

Making a pest: gall midge *Dasineura rozhkovi* Mam. et Nik. (Diptera: Cecidomyiidae) in the larch seed orchards in Southern Siberia

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Fig 1. Larch twig, infested by galls of *Dasineura rozhkovi*.

Создание вредителя: галлица *Dasineura rozhkovi* Mam. et Nik. (Diptera: Cecidomyiidae) в лесосеменных плантациях лиственницы в Южной Сибири

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РЕЗЮМЕ. Лиственничная почковая галлица *Dasineura rozhkovi* Mam. et Nik. (Diptera: Cecidomyiidae) – специализированный фитофаг лиственниц, формирующий галлы на почках лиственниц (*Larix*) в северной Палеарктике: от Западной Сибири до Дальнего Востока. Огромное хозяйственное значение галлица приобрела как вредитель лесосеменных участков и городских насаждений лиственницы после массового создания человеком разреженных насаждений паркового типа. Ранее в природе галлица, имея светлюбивых имаго, заселяла исключительно лесные опушки. Образовавшиеся галлы убивают брахибласты лиственниц, уничтожая возможность цветения и уродуя кроны. Массовое заселение брахибластов на лесосеменных участках сводит на нет их продуктивность, а пораженные галлицей лиственницы в городах теряют свою привлекательность.

The larch gall midge *Dasineura rozhkovi* (Fig. 1) is a major pest destroying Siberian larch (*Larix sibirica* Ledeb.) stands in seed-growing forest enterprises in Krasnoyarsk Krai, Tomsk Region, Republic of Khakassia and northwestern Mongolia (Isaev et al., 1983). During the last 10 years it became clear that its range is dramatically larger: the midge infested *Larix gmelinii* (Rupr.) Rupr. at the Russian Far East (from Khabarovsk to Magadan and near Yakutsk), it was found on *L. sibirica* at the city of Irkutsk and near Novosibirsk (Fig. 2). Having overwintered in galls on larch branches and emerged from them in early May, female gall midges lay eggs at the bases of brachyblasts (shortened shoots) that begin to produce needles. Larvae hatch from the eggs 7 days later. It crawls inside a growing cluster of needles and, reaching the meristematic growth cone of the next-year vegetative bud, modifies its morphogenesis. Substances secreted by the larvae modify the buds' morphogenesis: the folia primordia start growing and produce scales instead of needles. The galls become visible in early June and stop growth in 1-2 months. The base of the galled bud increases and the scales closing up, form a larval chamber, in which the insect develops. As a result, the bud is transformed into a large (up to 1 cm high), scaly, cone-shaped gall. The larva feeds in the gall, passes through three instars in its development before autumn, and overwinters in a whitish cocoon under the bract scales. The larva pupates in this cocoon in the early spring, and the adult insect emerges after a week. As the formation of a well-developed gall usually kills the brachyblast, heavily infested trees usually lack the basis for the development of new generative buds (Fig. 3 & 4).

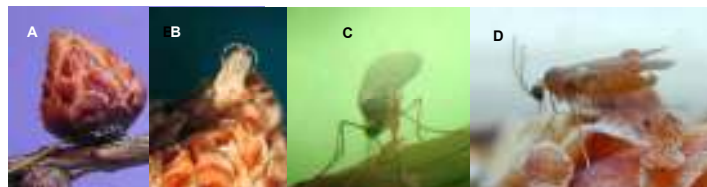


Fig. 3. Fully developed gall of *D. rozhkovi* (A); an empty skin of pupae on the top of a gall – the sign of flight initiation in the local populations of *D. rozhkovi* (B); egg laying female (C) and newly hatched male (D) of gall midge *Dasineura rozhkovi* on *Larix sibirica*. Body length – 1.5–2 mm.

