Using different scents to attract or repel insects

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Turnip rape with pollinating bumblebee and caterpillar. Credit: UZH

Flowering plants attract pollinating insects with scent from their flowers and bright colours. If they have become infested with herbivores like caterpillars, they attract beneficial insects like parasitic wasps with the help of scent signals from their leaves. The wasps then lay their eggs in the caterpillars and kill the parasites. Floral and foliar scents can, however, mutually reduce their attractiveness. That's why flowering

plants face a dilemma: should they use their resources to attract pollinating insects and, by extension, for reproduction or should they invest in defence against herbivores? A Swiss-Italian research team headed by Florian Schiestl from the University of Zurich has now demonstrated that plants are able to adjust their scent bouquet to their needs at any given time and, in this way, to attract partner or useful insects in a more targeted manner.

The scientists examined the reactions of turnip rape – an edible flowering plant closely related to rape – after its infestation with herbivores. The researchers demonstrate that the infested plants markedly reduce their floral scent so as to attract parasitic wasps with scent signals from their leaves. "Decreasing the floral scent makes the plant less attractive to the insects which pollinate it. At the same time, it is then more attractive for the parasitic wasps", is how Florian Schiestl explains this mechanism. After infestation with herbivores and attracting wasps, the plants produce more flowers to compensate for their reduced attractiveness and to attract pollinating insects. "Floral scents are thus part of a complex trade-off with other scents that likewise attract beneficial insects", says Schiestl.

The results illustrate important ecological interactions when a plant attracts partner insects. Schiestl is of the opinion that the new findings may be relevant for the organic cultivation of useful plants. "One could try to optimise the attraction of parasitic wasps with less fragrant varieties and the attraction of pollinators with more fragrant ones."

Provided by University of Zurich