

First Record of *Elatobium abietinum* (Walker, 1849) (Hemiptera, Sternoryncha, Aphididae) on *Picea* spp. in Bulgaria

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Abstract: *Elatobium abietinum* is reported for the first time in Bulgaria. The aphid was found in the spring of 2014 in three private properties near Sofia (Bistritsa, Pancharevo and Dragalevtsi) on Norway spruce, *Picea abies* (L.) H. KARST. and Colorado spruce, *Picea pungens* ENGLEM. Both *Picea* species are often used in gardens and landscaping. The damage caused by the aphid leads to the full loss of needles from infested branches. In this paper, a brief description of the morphology of *E. abietinum* is given, accompanied with data on its distribution and biological characteristics. Previous studies in several countries indicated that the aphid is a hazard for both large-sized spruce trees in landscape situations and small-sized trees in nurseries.

Key words: aphid, Aphididae, *Elatobium abietinum*, insect pest, *Picea*, Bulgaria

Introduction

Aphids are among the most important plant pests, distributed on a world-wide scale. Species of the genus *Picea* Mill. have been found to be infested with more than 30 aphids (HOLMAN 2009, BLACKMAN, EASTOP 2015) and many of them cause serious damage on both ornamental and forest plantings. Representatives of the genera *Cinara* Curtis, 1835, *Mindarus* Koch, 1857 and *Elatobium* Mordvilko, 1914 are among them.

So far, only two pests of the family Aphididae on spruce trees have been reported from Bulgaria: *Cinara bogdanovi* (Mordv.) and *Cinara cistata* (Bect.) (TASHEV 1984).

The first record of the green spruce aphid *Elatobium abietinum* (Walker, 1849) from Bulgaria and its distribution is given in the paper. The aphid is native to Northern and Western Europe and introduced to other parts of the world where it is invasive and a serious pest of *Picea* spp. (STRAW *et al.* 1998, CARTER, HALLDÖRSSON 1998, CABI 2015). It belongs

to the family Aphididae, subfamily Aphidinae, tribe Macrosiphini. Other synonyms of this species are *Aphis abietina* WALKER, 1849, *Liosomaphis abietina* (WALKER), *Myzaphis abietina* VAN DER GOOT, 1913 and *Neomyzaphis abietina* THEOBALD 1926 (CABI, 2015; DONCASTER, 1961; REMAUDIERE, REMAUDIERE, 1997). The aim of this study was to investigate the distribution of *E. abietinum* in Bulgaria.

Materials and Methods

Trees of *Picea* species have been examined in the region of Sofia from 2010 to 2015, especially during the periodical phytosanitary observations of ornamental plants. The collected insects have been fixed in 70% ethanol. The species identification was carried out using permanent microscope slides, after the traditional method of LAMBERS (1950), using 10% KOH for maceration, chloralphenol for brightening, and Berlese's medium for mounting. Aphids' identi-

fication was performed following BLACKMAN, EASTOP (2015). The slides are deposited in the collection of the Institute of Ornamental Plants, Sofia.

Results

The specimens of *E. abietinum* were collected in 2014 from Norway spruce, *Picea abies* (L.) H. KARST. and Colorado spruce, *Picea pungens* ENGELM. in Bulgaria near Sofia (Bistritsa, Pancharevo and Dragalevtsi).

Elatobium abietinum was detected for the first time on 9th April 2014 on a Colorado Spruce tree in a private property in Bistritsa (near Sofia). Later, in May and June, the aphid was found in other locations near Sofia: Pancharevo and Dragalevtsi on two *Picea* species (Norway Spruce and Colorado Spruce). Dense colonies of nymphs, apterous and alate females were observed on the branches of single planted large-sized trees that were between ten and 50 years old.

Apterous viviparous females of *E. abietinum* are green and have a body length of 1.0-2.0 mm (Fig. 1). DONCASTER (1961), HEIE (1992) and CABI (2015) give a detailed description of the morphology of the fundatrix, apterous and alatae viviparous females, and their nymphs and eggs. According to BLACKMAN, EASTOP (2015), *E. abietinum* differs from the closely related species *E. piceanum* (INOUE) by the length of hairs on the front of the head and the correlation of the antennal processus terminalis and its basal part of the sixth antennal segment.

The damage caused by *E. abietinum* on the infested plants was significant and had led to the full defoliation of infested branches. The youngest tree (about 10ten-15 years old) was located in a shaded place. The infestation had started from the youngest branches and gradually spread all over the crown of the tree. Later in the season the progressing damage was significant and the tree became completely needleless. The oldest tree (40-50 years old) at first was infested only on one side of the crown with gradually spreading all over the whole crown.

The infestations of *E. abietinum* were controlled until July 2014 using insecticide consisting of 250 g/kg tiametoxam. In observations conducted in the growing season in 2015, the pest was not found in either of the previous or any of the other investigated locations.

