

Host manipulation of the soybean aphid by the parasitoid *Aphelinus certus*

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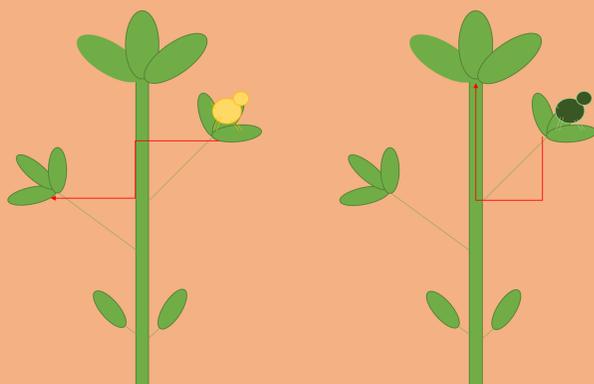
Introduction

Parasitoids are insects whose larvae feed on one host and eventually kill it in order to develop into an adult¹. The parasitoid wasp *Aphelinus certus* uses the soybean aphid as its host for development. Host survival from predation and other threats is important for the development and survival of the parasitoid wasp². One way the wasp may increase their chances of survival is host manipulation.

Objective: observing and verifying if soybean aphids stung by parasitoid wasps behave differently than soybean aphids not stung, which could be an indication to whether or not host manipulation is occurring.



Hypothesis: Soybean aphids stung and infected with parasitoid larvae will move lower on a soybean plant for better protection from natural enemies compared to not infected soybean aphids, which will move higher on the plant.

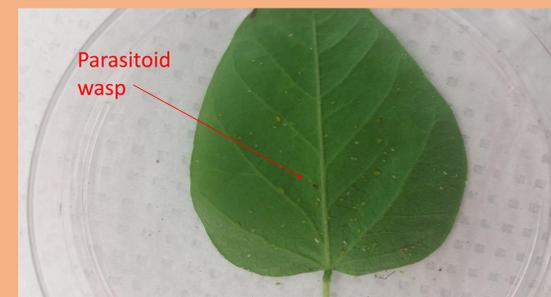


Materials & Methods

- 30 replicates created overall
- Two plants in each replicate
 - *One with 10 stung aphids
 - *One with 10 not stung aphids
- Aphids were stung by a parasitoid wasp and transferred to the plant
- Every couple of days aphid location was measured
- We performed a Welch's two sample T-test, after checking for normality. The offspring data were log transformed (+ 0.5) prior to performing a T-test.

Conclusion

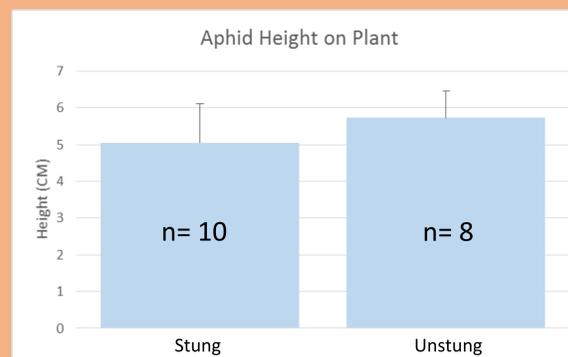
- Stung aphids traveled less far on the plant compared to unstung aphids.
- Stung aphids had fewer offspring on average per day compared to aphids that were not stung.



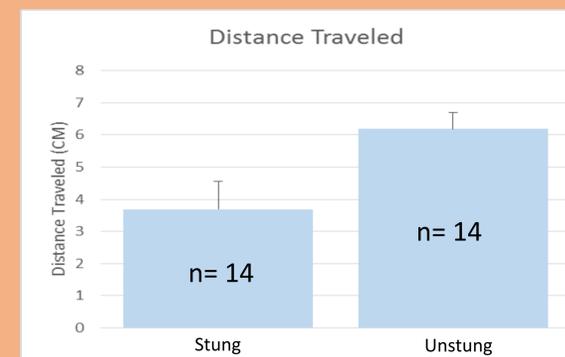
Implications

- Although a difference in behavior is observed, which is consistent with host manipulation, there are other alternative explanations, such as host injury.
- Stung aphids producing less offspring could be a result of preserving more resources for the parasitoid larvae¹.
- Future research can further explore the possible reasons of this behavior difference.

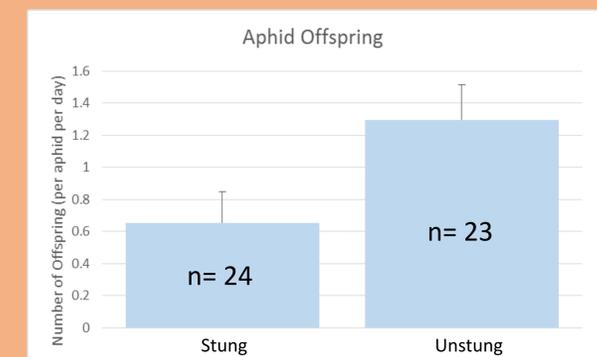
Results



-Stung aphids on average were 5.8 cm higher on the plant than they were originally placed compared to not stung aphids which were 6.2 cm higher than originally placed
p-value: 0.602



-Stung aphids traveled a distance of 3.7 cm from their original location compared to not stung aphids, which traveled an average distance of 6.2 cm
p-value: 0.0214



-Stung aphids had an average of 0.6 offspring per aphid per day compared to aphids that were not stung which averaged about 1.2 offspring per aphid per day
p-value: 0.0056

References

- ¹Godfray, H. Charles J. Parasitoids: behavioral and evolutionary ecology. Princeton University Press, 1994.
- ²Poulin, R. "The evolution of parasite manipulation of host behaviour: a theoretical analysis." *Parasitology* 109.S1 (1994): S109-S118.

Acknowledgments

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