) (Geometridae) and *Amphipyra pyramidea* (Linnaeus, 1758) (Noctuidae).

**Ključne besede:** Lepidoptera, divji kostanj, škodljivci, Carigrad, Turčija.

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## INTRODUCTION

The general area of Turkey is 77.056.192 ha. The forested area is 21.188.747 ha, so 27.5% of the land in the country is covered with forests (Anonymous, 2006a). The Belgrad Forest corresponding to 0.03% of forested areas in Turkey covers an area of 5.444 ha. Elevation in the area ranges from 40 to 230 meters. The climate of Belgrad Forest according to Thornthwaite classification system is humid, mesothermal oceanic with a moderate water deficit in summer. The soils are shallow to deep, gravelly, loamy clay in texture, rich in organic matter with medium to good permeability rates. Dominant vegetation includes *Quercus frainetto*, *Q. cerris* and *Fagus orientalis* tree species mixed with varying amounts of *Acer campestre*, *A. trautvetteri*, *Alnus glutinosa*, *Carpinus betulus*, *Castanea sativa*, *Populus tremula*, *Sorbus torminalis* and *Ulmus campestris* with a normal crown closure (Yaltirik, 1966; Kantarci, 1980; Karaoz, 1988; Ozyuvaci *et. al.*, 2004).

The name of horse chestnut is given for its speciality of being used against heaves (Chronic Obstructive Pulmonary Disease) after completing of the horse racing. This tree species with a domed crown grows up to about height of 25 m. The outer branches of the old trees lean out of during vegetation period because of heights of leaves. During winter season branches falling leaves turn towards up again. The leaves are opposite and palmately compound, with leaflets; each leaflet is 10-25 cm long, making the whole leaf up to 50 cm across, with a 20 cm petiole (Anonymous, 2006b; Anonymous, 2007). *A. hippocastanum* is an exotic plant species for Turkey and is widely cultivated in Belgrad Forest. *A. hippocastanum* is generally used for parks and gardens or afforestation of gaps because of the fast and good growing on each area such as native species. It offers an aesthetic image and protection against the noises, dusts, air pollutions and heat in urban areas of Turkey. The horse chestnut is also an ornamental plant species used in Landscape architecture planning. But, there is almost no information about its pests in Turkey. Although some insects were observed feeding on *A. hippocastanum* but more of this studies investigated directly Lepidopterous species that cause problems on this tree species. On the other hand, in European and Balkan countries it is especially well known the *A. hippocastanum* is severely damaged by some insects (Ariëns, 2004; Augustin *et. al.*, 2004; Avtziş, 2004; Baraniak *et. al.*, 2004; Del Bene / Gargani, 2004; Gininenko, 2004; Girardoz *et. al.*, 2004; Johné *et. al.*, 2006; Matošević, 2004; Matošević *et. al.*, 2006; Milevoj, 2004; Milevoj / Pivk, 2004; Perju *et. al.*, 2004; Subchev *et. al.*, 2004; Tilbury *et. al.*, 2004). In contrast, nobody investigated insect problems on this tree species in Turkey. Therefore, the aim of this study was to investigate harmful Lepidopterous species causing disease on horse chestnut adapting itself the climate conditions of Turkey.

