

# EUROPEAN OAK METABOTYPES SHAPE DIGESTION AND FITNESS OF THE HERBIVORE TORTRIX VIRIDANA

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May 31, 2022

## Abstract

Plants harbor a wide range of leaf-feeding insects. Insect survival and fitness are influenced by both energy-rich molecules and phytochemicals in the host foliage. Yet, how leaf chemical diversity and insect microbiota - key factors in ecological and physiological processes – shape insect nutrition and impact insect performance is still poorly understood. Here we forced *Tortrix viridana* larvae, an oak-specialized herbivore, to feed on two *Quercus robur* susceptible and resistant metabolic phenotypes (metabotypes) and examined leaf, salivary, and fecal metabolomes associated with larval performance, mortality, and fecal microbiota. We show that host chemical diversity affects larval development and that the distinct signatures of oak metabotypes are maintained in the insect digestive system. Larvae were highly efficient in nutrient assimilation and able to minimize plant chemical defenses, thanks in part to the adaptation of the gut microbiota to the different food qualities.

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