

BARK BEETLES FROM EXOTIC PINES, *PINUS ARMANDI* FRANCH. AND *PINUS* ×*SCHWERINII* FITSCHEN, IN POLAND

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ABSTRACT

Many exotic pine species are planted in Europe. These pines are tested for resistance to ozone, sulfur dioxide, drought and frost. However, their resistance can be reduced by bark beetles. In Poland the bark beetles *Pityophthorus pityographus* and *Pityophthorus lichtensteinii* were detected on *Pinus armandi* and *Pinus* ×*schwerinii* pines. In Europe these are the first findings of bark beetles on these trees and, at the same time, new host plants for these bark beetles.

Keywords: *Pityophthorus lichtensteinii*, *Pityophthorus pityographus*, climate change, Poznań, arboretum

INTRODUCTION

Dendrological gardens are places where we find exotic conifers that do not occur naturally in Europe. These exotic tree species are hosts of several bark beetles in their native habitats, which damage them to a greater or lesser extent (Chen and Tang, 2007; Li et al., 2010). When growing in Europe, they sometimes bring these bark beetles with them (Chobaut, 1897; Schuler et al., in press). European bark beetle species are usually able to adapt to these tree species (Bertheau et al., 2009; Fiala et al., 2022).

Pinus armandi Franch. is native to China and is being tested in central Europe in urban parks due to climate change as a drought- and ozone-tolerant tree species and slightly less resistant to frost and sulphur dioxide (Genys and Heggstad, 1978; Roloff et al., 2009). *Pinus* ×*schwerinii* Fitschen is a hybrid cross between *Pinus strobus* L. and *Pinus wallichiana* A.B. Jacks and was first found in Germany (Little

and Righter, 1965). The hybrid is ozone resistant and susceptible to sulfur dioxide (Genys and Heggstad, 1978), but it is significantly immune to the rust *Cronartium ribicola* J.C. Fisch. (Callaham, 1962).

Pinus armandi is one of the main tree species in the forests of China and is significantly attacked by local bark beetles. A total of 31 species of bark beetles have been found on it (Wood and Bright, 1992; Li et al., 2010; Zhao and Långström, 2012; Bu and Chen, 2013; Smith et al., 2020). Of these bark beetles, 11 species occur in Europe (Appendix 1). From *Pinus* ×*schwerinii* no report on bark beetle has yet been published. Bark beetles are reported on the parent trees *P. strobus* and *P. wallichiana* (Wood and Bright, 1992).

The aim of this work is to describe the bark beetle species that occur on *P. armandi* and *P.* ×*schwerinii* from Poland.

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RESULTS AND DISCUSSION

At the beginning of August 2022, two bark beetles species, *Pityophthorus lichtensteinii* Ratzeburg, 1837 and *Pityophthorus pityographus* Ratzeburg, 1837, were found on a pine *P. armandi* in the arboretum of Poznań University of Life Sciences (GPS 52°25'36.5"N, 16°53'34.9"E). The bark beetles were determined by the first author and are deposited in his collection.

The beetles were found on both the stem and branches, the pine was practically dead (Fig. 1). A few metres away a hybrid of *P. ×schwerinii* grows, on which the bark beetle *P. pityographus* was found on only one dying branch. These findings are the first data on the occurrence of these bark beetles on pines *P. armandi* and *P. ×schwerinii* in Europe. They are new host tree species for both bark beetles.



Fig. 1. *Pinus armandi* infested by bark beetles *Pityophthorus lichtensteinii* and *Pityophthorus pityographus* in Poznań (phot. T. Fiala)

The introduction of new exotic tree species into urban forests and parks can have benefits for landscape aesthetics and for improving the lives of local residents, including reducing urban temperatures (Chow et al., 2016; Solomou et al., 2019). These exotic trees may be more adapted to climatic changes such as drought or frost (Genys and Heggstad, 1978; Roloff et al., 2009). Nevertheless, in the case of a more massive introduction, there is a risk of introducing non-native pests, which may then have a negative impact on the native biota (Li et al., 2020). In the case of *P. armandi*, this may involve the introduction of ophiostomatic fungi (Paciura et al., 2010; Pan et al., 2020) or even new invasive bark beetle species (Ning et al., 2021). For now these factors are not imminent, but they are possible and the simultaneous effect of multiple invasive species and their fungi, at the subsequent interaction with climate change and air pollutions creates a situation where future environmental impacts are difficult to predict (Lovett et al. 2013). The bark beetles *P. lichtensteinii* and *P. pityographus* are common European bark beetles that attack the most conifers, including pines (Wood and Bright, 1992). Therefore, it is not surprising that they also attacked exotic pines in the Poznań Arboretum.

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Appendix 1. European bark beetles occurring on *Pinus armandi* in Asia

Species	References
<i>Dryocoetes autographus</i> Ratzeburg, 1837	Bu and Chen, 2013
<i>Dryocoetes hectographus</i> Reitter, 1913	Bu and Chen, 2013
<i>Ips acuminatus</i> Gyllenhal, 1827	Bu and Chen, 2013
<i>Ips sexdentatus</i> Boerner, 1776	Bu and Chen, 2013
<i>Orthotomicus laricis</i> Fabricius, 1792	Bu and Chen, 2013
<i>Orthotomicus mannsfeldi</i> Wachtl, 1888	Bu and Chen, 2013
<i>Polygraphus poligraphus</i> Linnaeus, 1758	Bu and Chen, 2013
<i>Tomicus minor</i> Hartig, 1834	Zhao and Långström, 2012
<i>Tomicus piniperda</i> Linnaeus, 1758	Bu and Chen, 2013
<i>Xyleborinus attenuatus</i> Blandford, 1894	Smith et al., 2020
<i>Xyleborinus saxesenii</i> Ratzeburg, 1837	Wood and Bright, 1992