Discussion

Elatobium abietinum is a monoecious and holocyclic species with alate males distributed in parts of continental Europe (VON SCHELLER 1963). It appears to be

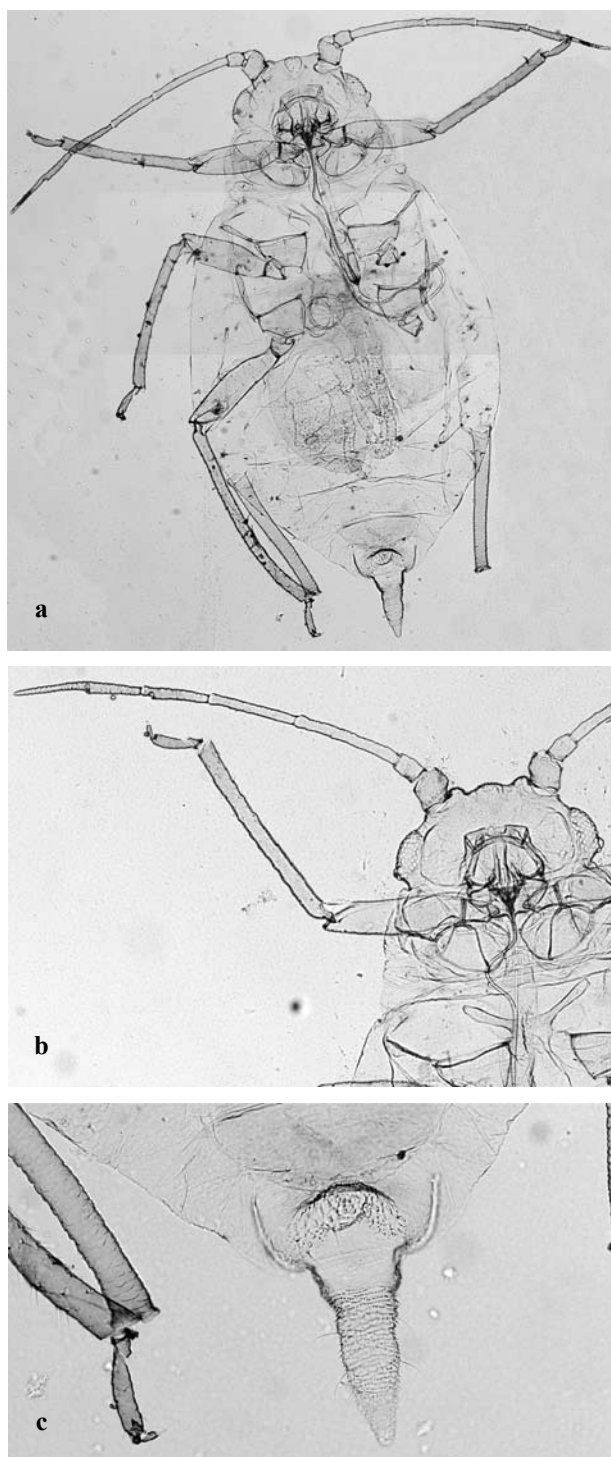


Fig. 1. *Elatobium abietinum* – apterous viviparous female: photos of microscope slide: **a.** body; **b.** head with antennae; **c.** cauda (orig.)

anholocyclic everywhere else (BLACKMAN, EASTOP 2015), especially in regions with a maritime climate, where it develops throughout the year (STRAW *et al.* 1998).

The aphid usually feeds on the lower side of needles in the shaded portions of the lower crown. When infestations are severe, it may colonise the

upper crown and any subsequent new growth of the host plant. The pest causes needle necrosis and premature needle drop (BEVAN 1966) and may completely defoliate and kill trees (HUSSEY 1952, KOOT 1992). Trees stressed by drought and attacked by aphids are also more susceptible to bark beetle attack (RAY *et al.* 2008).

The host plants of this insect species are mostly *Picea* spp. and, to a smaller extent, *Abies* spp. There are also records of *Elatobium* on some *Pinus* spp., *Pseudotsuga menziesii* (Mirb.) Franco and *Larix sibirica* Ledeb. (CABI 2015, HOLMAN 2009, BLACKMAN, EASTOP 2015). These plant species are grown in many nurseries and almost all of them are used for landscaping purposes, due to their high ornamental qualities. The need for a highly decorative effect requires such plants to be in good health and pest free. *Elatobium abietinum* can also be a serious problem for forest areas where it can cause material losses in forestry and wood production (HALLDÓRSSON *et al.* 2003, STRAW *et al.*, 2011).

According to CARTER, HALLDÓRSSON (1998) and CABI (2015), *E. abietinum* originates from Central and Northern Europe. This species was also introduced in Asia, North Africa, Australia, New Zealand, South part of South America and North America. At present, the green spruce aphid is distributed throughout Europe (Austria, Belarus, Belgium, Britain, Croatia, the Czech Republic, Denmark, Estonia, Faroe Islands, Finland, France, Germany, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Madeira, Norway, Poland, Portugal, Romania, Russia, Slo-

vakia, Spain, Sweden, Switzerland, the Netherlands, Ukraine, UK). (FAUNA EUROPAEA 2014, BLACKMAN, EASTOP 2015, CABI 2015).

Owing to the lack of data on the presence of *E. abietinum* in neighbouring countries (Turkey, Greece, Macedonia and Serbia) and the local distribution of the species only near Sofia, it can be concluded that the pest was introduced in Bulgaria from abroad via imported infested *Picea* plants.

The newly established presence of *E. abietinum* in Bulgaria could represent a serious problem for landscaping, nursery production and forestry. This species diminishes the quality of ornamental plants and decreases the growth of affected trees, subsequently, though seldom, killing them (HALLDÓRSSON *et al.* 2003). Even though not many host plant species for this pest exist in Bulgaria, *Picea* species are often used in landscaping and in forestry wood production. The risk posed by this pest could be very significant, because of its high reproductive potential and its comparatively easy dissemination.

Although *E. abietinum* was not found in 2015, according to the high potential risk posed to the natural spruce forests in Bulgaria and the high economic importance of the pest species (STRAW *et al.* 1998, HALLDÓRSSON *et al.* 2003, CABI 2015, etc.), it is highly imperative that additional studies regarding future distribution, biological and ecological characteristic in Bulgaria are warranted. Such studies will contribute to a more appropriate control strategy of *E. abietinum* in order to prevent eventual damage.

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