

Introduction/Background

Aphids are notorious agricultural pests due to their rapid population growth. Research in temperate regions has shown that aphid populations may only be regulated by predators early in the growing season (Kindlmann et. Al. 2010).

We focused on the aphid species *Aphis nerii*, which feeds on the milkweed species *Asclepias curassavica*. *A. curassavica* is commonly found in pastures and along roadsides in Costa Rica.

One of *A. nerii*'s many predators includes a species of parasitic wasps. The parasitoids lay their eggs inside of the aphid, causing the aphid to mummify.

Objectives/Hypotheses

We had two objectives in this study:

- 1) observe the growth pattern of *A. nerii* colonies
- 2) determine whether the size of an aphid colony influenced the ability for parasitoids to locate and parasitize the colony.

We hypothesized that the abundance of mummified aphids is not related to the size of the aphid colony because the parasitoids are bad flyers and therefore must parasitize colonies on clustered milkweeds

We also hypothesized that if given a new, un-colonized food source, *A. nerii* will reproduce exponentially due to their ability to reproduce asexually until a carrying capacity is reached.

Methods

The study site was located in a cattle pasture on the UGA Costa Rica campus in San Luis de Monteverde.



1) Population growth:

- We haphazardly chose 10 milkweed plants that lacked aphid colonies.
- We secured a 2 cm segment of milkweed containing aphids to the stem of each plant.
- We measured the length of the aphid colony on the stem every 12 hours for 9 days.
- A note was made for predators present on the colonies.

2) Aphid colony size vs. Abundance of mummified aphids:

- We walked through the pasture and haphazardly chose milkweed plants that had colonies on them.
- We measured the length of the colony present on the stem and counted the number of mummified aphids.

Results

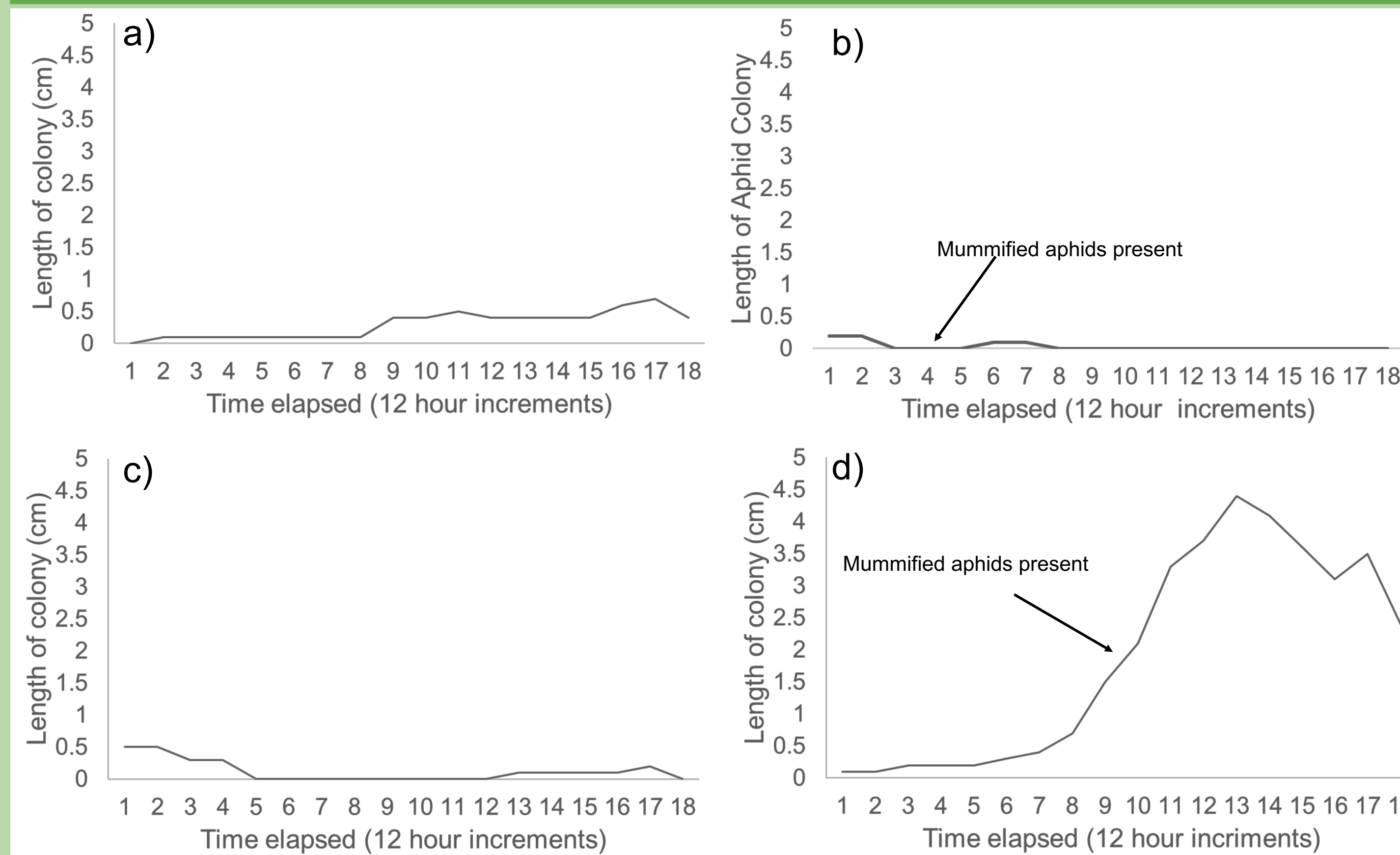
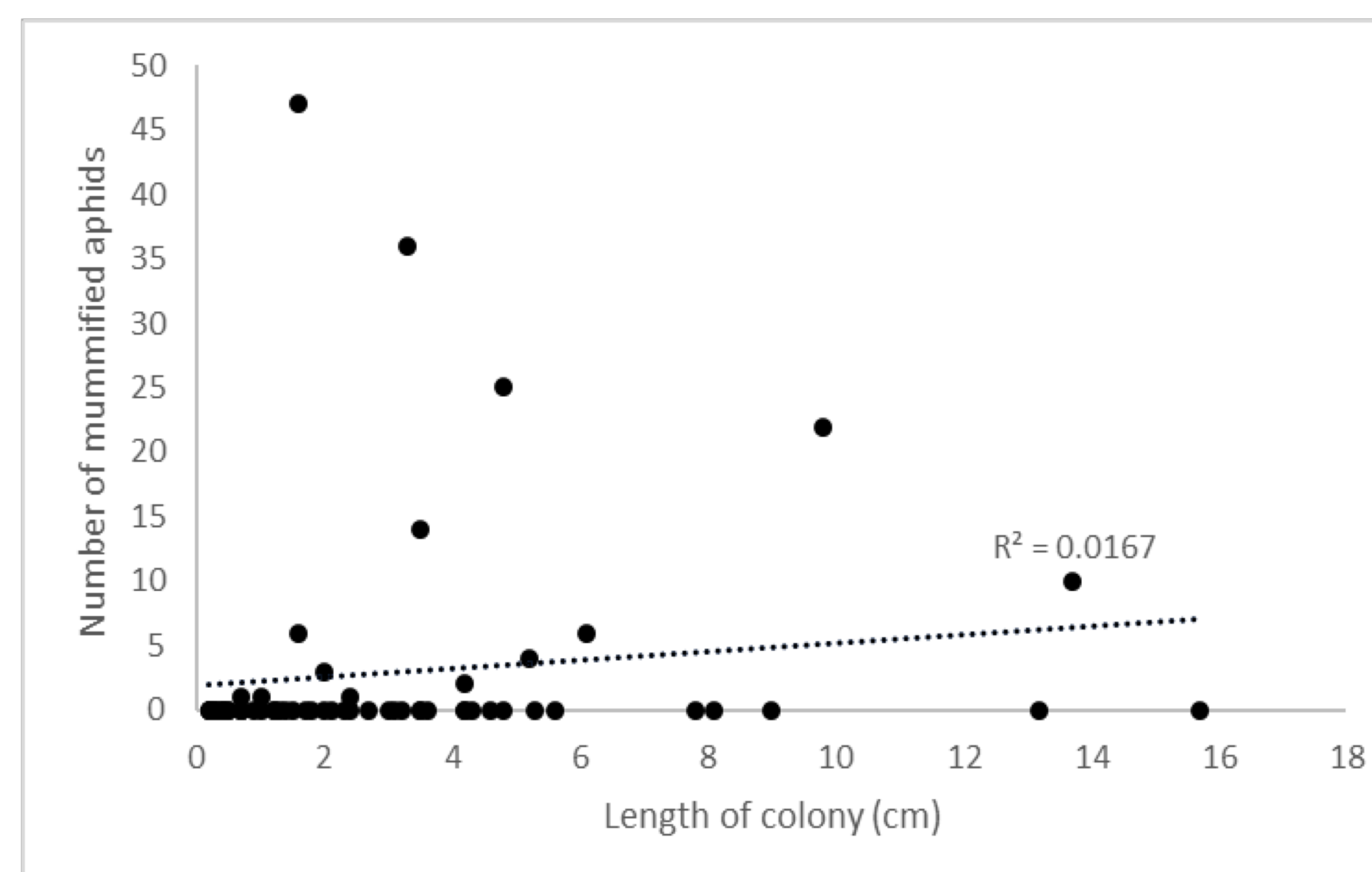


