Examining the role of plant structural defenses in restricting herbivory

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Introduction

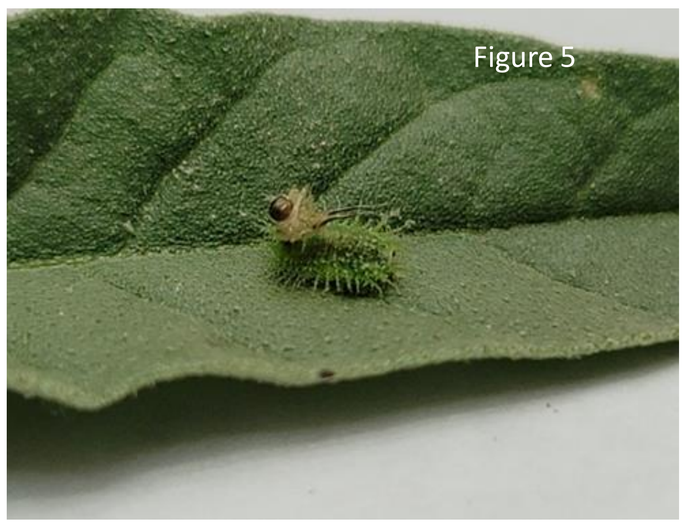
- Trichomes prevent herbivory: inhibiting herbivores' movement, feeding, and causing post-ingestive damage.
- The tortoise beetle feeds on them and protect themselves with their fecal shields.
- We are interested in assessing the feeding behavior of these beetles and the effect of high trichome density on beetle biology and physiology.
- The objective of this study is to assess the feeding behavior of Eggplant tortoise Bettle on three Solanaceae speacies (*Solanum macrocarpon, Solanum glaucescens and Solanum eleagnifolium)* with variation in trichome density and structure using two experiments.

Research question

- We are interested in assessing the feeding behavior of these beetles and the effect of high trichome density on beetle biology and physiology.

Results

- About 6,615 insects were collected and have been classified to their order
- Arthropod community did not vary across the four fields
- There was no significant difference between the population of the pollinators and non-pollinators in the cover crop and the control treatments yet.
- Aphids, earwigs, and *Megachile* bees were common in the sticky, pitfall, and the pollinator traps respectively across the four fields



Hypothesis

- Beetles feeding on leaves with higher trichome density will possess gut damage but get protection from other predators due to their frass shields.

Experiments

1. Trichome density analysis of three Solanaceae species
   - Solanum elaeagnifolium was higher than Solanum macrocarpon and Solanum glaucescens: no difference in total glandular and non-glandular trichome density between S. macrocarpon and S. glaucescens.

2. Feeding behavior and damage assessment of larvae on three Solanaceae species

- Area of holes higher in S. elaeagnifolium than S. macrocarpon and S. glaucescens , but the difference was nonsignificant between S. macrocarpon and S. glaucescens.

- Parameter: significantly higher in S. elaeagnifolium than S. macrocarpon and S. glaucescens. S. macrocarpon had higher damage hole parameter than S. glaucescens

Conclusion

- G. pallidula larvae feed more on leaf surfaces with high trichome density to enhance its security.
- The potential of frass shield acting as defense mechanism by beetles can be examined using a natural enemy of the beetles in lab and field conditions

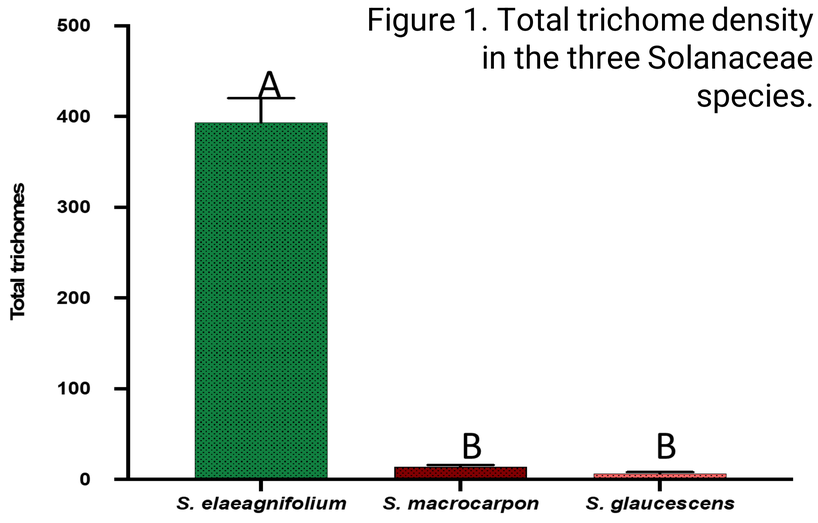


Figure 1. Total trichome density in the three Solanaceae species.

