



## Could fungi naturally control Bluetongue-spreading insects?

**A fungus** could offer an alternative to chemical pesticides for the control of biting midges that spread livestock diseases, including Bluetongue and African horse sickness, according to new research.

**Biting midges that belong** to the *Culicoides* family spread diseases such as Bluetongue and African horse sickness. Since 2006, livestock in northern Europe has suffered an outbreak of Bluetongue that has affected 16 countries. The EU framework directive on the sustainable use of pesticides<sup>1</sup> calls for mandatory Integrated Pest Management (IPM). Biocontrol - or the use of natural biological processes to control pests - is one IPM technique.

The research is the first to investigate the potential of fungi to control biting midges. It focused on four different fungal species - *Metarhizium anisopliae*, *Beauveria bassiana*, *Isaria fumosorosea* and *Lecanicillium longisporum* – to assess their effectiveness at killing the larvae of *Culicoides nubeculosus*, which spreads African horse sickness. The fungus *M. anisopliae* was consistently the most effective form of control at all stages of a larva's development. Ten strains of *M. anisopliae* were investigated, which killed up to 100 per cent of the larvae.

The three strains of *B. bassiana* produced killed between 20 and 35 per cent of the larvae, the four strains of *I. fumosorosea* between 20 and 40 per cent. The single strain of *L. longisporum* killed 35-40 per cent of larvae. Higher concentrations of fungus had greater effects. A high concentration of *M. anisopliae* had a 100 per cent success rate at all stages of larval development whilst the lowest concentration killed just 73 to 80 per cent of larvae.

The researchers were not able to tell exactly how the fungi kill the larvae, but suggest several possible mechanisms. For example, they noticed that the fungi accumulated around the mouths of the larvae, which may cause the larvae to starve to death by restricting movement.

*M. anisopliae* has the potential to be an environmentally compatible method of preventing midge transmitted diseases. As well as being highly effective, *M. anisopliae* has a high spore yield, a long shelf life and has been shown to pose no obvious risk to humans or the environment.

However, *M. anisopliae* does not produce spores on the larvae once they are killed which means it will have to be applied frequently to ensure they continue to be effective. In addition, fungi must come into direct physical contact with the larvae which may be difficult if they are not suspended in liquid as they are in the study. Additional field studies are needed to evaluate the feasibility of using the fungus as a biocontrol method in real life situations, as well as the costs.

The fungus's effect on the larvae of this *Culicoides* species suggests it may also be effective at controlling other species of *Culicoides*, such as those that spread Bluetongue, but this needs to be fully evaluated along with the fungus's effects in different midge habitats, such as manure, turf and leaf litter.

1. See <http://ec.europa.eu/environment/ppps/home.htm>

**Source:** Ansari, M.A., Carpenter, S. & Butt, T.M. (2009). Susceptibility of *Culicoides* biting midge larvae to the insect-pathogenic fungus, *Metarhizium anisopliae*: Prospects for bluetongue vector control. *Acta Tropica*. Doi: 10.1016/j.actatropica.2009.08.022.

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