

# Science for Environment Policy

## Fungi could help control weevil infestations of forests

**Pests that cause** millions of euros in damage to Europe's forests every year could be controlled using fungi. A new study finds that certain strains and formulations of fungi are extremely effective in killing large pine weevils. Control of the weevils using fungi may provide forest managers with an alternative to chemical pesticides.

**Large pine weevils** (*Hylobius abietis* L.) feed on the bark of saplings of conifer trees, causing economic losses estimated at around €140 million per year. Severe infestations may prevent saplings and seedlings growing on a conifer plantation for several years in a row<sup>1</sup>. The Scots pine – economically important in the timber and paperindustries – is just one tree species that suffers major losses as a result of large pine weevil infestations.

In the study, conducted under the IMPACT project<sup>2</sup>, co-funded by the EU, researchers chose different species and strains of insect-infesting fungi to test on large pine weevil larvae (grubs), pupae and adult insects. For each strain, they observed how many insects died whilst feeding on spruce twigs in containers, when infected with the fungi. The most effective fungal species for killing pine weevils was *Metarhizium robertsii*, which killed all larvae and pupae in four days. One strain of *M. robertsii* killed all adult insects in 12 days. Larvae and pupae were more susceptible than adult insects to all fungal species and strains. According to the researchers, this may have been because larvae and pupae are softer-bodied than the fully grown insects, so fungi hyphae could penetrate more easily.

The fungus *M. robertsii* (strain V275) is found all over the world and is also native to Europe. So far, the fungi tested in the study appear to present little risk to the environment or people. Strain V275 infects a wide range of insects, including mites and mosquitos. The strains used in the study were selected on the basis of their virulence towards various insect species including vine weevils.

The researchers also compared wet versus dry fungal spores to see whether – as suggested by other studies – dry spores would be more effective in infesting pine weevils, which would result in higher killing rates. Dry spores of *M. robertsii* were indeed more effective. However, the researchers point out that dry spores may quickly become deactivated by heat or UV light under field conditions. Therefore, they suggest that applying wet spores during July and August, when the more susceptible larvae and pupae are abundant, might be the best way to combat large pine weevil infestations.

Although the pyrethroid insecticide cypermethrin can be used to control pine weevils, the [Directive](#) on the sustainable use of pesticides promotes non-chemical pest control methods. Strategies to kill pine weevils using fungi may be safer than chemical methods, although additional studies will be required to understand more about their environmental impacts. Previous research suggests the fungi pose little risk to mammals, birds, fish and humans. Future experiments will be carried out under field conditions to test the fungi's effects on other species, including insects that are not being targeted, and its potential as a commercial product.

Nematodes (roundworms) are also considered for controlling large pine weevils. Major benefits of fungi over nematodes include: effective killing of larvae, pupae and adult insects, a better shelf-life and flexibility of formulation (wet or dry spores) depending on field conditions. However, strains that act faster may be required for insects feeding on some types of conifer, as three adult weevils can strip the bark from a spruce seedling in just six days.

4 October 2012  
Issue 300

Subscribe to free  
weekly News Alert

**Source:** Ansari, M. A. and Butt, T. M. (2012). Susceptibility of different developmental stages of large pine weevil *Hylobius abietis* (Coleoptera: Curculionidae) to entomopathogenic fungi and effect of fungal infection to adult weevils by formulation and application methods. *Journal of Invertebrate Pathology*. 111(1): 33-40. DOI:10.1016/j.jip.2012.05.006.

**Contact:**  
[m.a.ansari@swansea.ac.uk](mailto:m.a.ansari@swansea.ac.uk)

**Theme(s):** Biotechnology,  
Forests

The contents and views included in Science for Environment Policy are based on independent, peer-reviewed research and do not necessarily reflect the position of the European Commission.

To cite this article/service: "Science for Environment Policy": European Commission DG Environment News Alert Service, edited by SCU, The University of the West of England, Bristol.

1. Heijari, J. et al. (2011). Feeding of large pine weevil on Scots pine stem triggers localised bark and systemic shoot emission of volatile organic compounds. *Environmental and Experimental Biology*. DOI: 10.1016/j.envexpbot.2011.02.008.

2. IMPACT (Integrated Management of forest Pests Addressing Climate Trends) is part funded by the European Regional Development Fund (ERDF) through the Ireland-Wales Programme (INTERREG Iva): [www.impactproject.eu](http://www.impactproject.eu)