

# The patterns of alien pest proliferation in the Botanical Garden of the University of Latvia in the last decade

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Nowadays the spread of different living organisms outside their natural range due to the various human activities (trade, travel, as well as climate change) has become one of the most serious environmental problems worldwide. These changes lead to the homogenization of floras and faunas and have far-reaching consequences for biodiversity, ecosystem integrity, human health and economy [1].

Under such conditions, when rapid identification of new plant pests or pathogens is critically important, botanical gardens can play a special role in providing biosecurity: they host diverse plant collections (in greenhouses and outdoor) monitored by the qualified personnel which can ensure early detection [2]. In recent decades, there have already been reported some new findings of plant pathogens in the Botanical Garden of the University of Latvia (BGUL) [3, 4].

This presentation deals with some newest observations of alien pests in the plant collection of the BGUL.

## Results and discussion

### *Polyphagotarsonemus latus* (Banks, 1904)

In 2012, broad mite *Polyphagotarsonemus latus* was identified on *Rhododendron simsii* hybrids (greenhouse azaleas) (Fig.1). At first, typical deformed, undeveloped leaves were noticed, following that, tiny mites were identified using a stereo microscope. By now, the mite has been found on the numerous greenhouse plants: *Hedera*, *Ficus*, *Laurus*, *Fuchsia*, *Coffea*, *Fatsia*, *Oleander*, *Cuphea*, *Pelargonium* et al.; and it is one of the most destructive pests requiring constant monitoring and restriction. Since around 2015 the presence of *P. latus* has been noted in the National Botanic Garden of Latvia in Salaspils. In 2017, this pest has been detected on *Capsicum* in one commercial greenhouse too.

It is known, that in many Western European countries, since 2007, *P. latus* has become one of the most important pests in ornamental plant production, especially in greenhouse azaleas, due to restrictions on the use of wide spectrum pesticides e.g. endosulfan (EU directive 2005/864/EC) [5]. However, there is apparently a lack of information about the distribution of *P. latus* in lots of countries including several Northern and Eastern European ones as well (Fig. 2).

#### Some info on *Polyphagotarsonemus latus* [6, 7]

- initially collected on tea in Sri Lanka in 1890;
- first recorded in Europe (Italy) in 1961;
- cosmopolite in tropic and subtropic;
- host plants belong to over 60 different plant families;
- microscopic (female 0.2 mm long);
- feed on young leaves, fruit, flower buds near the growth cones;
- optimal temperature is 21-27 °C, likes high humidity (> 80%);
- life cycle duration 1-2 weeks.

#### Examples of host plant families [6]

Cupressaceae	Caricaceae	Rosaceae
Araceae	Cucurbitaceae	Rubiaceae
Orchidaceae	Euphorbiaceae	Rutaceae
Anacardiaceae	Fabaceae	Solanaceae
Araliaceae	Lamiaceae	Theaceae
Asteraceae	Lauraceae	Tiliaceae
Balsaminaceae	Malvaceae	Vitaceae
Brassicaceae	Moraceae	et al.

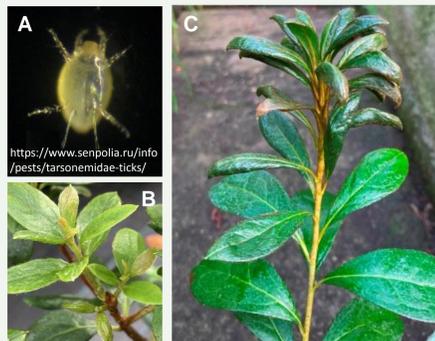


Figure 1. An illustration of *Polyphagotarsonemus latus*:

- A – close-up photo of female, length approx. 0.2 mm
- B, C – damages to the leaves of *R. simsii* hybr.

Photos (B,C) taken by Inga Apine in Botanical Garden UL, 2022.

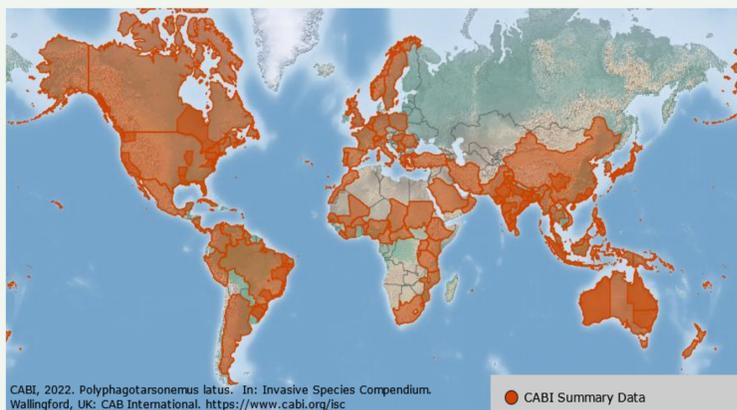


Figure 2. Current known distribution of *Polyphagotarsonemus latus* [6].

