

Characterizing soybean epicuticular lipids to discern their role in the soybean- soybean aphid relationship



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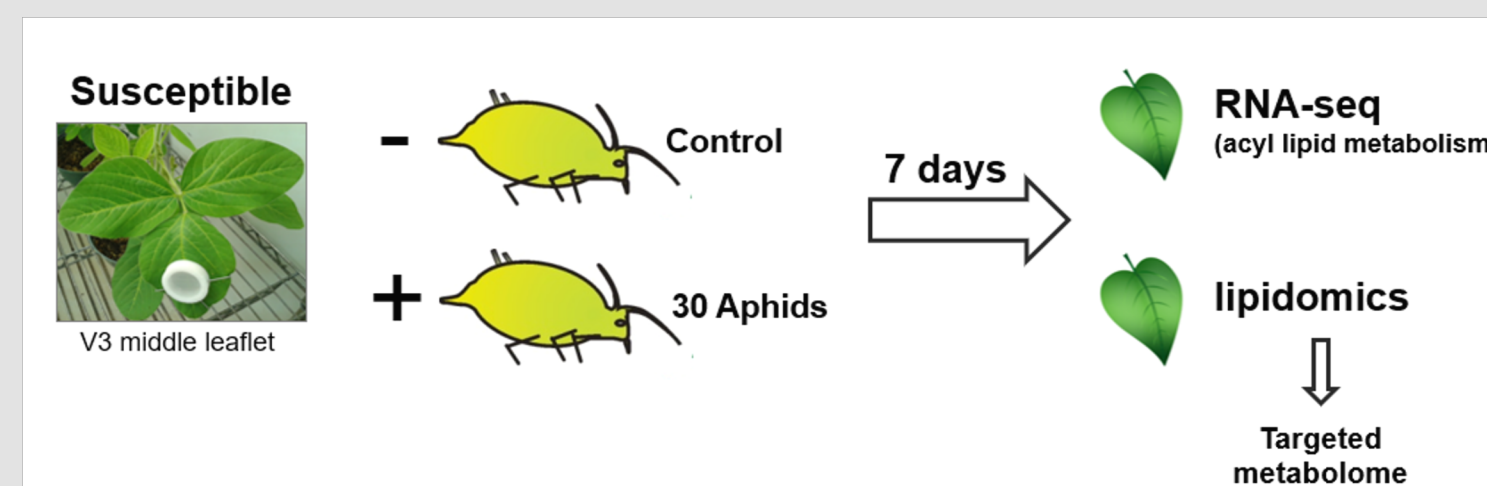
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Abstract

The soybean aphid is one of the most important soybean pests in the US Midwest. Understanding how soybean plants respond to the introduction of aphids can lead to the development of new insecticidal technologies. Previous studies have shown that the presence of aphids cause a change in the expression of genes suspected to be responsible for cuticle lipid production. **This project characterized the lipid composition of soybean epicuticular lipids with and without the introduction of aphids.** Total cuticular lipids increased across all types of lipids. A significant amount of lipids, especially triacylglycerols, were deposited onto the cuticle by aphids. The cuticular lipid increase was significant without the aphid deposition as well. We hypothesize that lipid deposition is used to make the plant more habitable and/or mark it as a favorable site for aphid infestation.

