

Death by fungus provides solution

Findings of a groundbreaking study by a team of Welsh academics could have far-reaching implications for the control of mosquito larvae across the world

Professor Tariq Butt, from the Department of Biosciences at Swansea University, South Wales, has led a rigorous and thorough study into the mechanisms by which the insect pathogenic fungus *Metarhizium anisopliae* kills mosquito larvae, demonstrating that the fungus infection processes that occur for terrestrial insects do not apply to the mosquito larvae.

The research has shown that this fungus is able to kill the larvae without germinating which results in a stress related and fast 'accidental death'. It is not adapted for the aquatic environment and does not stick to the surface of the insect - instead it kills its host inadvertently when ingested. This means that the *Metarhizium* spores do not penetrate the gut or cuticle but instead produce proteases which induce stress and subsequently death to the larvae. This is a new discovery as it has always been assumed that the fungus penetrates the cuticle as it does terrestrial hosts. The fungus does not propagate in the infected larvae as it would in susceptible hosts and so the conclusion is that the death caused is therefore unintentional - hence the verdict of accidental death.

Mosquitoes are small, midge-like flies in the family *Culicidae*. Although a few species are harmless, most are considered a nuisance because they consume blood from living vertebrates, including humans. Professor Tariq Butt said, "Female mosquitoes feed on blood and in the process, some of them transmit extremely harmful human diseases, such as malaria, dengue and yellow fever. More than half the world's population is at risk to mosquito transmitted diseases."

Findings from this Swansea-led study have shown that these strains of fungi kill both adult and larval mosquito of three important genera: *Aedes* - vector of yellow fever and dengue, *Anopheles* - vector of malaria and *Culex* - vector of West Nile Virus.



The team at Swansea are now developing environmentally friendly products and strategies for mosquito control. The products include strains of insect pathogenic fungi, for example, *Metarhizium anisopliae*, and attractants. Their aim is to use the attractants to lure mosquitoes to improve monitoring and to deploy in "lure and kill" pest control programmes. Luring mosquitoes to control agents is more cost effective as there is not the need to spray large areas and further testing has shown that the strains of the fungi known to kill mosquitoes can also kill midges and ticks.

Speaking about the future application of these findings Professor Butt said, "The results from the study show that by simply casting the fungus spores on water we should be able to help to defeat troublesome life threatening colonies of mosquitoes which have been gradually moving north into Europe as the climate warms up. Trials are currently taking place in Africa and the findings would have important consequences for tackling malaria and other mosquito transmitted diseases."

"We hope that our 'accidental death' findings will stimulate much discussion on this topic and lead to some important and exciting developments which could eradicate the most dangerous animals on earth! "

The results of this study will have far reaching implications for the control of mosquitoes and other pests as well as the resulting diseases which they transmit.

Profile

Product
Mosquito attractant

Applications
Pest control

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