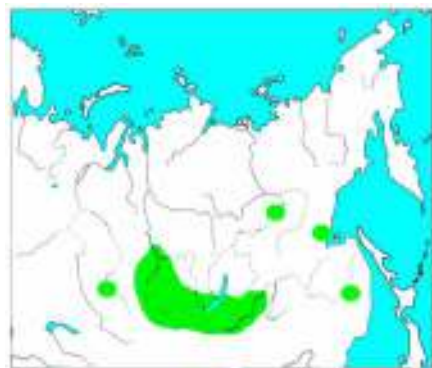


Fig. 2. Modern range of *D. rozhkovi* (in green).

Until the early 1970s, larch gall midge was not considered a significant pest of forests. It was mentioned as a mandatory component of the Siberian larch consortium in only a few publications (Kolomiets, 1955; Galkin, 1965). The situation changed dramatically with the widespread formation of forest seed plantations in Southern Siberia. To accelerate the harvest, plantations were laid in plain larch forests by its significantly thinning. Lightning contributed to the growth in the number of generative buds in the larch crown, but at the same time sharply increased the attractiveness of lighted brachyblasts for laying eggs of female gall midges.

As a result, by the mid-1970s, most of the plantations in the Republic of Khakassia turned out to be so densely infested by the gall midge that they could not fulfill their target function.

Later larch trees became widely used in the urban greenery. When trees were moved to the city streets from infested plantations the midge infested larch twigs pretty densely killing up to 80–95% of the brachyblasts. In the majority of South Siberian settlements larch trees in summer have absolutely naked branches with green needles only on the previous year twigs and aubsblasts at the periphery of crowns. Even at high infestation, the pest does not kill trees but in the cold seasons they look rather ugly (Fig. 5).

The current situation with *D. rozhkovi* is a classic example of how an ill-conceived forestry initiative can lead to the emergence of a new pest. Meanwhile, massive infestation of larch trees does not affect their reproductive potential (Baranchikov et al., 2009), and with a proper chemical control, a regular harvest of seed orchards can be achieved. For the ornamental purposes in cities a grafted progeny of gall-midge resistant trees (Baranchikov, 2006) can be used.

Funding

The work was supported by the RFBR (grant № 14-04-01235).

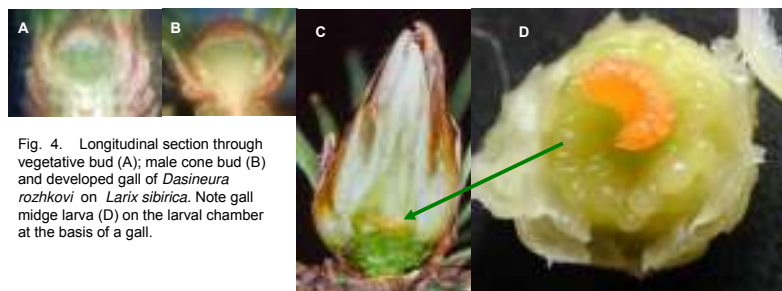


Fig. 4. Longitudinal section through vegetative bud (A); male cone bud (B) and developed gall of *Dasineura rozhkovi* on *Larix sibirica*. Note gall midge larva (D) on the larval chamber at the basis of a gall.

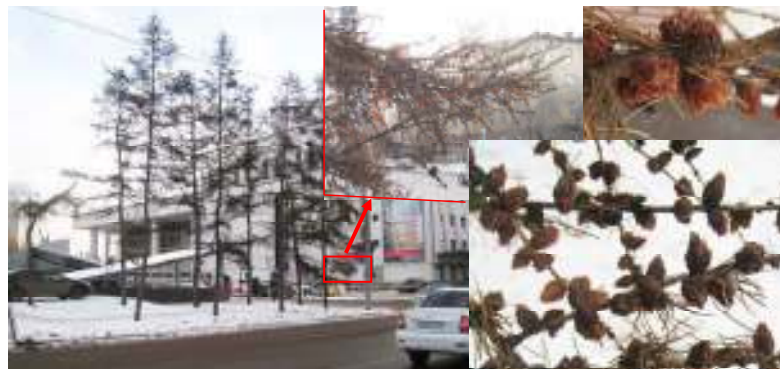


Fig. 5. Trees of Siberian larch densely infested by *D. rozhkovi* in the center of Krasnoyarsk.

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