Introduction

The alfalfa leaf cutting bee (Megachile Rotundata)(ALCB) is a solitary bee that when managed, proves to be vital for the alfalfa seed production industry of North America. In the Megachile Rotundata life cycle, bees that overwinter are called diapausers. However, during the early season, there is an increased chance to having non-diapausing bees (bees that do not overwinter) which will result in a second generation. Farmers can run into issues with Megachile Rotundata management and alfalfa pollination due to the presence of these non-diapausers. With their early emergence, less bees are present in the following spring to pollinate alfalfa fields for seed production. By dosing Megachile Rotundata with the methylation inhibitor 5-aza-2-deoxycytidine, we hope to see an overall reduction in the amount of non-diapausers present.

Hypothesis

5-aza-2-deoxycytidine will increase rates of diapause in longer photoperiods.

Methods

Dosage Determination:
- To determine the toxicity of 5-aza-2-deoxycytidine and in turn an appropriate dosage to be fed to our field study Megachile Rotundata.
- Based on overall high survival rate and sufficient flight performance, the medium concentration (10 µM) was chosen for the field study.

Field Study

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<tr>
<th>KEY</th>
<th>C (Control)</th>
<th>T (Treated)</th>
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<tbody>
<tr>
<td>Blue</td>
<td>10µM</td>
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<td>Red</td>
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Results

- Bees treated with 5-aza-2-deoxycytidine experience a higher rate of diapause compared to the control bees.
- Compared to the control bees, treated bees exhibit a higher rate of pollen ball occurrences.
- Our findings correlate to results of previous studies and may suggest that this relationship can be found in a variety of insects.

Future studies:
- Focus on finding a dosage to yield the highest diapause rates and lowest death rate to maximize bee populations.
- Administer widespread management practices that involve farmers dosing their bees with a methylation inhibitor.
- Determine the importance of increased pollen balls with treated bees as well as how to reduce their occurrence.

Conclusion

Acknowledgements

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References: