

Butterfly eggs alert mustard plant to voracious caterpillars

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Mustard plants are able to defend themselves against voracious caterpillars before these emerge from their eggs. As butterflies lay eggs, a substance is released that the plant recognises, thus activating a series of defence mechanisms. Caterpillars develop less well on plants where eggs have been laid than on plants where no eggs were present. The plant remains fitter too. These are the results of research conducted by

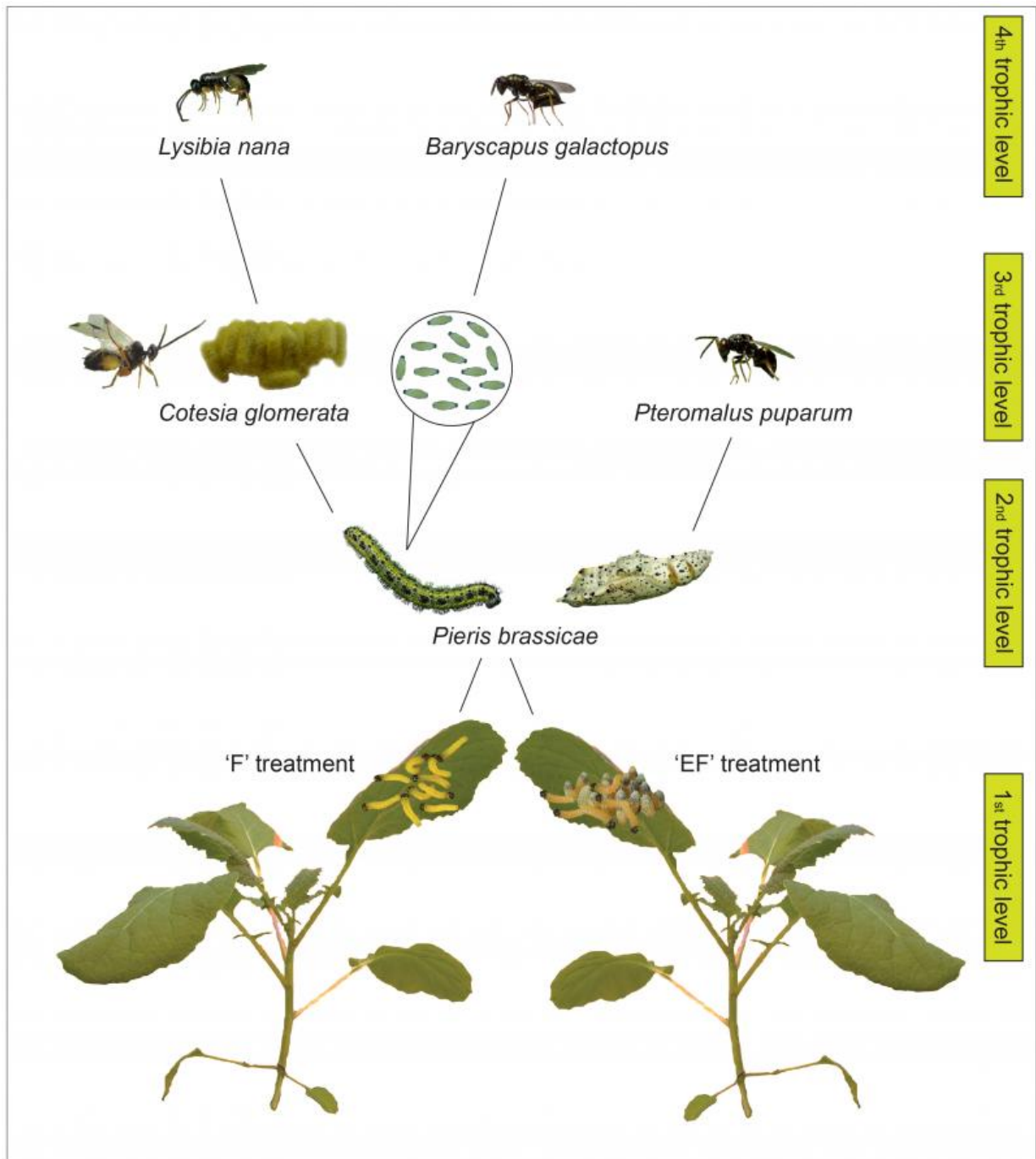
entomologists at Wageningen University. The research was published online in *Ecology Letters* on 6 July.

Plants can be aware of insects before the latter cause any damage. When the large cabbage white butterfly (*Pieris brassicae*) lays eggs on black mustard (*Brassica nigra*), the plant registers an alerting substance released from the eggs. The plant subsequently prepares itself for the greedy [caterpillars](#) that will emerge from the eggs. Tests using that substance have shown that the caterpillars, as a result, do not develop well.

During the first few hours that the caterpillars start chewing on the plant, there is a change in the odour normally produced by the plant. This helps ichneumon wasps to find caterpillars. The odour released by [plants](#) where eggs are present is different from the odour in plants where there are no eggs.

Natural enemies

One of the [natural enemies](#) arriving on the scene is the parasitic wasp *Cotesia glomerata*. This ichneumon wasp develops inside a caterpillar, ultimately killing it. In turn, an enemy of the wasp itself is also attracted to the plant: the hyperparasite *Lysibia nana*, which kills the wasp cocoons. Caterpillars that feed on plants that have been alerted to the presence of eggs are parasitised far more often by ichneumon wasps than the ones on plants that have not been alerted. Researcher Foteini Pashalidou and her colleagues at Wageningen University made this discovery.



Trophic network on *Brassica nigra* in the field study. EF plants were exposed to *P. brassicae* eggs, and then eaten (Feeding; plant on right) while F plants were only exposed to being eaten (Feeding; plant on left). Credit: www.bugsinthepicture.com.

Seed production

Another surprising result in this study refers to plant reproduction. Mustard plants on which the large cabbage white lays eggs and which get eaten up produce more seeds than plants where no [eggs](#) were deposited but where caterpillars have nevertheless caused damage. More research is necessary to discover how exactly parasitisation of caterpillars by ichneumon wasps is initiated.

More information: "Early herbivore alert matters: plant-mediated effects of egg deposition on higher trophic levels benefit plant fitness." *Ecology Letters*. [DOI: 10.1111/ele.12470](https://doi.org/10.1111/ele.12470).

Provided by Wageningen University

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