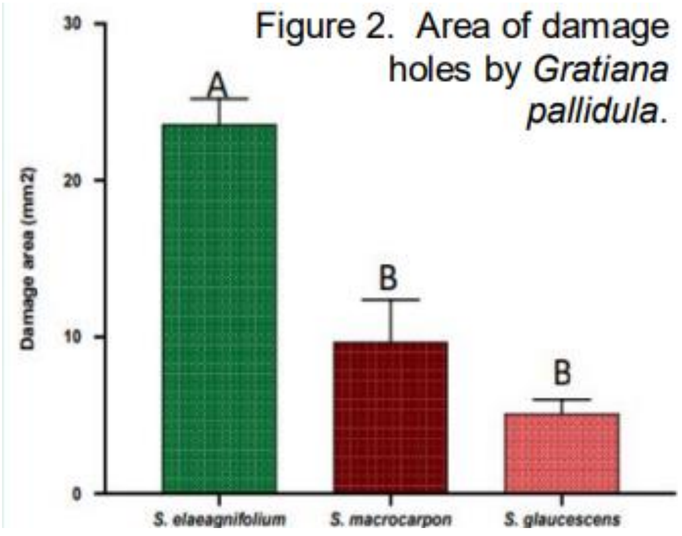


Figure 2. Area of damage holes by *Gratiana pallidula*.

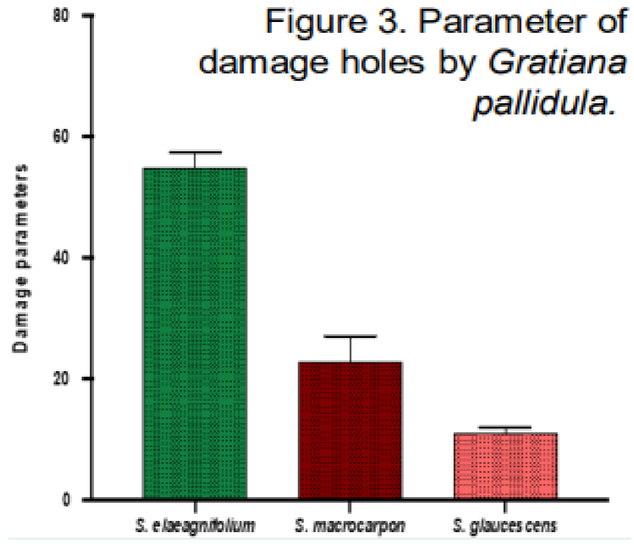
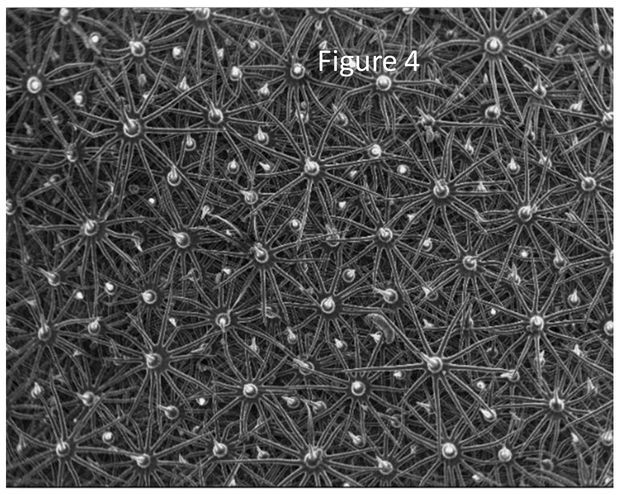
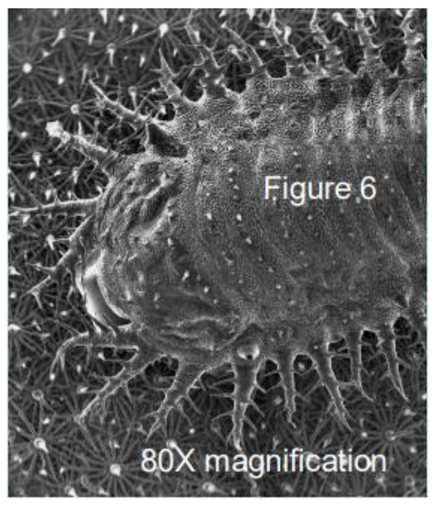


Figure 3. Parameter of damage holes by *Gratiana pallidula*.



Scanning electron micrograph of non-glandular trichome of Silverleaf nightshade.



SEM of Larva of *Gratiana pallidula*