

# Hope for the ash tree: Trees resistant to ash dieback are also resistant to beetles

July 10 2023, by Beate Kittl

---



The emerald ash borer (*Agrilus planipennis*) is an invasive jewel beetle species whose larvae have already killed millions of ash trees in North America. The ash borer beetle was introduced into Russia in 2003 and has since been on the advance towards Central Europe. Photo: Beat Wermelinger. Credit: *New Phytologist* (2023). DOI: 10.1111/nph.19068

The invasive fungal disease ash dieback has already affected 90% of ash trees in Central Europe. In addition, an invasive beetle threatens the trees. But there is now good news: trees that are resistant to the fungus are also better able to withstand the beetle, as a trial led by the Swiss Federal Institute for Forest, Snow and Landscape Research WSL shows.

Ash dieback was devastating for what used to be Switzerland's second most common deciduous tree species. More than 90 percent of ash trees fell ill and [young trees](#) in particular died in large numbers. The causative agent of the disease is a [fungus](#) originating from Asia called *Hymenoscyphus fraxineus*, which has been detected in Switzerland since 2008.

Another ash tree killer is approaching from the same direction, the [emerald ash borer](#) (*Agilus planipennis*), which was introduced to Russia from East Asia in 2003. Since then, it has been spreading westwards. The larvae that develop inside the tree are deadly to ash trees.

One small ray of hope is that foresters keep discovering healthy-looking ash trees in their forests that are apparently resistant to the fungus. An international research team led by WSL collected branches from fungus-resistant and fungus-susceptible ash trees in Switzerland, Sweden and Denmark. They grafted these twigs onto understocks and thus grew new saplings. They exposed these to both the fungus and the beetles in WSL's high-security greenhouse (biosafety level 3).

## **Glimmer of hope for ash trees**

In fact, they found that on ash trees that were more resistant to the fungus, the beetles also grew more poorly. This is called cross-resistance, and it is a glimmer of hope for ash trees. "This result is encouraging," states study leader Michael Eisenring, who has now published the result together with his colleagues in the journal *New Phytologist*. "For

example, fungus-resistant ash trees could be planted to make it more difficult for both the fungus and the beetle to advance."

In fungus-resistant ash trees, the beetles gained less weight and developed more slowly. The research team suspected that fungus-resistant plants produce certain defense substances that are effective against both the fungus and the beetle. So they studied the chemical composition of the tree sap, which transports sugars and other substances between plant parts. The beetles feed on this sap in the tree trunk. Indeed, the chemistry in the sap differed between more and less resistant ash trees and also explained the differences in weight of the beetles. These are phenolic substances, which are known defense substances.

Such trees will not stop the beetle, says Eisenring. But they might slow it down. It also gives researchers time to train [sniffer dogs](#) on the beetles, for example, or to find natural antagonists against the two ash-killers.

One such possibility could be [parasitic wasps](#) that lay their eggs in beetle larvae. Therefore, the task now is to get as many of the resistant ash trees as possible into the forests. However, no one yet knows whether the resistant [ash trees](#) will also work well economically and ecologically. So the rescue of the ash tree is far from being accomplished.

**More information:** Martin M. Gossner et al, A glimmer of hope—ash genotypes with increased resistance to ash dieback pathogen show cross-resistance to emerald ash borer, *New Phytologist* (2023). [DOI: 10.1111/nph.19068](https://doi.org/10.1111/nph.19068)

Provided by Swiss Federal Institute for Forest, Snow and Landscape Research WSL

Citation: Hope for the ash tree: Trees resistant to ash dieback are also resistant to beetles (2023, July 10) retrieved 29 April 2024 from <https://phys.org/news/2023-07-ash-tree-trees-resistant-dieback.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.