

Siberian scientists study aphids that build houses on poplars

Siberian scientists have studied street aphids (*Pemphigus spyrothecae*) that damage poplars in Eastern Siberia. Aphids form galls, i.e. growths on leaves and shoots of plants. Scientists are confident that their research will help not only fill in the gaps in the description of the aphid fauna of the Siberian region but also understand how they develop relationships with trees. This might be the key to finding a way to protect urban green spaces from such pests.

Who lives in the house?

Pemphigus spyrothecae are social insects with a complex life cycle. They form galls, i.e. external growths on leaves, stalks, and young shoots of poplars. The latter acts as a habitat for aphids, inside which they live and feed. Aphids have spread across almost the entire northern hemisphere, where poplars grow, which are their favorite food, and some species have penetrated the southern hemisphere. It is believed that this group of insects evolved along with their food plants — poplars, and their supposed homeland is in the Mediterranean and East Asia.

*“There are many species of aphids in the world, of which hundreds are garden ones, well known to every farmer. Most often, they openly live in colonies on the leaves and shoots of plants. However, there are no more than 80 species of aphids of the genus *Pemphigus* in the whole world, and only 45 species live in galls on poplars,”* said **Natalia Kirichenko**, senior researcher of the School of Geography and Ecology (SibFU) and **V. N. Sukachev** Institute of Forest (SB RAS).



From poplars to carrots

It would be more correct to call poplar aphids not garden but street aphids, since they are associated with poplars grown in cities. Some species, due to their exceptional fertility, are large in number and can significantly harm poplars, which results in early leaf fall and shoot wilting.

Interestingly, these insects change their habitats depending on the season. In summer aphids live in galls on poplars, and in autumn they relocate to plants. In the latter case, aphids become pests, posing a threat to both industrial and garden crops. Some aphids are known to be serious pests of lettuce, carrots, and sugar beets in France, Germany, and Italy.



*“We are planning to study the life cycle and unique social formations of *pemphigus* aphids, as well as the ways of their dispersal and penetration to our region. A detailed study of the trophic relationships of pests with host trees is also necessary. This will help us find possible ways to deal with harmful aphids. Another challenging task for us is to investigate the ability of such aphids to form galls,”* said **Nikita Babichev**, co-author of the article, junior researcher of **V.N. Sukachev** Institute of Forest (SB RAS).

Scientists say that they have already established the species diversity of *pemphigus* aphids in the south of Krasnoyarsk Territory and the north of Khakassia, and now they are planning to explore the vastness of Transbaikalia in detail. It is also necessary to clarify the range of aphids in Western Siberia, including the territory bordering with Kazakhstan.

DNA-library of aphids

One of the challenging tasks for Siberian entomologists is to create a “DNA library” of aphids. Molecular genetics will make it possible to obtain species-specific genetic characteristics, by which we may determine with high accuracy the species of aphids at any stage of development. Moreover, such libraries will help to investigate the relationship between aphid species in different parts of our planet. According to the molecular genetic codes of the species, it will be possible to learn not only about the ways of distribution of aphids but also to establish the places from which these pests are brought to new regions.

To teach and to learn

At the moment scientists of SibFU and V.N. Sukachev Institute of Forest has compiled a detailed review of gall-forming aphids of the genus Pemphigus for most of the territory of Eastern Siberia. The authors provide new information on the distribution of aphids in the world and especially in the Asian part of Russia, as well as on their trophic connections and harmfulness. For most species, illustrations of galls are provided to help identify these aphids.

“I believe this faunistic review article is important not only for specialists but it is also a good training material for students. We are confident that the work will be in demand among SibFU students, who study the urban entomofauna. It will serve as a guide to the world of species diversity of gall-forming aphids in Siberia, and a reference manual on their global and domestic distribution, harmfulness, and invasiveness, i.e. the ability to penetrate new regions and settle there,” explained **Natalia Kirichenko**.



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