Background

Aphid Feeding Transcriptome Study



After aphid feeding, 354 genes were differentially expressed

33 DE genes were associated with cuticle biosynthesis or transport

Cuticle Extraction Method



Figure 1

Results

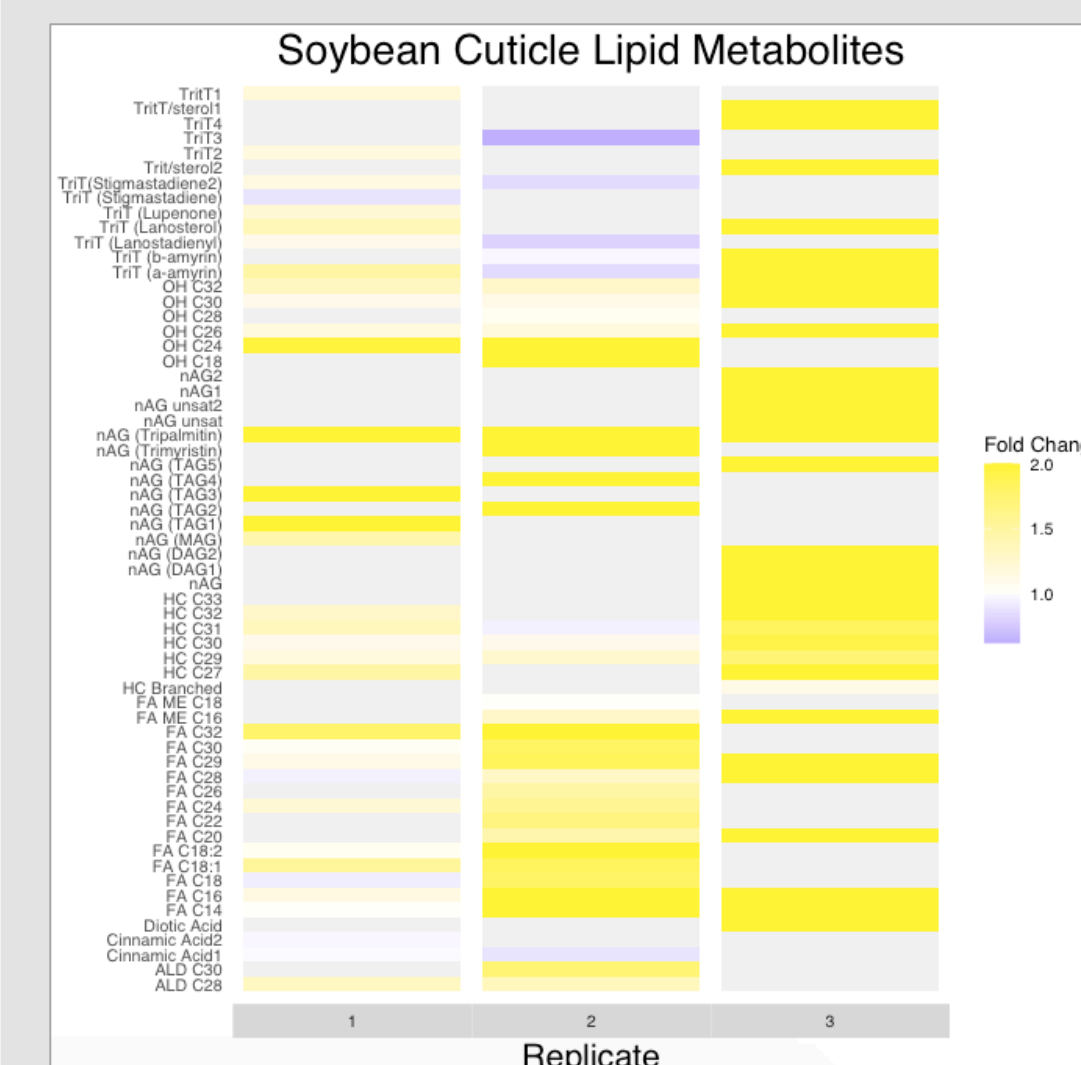


Figure 2a

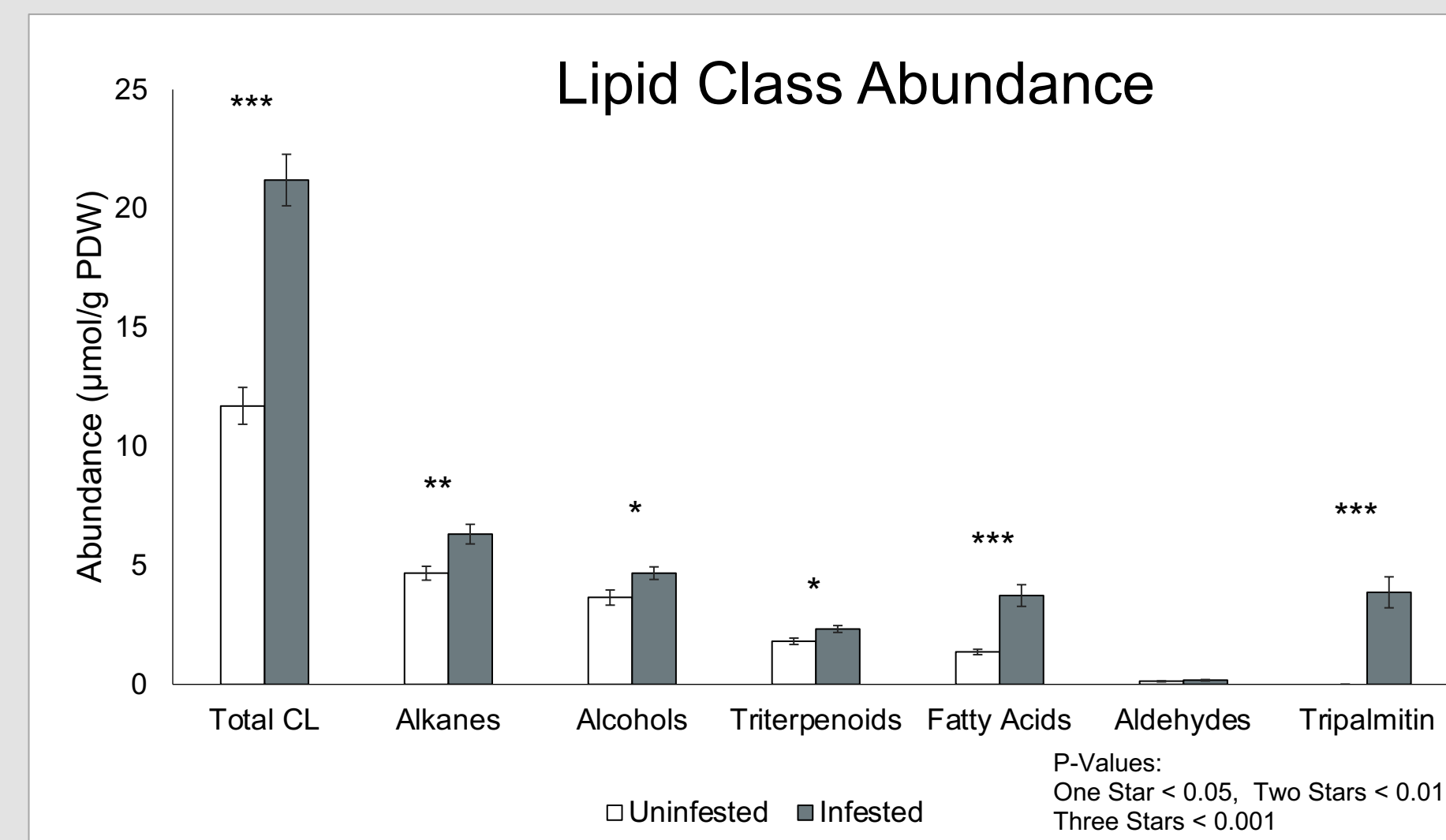


Figure 2b

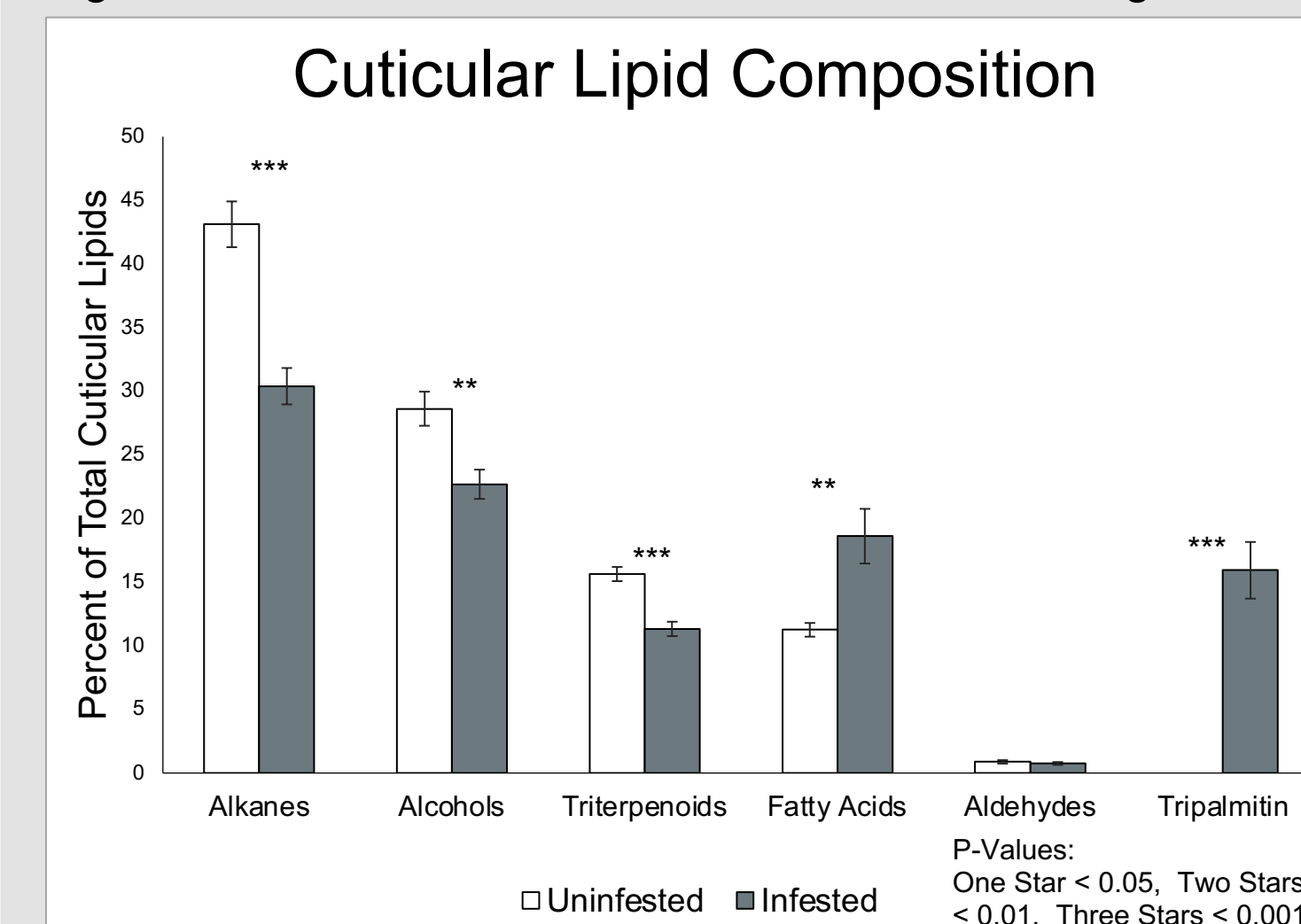


