

No safety in numbers for moths and butterflies

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Scientists at the University of Leeds (UK) are to investigate how lethal viruses attack differently sized populations of moths and butterflies in research that may open the door to new methods of pest control.

The project, funded by the Natural Environment Research Council, will study the grain-infesting Indian meal moth (*Plodia interpunctella*) and a virus it carries that is sometimes deadly to its host and sometimes not.

Dr Steve Sait from the University of Leeds and Professor Rosie Hails from the Centre for Ecology & Hydrology hope to understand what criteria trigger the virus to become lethal. The work could help provide better ways to manage pests and invasive species.

The Indian meal moth is a significant problem around the world, attacking harvested crops such as cereals, rice, nuts and seeds and manufactured foods such as chocolate.

The Indian meal moth virus uses two forms of virus transmission – vertical and horizontal. The virus is passed 'vertically' from parent to offspring, but 'horizontally' through contact between infected and healthy caterpillars in the same generation.

As vertical transmission requires the host to be alive to reproduce, it is used by non-lethal forms of the virus and can continue even when host [population](#) levels are low.

Lethal forms – which kill a large percentage of the host caterpillars – use horizontal transmission and require population levels to be high enough for it to spread. But how does the virus know when to change its methods?

Dr Steve Sait, Reader in Ecology at Leeds' Faculty of Biological Sciences, explains: "[Moths](#) and [butterflies](#) tend to have population peaks every few years and in between, survive with more limited numbers. Viruses should use vertical transmission when population density is low, but during population peaks, the same viruses can become more virulent and use horizontal transmission.

"We believe that changes in the host insects' physiology, perhaps caused by greater competition for food as populations increase in number, may be one of the main triggers for this switch between lethal and non-lethal forms."

The researchers will be studying the Indian meal moth and its virus in the laboratory under controlled conditions, to determine how population levels and food availability impact on [virus](#) transmission and how deadly it is. The fast-living moth populations live in microcosms of the real world, which allows the team to collect data that might otherwise take an entire research career.

Provided by University of Leeds

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