Figure 1) Colony growth (cm) over a 9 day period for populations 5 (a), 9 (b), 3 (c), and 1 (d).

- 8 out of 10 populations died out at some point during the 9 day period.
- Population 1 showed the expected exponential growth pattern (Fig. 1d).
- Predators were found on populations 1, 4, 8, and 10. Colonies 4 and 10 died out shortly after to exposure to predators.



- There was no significant correlation between the size of the aphid colony and the abundance of mummified aphids ($p=0.3$)



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Conclusions

- Contrary to what I predicted, most of the populations did not show exponential growth. Only population one showed exponential growth.
- Of the 10 populations, 8 died out during the 9 day period. The success of a population may be related to the colony's size when exposed to its first predator
- Populations 4, 8, and 10 likely died out due to the early exposure of a predator. Population 1 was also exposed to a predator, but this occurred at a later time, allowing the population to grow to a size large enough to overcome the predation effects.
- The size of the aphid colony does not have any correlation with the abundance of mummified aphids. There was some evidence that suggests patches of milkweed (as opposed to milkweed standing alone) are more likely to be parasitized.

Future Directions

- Future studies should be also be conducted during the dry season to quantify the effects of seasonality
- The density of milkweed patches and surrounding grass should be taken into consideration when observing the abundance of mummified aphids.
- *A. nerii*, *A. curassavica*, and parasitoid wasps are all present in Georgia, so this study could be conducted to compare colony success between tropical and temperate zones.
- Manipulative experiments on population growth of *A. nerii* would be helpful for determining an intrinsic growth rate

Acknowledgements

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Literature Cited

Kindlmann, Pavel., A. F. G. Dixon, and J. P. Michaud. Aphid Biodiversity under Environmental Change : Patterns and Processes. Dordrecht ; New York: Springer, 2010, pp. 1-20. Web

