
Do aphids alter leaf surface temperature patterns during early infestation?

Sylvain Pincebourde*¹, Thomas Cahon , and Robin Caillon

¹Institut de recherche sur la biologie de l'insecte (IRBI) – CNRS : UMR7261, Université François Rabelais - Tours – Av Monge 37200 TOURS, France

Abstract

Arthropods at the surface of plants live in particular microclimatic conditions that can differ from atmospheric conditions. The temperature of plant leaves can deviate from air temperature, and leaf temperature influences the eco-physiology of small insects. The activity of insects feeding on leaf tissues may, however, induce changes in leaf surface temperatures, but this effect was only rarely demonstrated. Using thermography analysis of leaf surfaces under controlled environmental conditions, we quantified the impact of presence of apple green aphids on the temperature distribution of apple leaves during early infestation. Aphids induced a slight change in leaf surface temperature patterns after only 3 days of infestation mostly due to the effect of aphids on the maximal temperature that can be found at the leaf surface. Aphids may induce stomatal closure, leading to lower transpiration rate. This effect was local since aphids modified the configuration of the temperature distribution over leaf surfaces. Aphids were positioned at temperatures near the maximal leaf surface temperatures, thus potentially experiencing the thermal changes. The feedback effect of feeding activity by insects on their host plant can be important and should be quantified to better predict the response of phytophagous insects to environmental changes.

*Speaker