Effects of Methylation on diapause in *M. Rotundata* using the methylation inhibitor 5-aza-2-deoxycytidine

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Introduction

- *Megachile rotundata*, commonly known as the Alfalfa Leafcutting Bee (ALCB), is the most heavily managed solitary bee in the world
- Many insects rely on diapause, an overwintering mechanism, to avoid harsh environmental conditions
- Not all ALCB will enter diapause, despite having all the environmental cues to do so
- Inconsistent diapause status in ALCB reduces yield for bee managers
- Past studies have indicated that the use of a methylation inhibitor has shown a significant change in the diapause destiny of ALCB offspring

Objective

To test the effect of the methylation inhibitor 5-aza-2-deoxycytidine on diapause in M. rotundata

Methylation

Methylation is a chemical process in which a methyl group attaches itself to a section of DNA and alters the ability for the gene to be expressed. This can result in a change in behavior, in our study, we look at the role of methylation in diapause in ALCB.

Methods

Five treatment groups of 44 females and 25 males:

- \- Control - sucrose solution (1:1 sugar water)
- Vector control - 30 µM DMSO (2.1 µM) in sucrose solution (7ml)
- Treatment 1 - 10µM (0.7 µM) drug in sucrose solution (7ml)
- Treatment 2 - 20µM (1.4 µM) in sucrose solution (7ml)
- Treatment 3 - 30µM (2.1 µM) in sucrose solution (7ml)

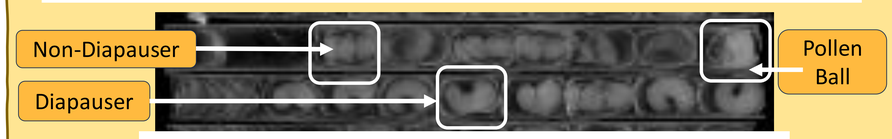
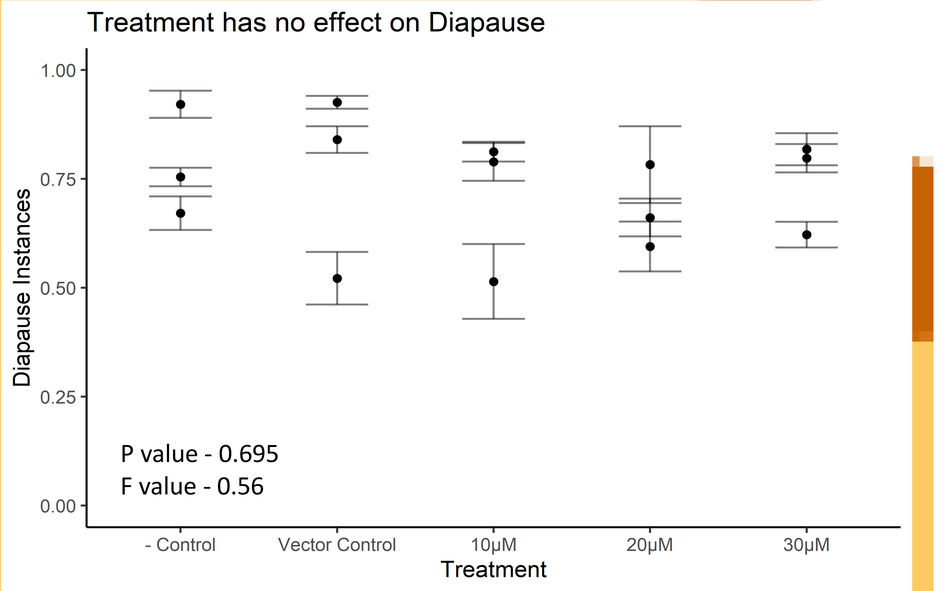


Figure 1 – an X-Ray of nests collected from field boxes used to determine the diapausing status of offspring



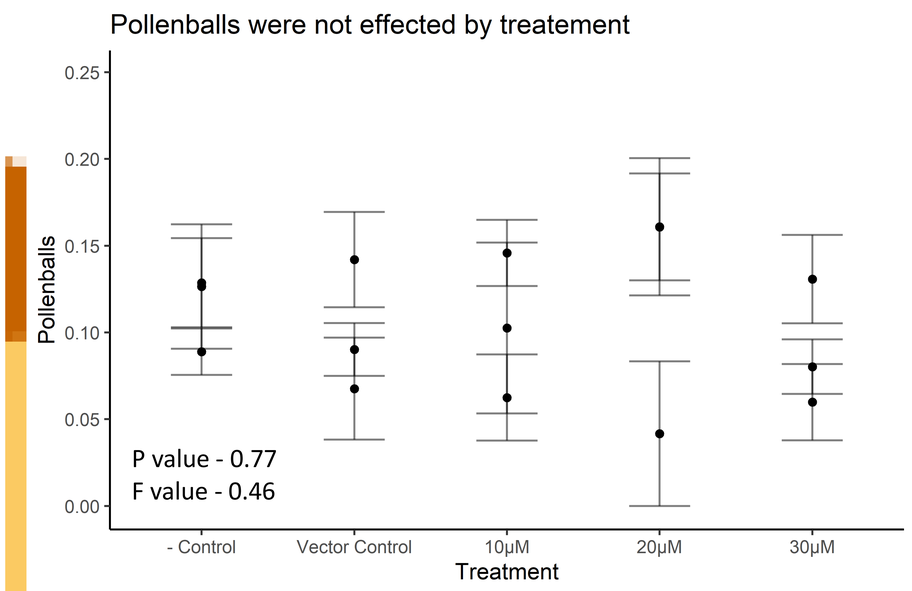


Figure 2 – an example of a field box with newly released bees

Figure 3 – Sarah Nash in the field releasing bees into the field

Conclusion

- The methylation inhibitor did not influence diapause
- The methylation inhibitor did not influence the presence of pollen balls

Future Studies

- Quantify the amount of methylation present
- Measure the amount of methylation that occurs naturally
- Repeat this study again during the spring

References

Acknowledgements

Alex Tennant for help both in the lab and in the field
Joseph P. Rinehart for help with writing and acquiring field space USDA-ARS for allowing us to use their facilities and offering general support This project was funded by National Science Foundation RII Track-2 FEC 182683