### *Nematus lipovskyi* (Smith, 1974)

In 2018, azalea sawfly *Nematus lipovskyi* was identified on deciduous *Rhododendron* spp. (Fig. 3). In the first two years, insect larvae feeding on rhododendron leaves were discovered, while imago was detected only in 2020. At the same time, this sawfly species has been identified in the Rhododendron Breeding and Testing Nursery “Babīte” (division of BGUL) that is located 7 km apart from the BGUL. There is no other information about the found pests yet. The sawflies used *R. calendulaceum*, *R. occidentale*, *R. luteum* and numerous hybrids that belonged to different groups (Knap Hill-Exbury, Kosterianum, Mixtum, Occidentalis and Rustica) as host plants. For the first time *R. albrechtii* was also noticed as feeding plant for *N. lipovskyi*.

According to currently available data, Latvia is only the second country in Europe (after the Czech Republic), where *N. lipovskyi* has been observed (Fig. 4) [8]. It should be highlighted that in both countries the pest was first found exactly in the botanical gardens. There is apparently a lack of information about the distribution of *N. lipovskyi* in other European countries, for example, Poland and Germany, where many large rhododendron collections are located and there is an active trade of rhododendron plants [9].

#### Some info on *Nematus lipovskyi* [8, 9]

- first described in North America only in 1974;
- first recorded in Europe (Czech Republic) in 2010;
- host plants - deciduous *Rhododendron* spp. (native to North America, Europe and Asia);
- univoltine (one generation per year);
- adults (about 5 mm length) fly on average from the end of April until the middle of May;
- larvae (to about 20 mm length) feed on leaves and sometimes flowers (May-June);
- overwinter in cocoons in the soil.

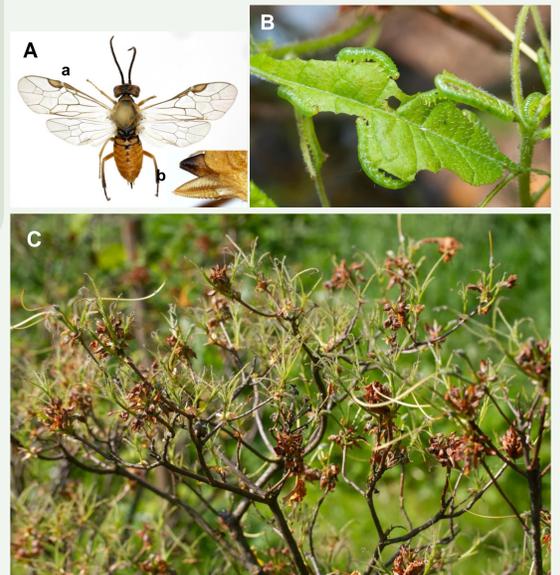


Figure 3. An illustration of *Nematus lipovskyi*:

- A – collected specimen: female, dorsal view (a), details of the female abdomen: ovipositor and ovipositor sheath, lateral view (b).
- B – larvae;
- C – defoliation caused by larvae.

Photos taken by Uģis Piterāns in Botanical Garden UL, 2019.

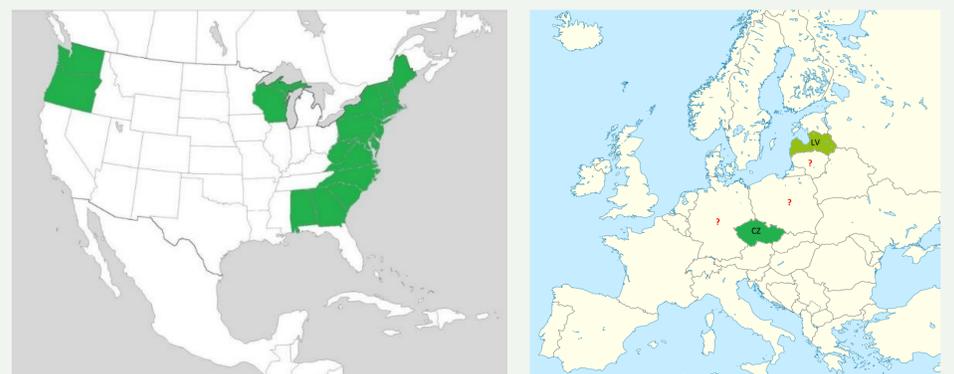


Figure 4. Current known distribution of *Nematus lipovskyi* [8, 9].

The exact pathway of the introduction of both pests (*P. latus* and *N. lipovskyi*) to Latvia is not known. However, it could be assumed that the trade of imported plants (greenhouse azaleas and garden azaleas, respectively) is the most likely route, since such plants are widely available in the local trade.

## Conclusions

Summarizing the observations, it can be concluded that

- biosecurity and quarantine requirement should be ensured for newly acquired plant accessions in botanical gardens as the most probable pathway of entrance for many pests is via imported plants;
- there are clear gaps in the available information on the true distribution of invasive species worldwide. This shows the necessity for more up-to-date information on newly identified species and botanical gardens can make a major contribution in this area.

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