

MOLECULAR ECOLOGY OF INDUCED RESISTANCE II

Small things do matter! Root nematodes affect resistance against shoot feeding cabbage aphids

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In natural environments, plants are attacked by a wide variety of root and shoot herbivores that may induce plant defence responses. If the induced responses are systemic, root feeding herbivores may affect the performance of shoot feeding herbivores, and *vice versa*. Such interactions between root and shoot herbivores feeding on the same plant may result from systemic changes in primary or secondary compound levels in the plant.

Phytophagous nematodes are ubiquitous members of soil systems. Despite their small size, they may significantly contribute to plant species succession and cause severe yield losses in agriculture. Depending on their feeding strategy, nematodes may induce local responses in their host plant to establish a feeding site. Here we study how root-induced responses by two different nematodes affect aboveground specialist and generalist aphids on a wild crucifer species.

We infested *Brassica nigra* plants with either migratory endoparasitic nematodes (*Pratylenchus penetrans*) or sedentary root-knot nematodes (*Meloidogyne* spp.). Three weeks later, the shoots of these plants were infested with five individuals of either the specialist cabbage aphid (*Brevicoryne brassicae*), or the generalist peach aphid (*Myzus persicae*). Cabbage aphid colonies on *P. penetrans* infested plants grew on average slower than those on control plants, whereas cabbage aphid numbers increased the fastest on *Meloidogyne* infested plants. Peach aphid populations were not affected by nematodes feeding on the roots. Both nematodes species caused a significant increase in root biomass at about five weeks after infestation. This suggests that the nematodes induced phytohormone (IAA, ethylene) production in the roots, thus creating a sink for nutrients. The modulation of the hormonal balance may also have affected aboveground plant quality for the aphids. Therefore, we analyzed sugar, amino acid and glucosinolate content of phloem and leaf samples of infested and control plants at regular intervals to correlate these to aphid performance.