

Fungal viruses cross the barriers between distantly related fungal species

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Forest tree stumps support a diverse fungal community coexisting with the root rot fungus *Heterobasidion*. Credit: Tuula Piri, Luke

According to research conducted at the Natural Resources Institute Finland (Luke), some fungal viruses (mycoviruses) that infect fungi associated with forest trees are able to cross the barriers between distantly related fungal species. This overturns the former theory that mycoviruses are host specific, and will create new perspectives on their possible roles in regulating forest biodiversity.

The wood decay fungus *Heterobasidion parviporum* causes root rot in spruce and is a serious pathogen. Its viruses have been intensively investigated in order to discover a method of controlling root rot in spruce. *Heterobasidion* root rot [fungi](#) host to more than 20 species of mycoviruses, which are known to survive for years in infected mycelium and can transfer from one [fungal species](#) to another, both in the laboratory and under natural conditions.

The new study investigated whether the mycoviruses of *Heterobasidion* root rot fungi are capable of being transmitted to more distant fungal species.

"We found two species of *Heterobasidion* viruses in the ectomycorrhizal fungus *Lactarius tabidus*, commonly known as the Birch Milkcap, and *Rhodocollybia butyracea*, the Butter Cap, which is known to be a saprotrophic fungus. In addition, *Heterobasidion* viruses were detected in the mycelium of mycorrhizal fungi that grow underground, says Professor Jarkko Hantula of Luke.

Mycoviruses are not distributed by air like the viruses of many other organisms, but along the mycelial bridges formed between fungal mycelia. They were thought to be strongly tied to their host species, but Luke's research results call into question this idea of mycoviruses being host specific.

"A few similar observations have been made elsewhere in recent years,

but the evidence we found poses a serious challenge to the former theory. Even if the transmission of viruses between species seems rare, it will nevertheless be necessary to investigate whether, for instance, the viral prevention of root rot would pose a risk to other fungal [species](#)," says Hantula.

Forest trees support a diverse fungal community, which includes many highly beneficial or harmless fungi. Symbiotic mycorrhizae in the root system boost the growth of green gold, endophytic fungi live in tissues, many epiphytes cover the surfaces of trees and saprotrophic fungi recycle the nutrients of dead trees.

"An example from the 1960s illustrates the economic benefits of mycoviruses: viruses helped to save the European chestnut from a dangerous pathogen of non-native origin. This incentivised our research of [root](#) rot viruses," says Hantula.

Provided by Natural Resources Institute Finland

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