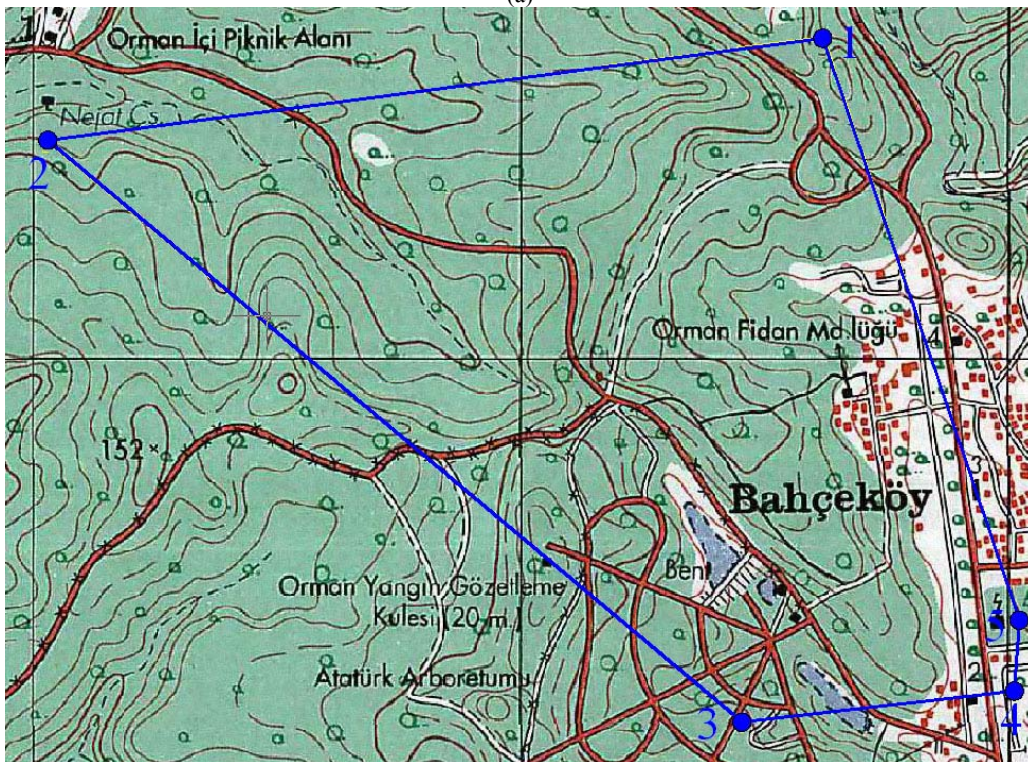
## MATERIAL AND METHODS

This study was conducted between 2004 and 2005 years in Istanbul-Belgrad Forest. The horse chestnut trees are distributed on sites (1, 2, 3, 4 and 5) in forest area (Figure 1). The horse chestnut trees were monitored for the presence of pests. Larvae on infested leaves, parts of trunks and shoots were picked up from April to October. The pests were fed regularly inside glass bottles covered organandy mesh in the laboratory. Also, *Cameraria ohridella* was monitored into bags hanging on tree branches. Relative humidity in the laboratory was maintained 60-70% within 20-24 °C. The emerged adults were killed in killing jars with ethyl acetate. Each specimen was pinned using a no: 1 insect pin and the wings were mounted on

a spreading board. After, the dried specimens were numbered and placed in insect boxes. Each Lepidopteran specimen was identified using our collections by an Olympus stereomicroscope.



(a)



(b)

Figure 1. (a) The map of Belgrad Forest.  
 (b) Sites of founded chestnut trees in forest area (1, 2, 3, 4 and 5)

## RESULTS

Lepidopteran species determined belong to four families Gracillariidae, Tortricidae, Geometridae and Noctuidae, and are shown below:

*Cameraria ohridella* (Deschka & Dimic, 1986) (Gracillariidae)

04.vi.2004 (larva), 06.ix.2004 (pupa), 27.ix.2004, 1 ♂; 04.vii.2004 (larva), 10.ix.2004 (pupa), 01.x.2004 1 ♂; 11.viii.2004 (larva), 15.ix.2004 (pupa), 04.x.2004, 1 ♀; 11.viii.2004 (larva), 12.ix.2004 (pupa), 02.x.2004, 1 ♀; 12.ix.2004 (larva), 17.ix.2004 (pupa), 13.x.2004, 1 ♀; 11.viii.2005 (larva), 04.ix.2005 (pupa), 24.ix.2005, 1 ♀; 11.viii.2005 (larva), 05.ix.2005 (pupa), 30.ix.2005, 1 ♂; 06.ix.2005 (larva), 10.ix.2005 (pupa), 03.x.2005, 1 ♂.

The moth was more abundantly in the study field. It was founded 3-9 larvae in point of numbers on each leaf, generally 6-9 larvae on lower branches and 3-5 larvae mid branches.

*Archips crataegana* (Hübner, 1799) (Tortricidae)

Istanbul-Bebek, Belgrad Forest on *Crataegus monogyna* and *Quercus robur* (De Lattin, 1951; Avci, 1997; Kocak / Seven, 2001a).

04.v.2005 (larva), 13.v.2005 (pupa), 30.v.2005, 1 ♂.

