What attracts the allies of *Aristolochia contorta*?

Si-Hyun Park[1], Jae Yeon Jang[1], Hangah Lim[2], Sang Kyu Kim[3], and Jae Geun Kim[1]

[1]Seoul National University
[2]KAIST
[3]Korea Advanced Institute of Science and Technology

October 16, 2024

Abstract

1. In the evolutionary arms race between plants and herbivores, sophisticated mechanisms of indirect defense play a pivotal role. This study investigated the intricate ecological dynamics between *Aristolochia contorta, Sericinus montela,* and *Ooencyrtus* spp., with a special focus on the role of volatile organic compounds (VOCs) in plant. 2. This study utilized field surveys, olfactometer experiments, and Gas Chromatography-Mass Spectrometry (GC-MS) analysis to investigate the role of volatile organic compounds. 3. Field surveys showed a 54.6% egg parasitism rate, with quadrats containing *A. contorta* and larvae attracting more *Ooencyrtus* spp. than those with the plant alone. In olfactometer bioassays, *Ooencyrtus* spp. demonstrated a notable preference for leaves damaged by a pattern wheel, attracting 46.8% of *Ooencyrtus* spp. compared to undamaged controls. Moreover, leaves treated with larval saliva were found to be similarly attractive, drawing in 48.7% of *Ooencyrtus* spp.. In addition, the difference in attraction between leaves with and without larval saliva did not reach statistical significance. GC-MS analysis identified essential VOCs in the damaged leaves, including hexyl acetate, cyclohexene, δ-cadinene, α-pinene, and β-caryophyllene. Additionally, leaves treated with larval saliva revealed the presence of exo-isocitral (0.61%), and β-pinene (0.14%), though in minimal amounts. Despite these complex responses, our analysis suggests that the compounds introduced or increased in concentration by larval saliva do not significantly boost the attraction of *Ooencyrtus* spp. 4. This finding implies that while the VOCs response to damage and saliva application is multifaceted, serving multiple defensive functions, the quantities of these saliva-induced compounds could be insufficient to substantially influence the behavior of *Ooencyrtus* spp. towards the damaged leaves. This research furthers our understanding of the indirect defense strategies of plants, particularly highlighting the vital roles of VOCs in *A. contorta*. Moreover, our findings suggest new avenues for exploring the ecological and evolutionary roles of chemical signals, shedding light on the complex interactions facilitated by these chemical cues in plant defense mechanisms.

Hosted file

`2024_Manuscript_Ecology and evolution.docx` available at https://authorea.com/users/843879/articles/1233111-what-attracts-the-allies-of-aristolochia-contorta