Figure 2c

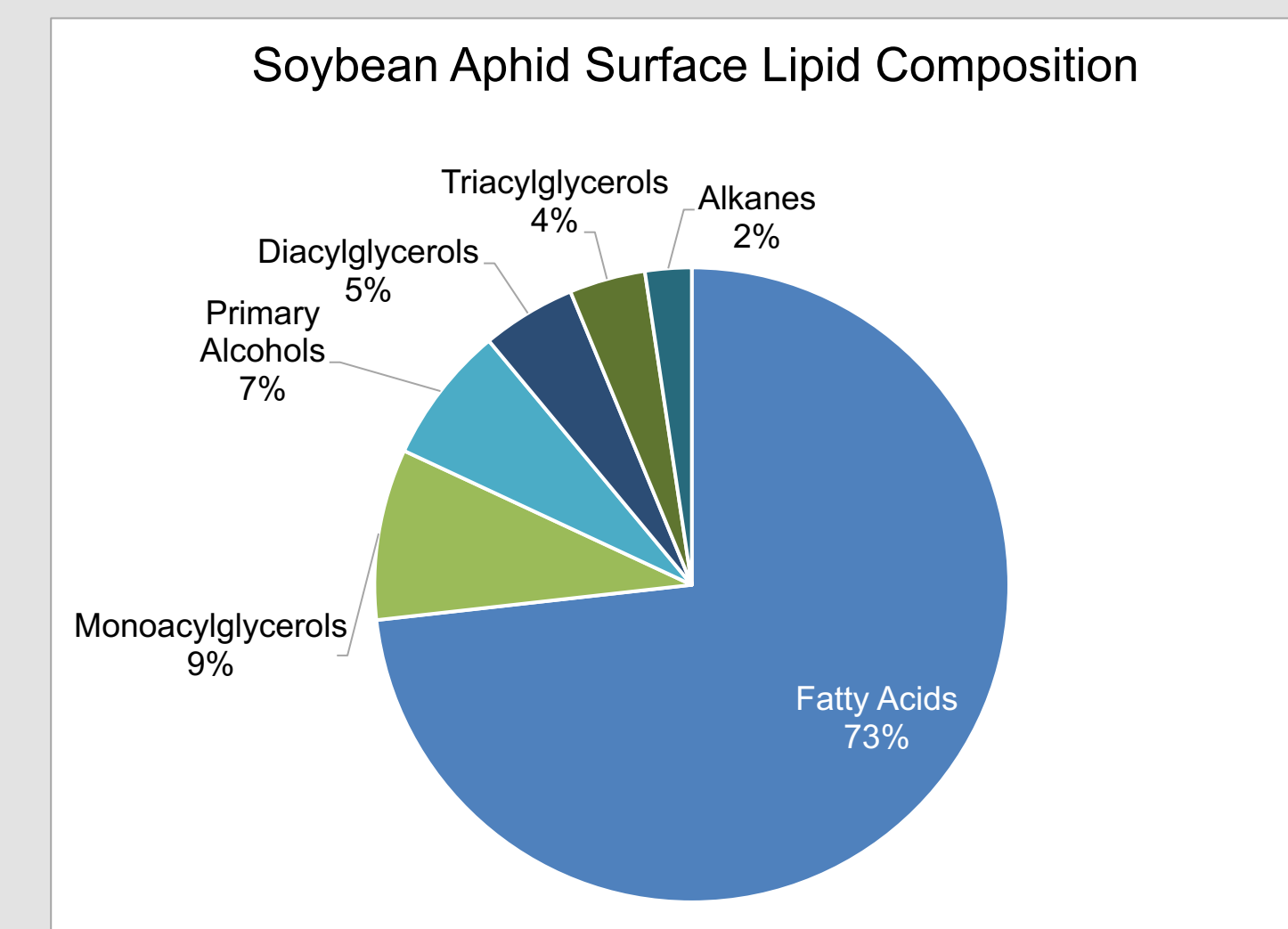


Figure 2d

Results

Tripalmitin Choice Experiment

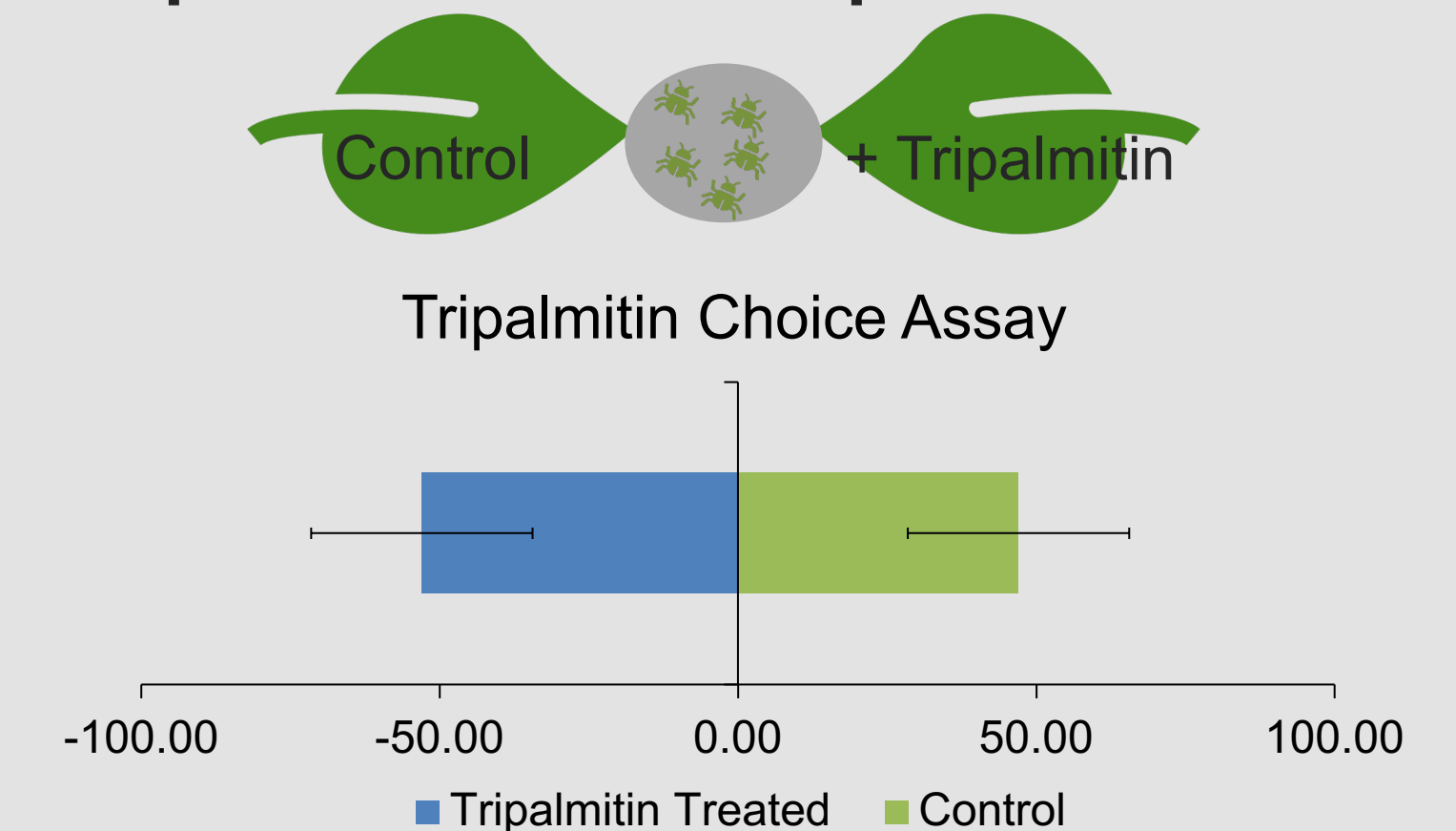


Figure 3

Conclusion

In response to aphid infestation:

- Plant-produced cuticular lipids increase overall
- All major lipid groups increase indiscriminately

Aphids deposit a significant layer of acylglycerols and fatty acids onto the cuticle

- The deposition changes both the composition and the thickness of the cuticle

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