*Archips podana* (Scopoli, 1763) (Tortricidae)

Adana, Bursa, Canakkale, Istanbul, Izmit, Kirklareli on *Cornus mas*, *Corylus colurna*, *Fraxinus angustifolia*, *Malus* sp., *Populus* sp., *Quercus frainetto*, *Rosa* sp. and *Tilia argentea* (Osthelder, 1935; Bodenheimer, 1941; De Lattin, 1951; Yigit / Uygun, 1982; Avci, 1997; Kocak, / Seven, 2001a; Ozbek / Calmasur, 2005).

03.v.2004 (larva), 25.v.2004 (pupa), 07.vi.2004, 1 ♂; 05.v.2004 (larva), 18.v.2004 (pupa), 05.vi.2004, 1 ♀; 11.v.2005 (larva), 02.vi.2005 (pupa), 09.vi.2005, 1 ♂.

*Archips xylosteana* (Linnaeus, 1758) (Tortricidae)

Bartin, Bursa-Mustafakemalpaşa, Istanbul-Alemdag, Belgrad Forest, Florya, Yildiz Park, Izmir-(Bornova, Torbali), Kirklareli-Kofcaz, Kocaeli on *Acer campestre*, *Ailanthus* sp., *Carpinus betulus*, *Cercis siliquastrum*, *Corylus colurna*, *Fraxinus* sp., *F. ornus*, *Lonicera* sp., *Pistacia* sp., *Platanus* sp., *Populus tremula*, *Rubus* sp., *Quercus* sp., *Q. petraea* subsp. *iberica*, *Q. robur*, *Rhododendron* sp., *Rosa* sp., *Salix* sp., *Tilia argentea*, *Ulmus* sp. (Bodenheimer, 1941; Acatay, 1943; Aysu, 1951; Alkan, 1962; Sekendiz, 1974; Canakcioglu, 1982; Uzun / Yalcin, 1992; Avci, 1997; Kocak / Seven, 2001a; Ozbek / Calmasur, 2005).

30.iv.2004 (larva), 18.v.2004 (pupa), 06.vi.2004 1 ♂; 5.v.2004 (larva), 17.v.2004 (pupa), 31.v.2004 1 ♀; 11.v.2004 (larva), 18.v.2004 (pupa), 10.vi.2004 1 ♀; 10.v.2005 (larva), 17.v.2005 (pupa), 30.v.2005 1 ♀.

*Crocallis elinguaris* (Linnaeus, 1758) (Geometridae)

Usak-Akse plantation (Mol, 1977; Kocak / Seven, 2001b).

11.v.2005 (larva), 18.v.2005 (pupa), 20.vi.2005 1 ♂.

*Ennomos quercaria* ([Hübner], [1812]) (Geometridae)

Istanbul-Belgrad Forest, Kirklareli-Demirkoy, Aegean region on *Aesculus hippocastanum*, *Carpinus betulus*, *Fagus orientalis*, *Quercus petraea* subsp. *iberica*, *Q. pubescens*, *Q. robur* and *Salix* sp. (Mol, 1977; Kocak / Seven, 2001b).

25.iv.2004 (larva), 28.v.2004 (pupa), 07.vi.2004, 1 ♂; 03.v.2004 (larva), 30.v.2004 (pupa), 14.vi.2004, 1 ♀.

*Ennomos quercinaria* (Hufnagel, 1767) (Geometridae)

Bursa, Istanbul-Sariyer, Kirklareli-Demirkoy, Kirsehir on *Quercus* sp. (Staudinger, 1881; Kansu, 1963; Okyar / Aktac, 1999).

05.v.2004 (larva), 30.v.2004 (pupa), 11.vi.2004, 1 ♀; 05.v.2004 (larva), 31.v.2004 (pupa), 10.vi.2004 1 ♀.

*Erannis defoliaria* (Clerck, 1759) (Geometridae)

Bursa-Karabelen, Edirne-Tavuk Forest, Istanbul-Belgrad Forest, Kahramanmaras, Kirklareli-Demirkoy, Samsun-Gelemen, Trabzon-Meryemana on *Acer platanoides*, *Alnus glutinosa*, *Betula* sp., *Carpinus betulus*, *Castanea sativa*, *Corylus colurna*, *Fagus orientalis*, *Quercus robur*, *Rosa* sp., *Salix alba*, *Sorbus torminalis*, *Tilia* sp. and *Ulmus* sp. (Osthelder, 1935; Mol, 1977; Ozay, 1997; Yuksel, 1998; Okyar / Aktac, 1999; Kocak / Seven, 2001b).

05.v.2004 (larva), 17.v.2004 (pupa), 28.xii.2004, 1 ♀; 05.v.2004 (larva), 18.v.2004 (pupa), 03.i.2005, 1 ♂; 05.v.2004 (larva), 18.v.2004 (pupa), 17.i.2005, 1 ♂; 11.v.2004 (larva), 19.v.2004 (pupa), 06.i.2005, 1 ♂; 04.v.2005 (larva), 17.v.2005 (pupa), 11.i.2006, 1 ♂.

*Operophtera brumata* (Linnaeus, 1758) (Geometridae)

Canakkale-Koru Mountain, Edirne-Tavuk Forest, Istanbul-Belgrad Forest, Kirklareli-Demirkoy-Igneada, Aegean region on *Acer* sp., *Carpinus betulus*, *Castanea sativa*, *Corylus colurna*, *Populus* sp., *Quercus* sp., *Q. petraea* subsp. *iberica*, *Q. robur*, *Rhododendron* sp., *Salix* sp., *S. alba*, *Ulmus* sp. (Mol, 1977; Ozay, 1997; Okyar / Aktac, 1999; Kocak / Seven, 2001b).

03.v.2004 (larva), 20.v.2004 (pupa), 01.i.2005, 1 ♂; 03.v.2004 (larva), 20.v.2004 (pupa), 24.i.2005, 1 ♀; 03.v.2004 (larva), 20.v.2004 (pupa), 03.i.2005, 1 ♂; 03.v.2004 (larva), 20.v.2004 (pupa), 18.i.2005, 1 ♂; 04.v.2005 (larva), 17.v.2005 (pupa), 30.xii.2005, 1 ♀; 04.v.2005 (larva), 31.v.2005 (pupa), 14.i.2006, 1 ♀; 04.v.2005 (larva), 30.v.2005 (pupa), 17.i.2006, 1 ♂; 10.v.2005 (larva), 29.v.2005 (pupa); 13.i.2006, 1 ♂.

*Pachynemina hippocastanaria* (Hübner, 1799) (Geometridae)

Amasya, Bursa, Canakkale-Ecebat (Staudinger, 1881; Okyar / Aktac, 1999; Kocak / Seven, 2001b).

30.iv.2004 (larva), 20.v.2004 (pupa), 18.i.2005, 1 ♂; 04.v.2005 (larva), 16.v.2005 (pupa), 22.i.2006, 1 ♂.

*Amphipyra pyramidea* (Linnaeus, 1758) (Noctuidae)

Duzce, Istanbul-Belgrad Forest, Tekirdag-Malkara, Zonguldak-Centre and Eregli on *Carpinus betulus*, *Fagus orientalis*, *Quercus* sp. (De Lattin, 1951; Hacker, 1987; Hakyemez, 1994; Kocak / Seven, 2001b; Akbulut *et. al.*, 2003).

14.v.2004 (larva), 18.v.2004 (pupa), 17.vi.2004, 1 ♂.

## DISCUSSION AND CONCLUSIONS

Most of obtained species are polyphagous and these species prefer forest trees than ornamentals.

*Cameraria ohridella* was the most important dominant insect species found on horse chestnuts in this study. However, this situation does not cause vitality problems on trees at least for now. The information about this species recorded in previous studies was not encountered during this study. *Cameraria ohridella* was not reported in the studies carried out previously in Turkey whereas it was the most dominant species found on chestnut trees in Belgrad Forest. Although *Cameraria ohridella* is well

known species in European and Balkan countries due to its damages on *A. hippocastanum* there is no information about this insect in Turkey.

Among the collected polyphagous species, *Archips crataegana*, *A. podana*, *A. xylosteana*, *Crocallis elinguaris*, *Erannis defoliaria*, *Operophtera brumata*, *Amphipyra pyramidea* and the monophagous species on *Quercus* sp., *Ennomos quercinaria*, were carried out on *Aesculus hippocastanum* in Turkey by this study. The obtained findings related to *Ennomos quercaria* living on *A. hippocastanum* in the Belgrad Forest are harmony with the recorded literature by Mol.

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