Wisconsin Research Update

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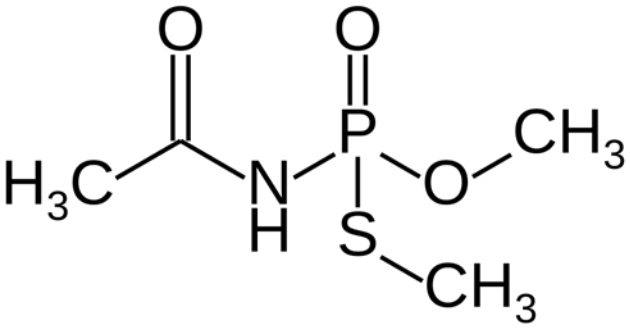
Does using Orthene (acephate) application before bloom result in fewer visits by honeybees to flowers during bloom or a subsequent reduction in yield?

Orthene (acephate) and honeybee activity

- Historical concern in Wisconsin dating back to the late 80s and early 90s.
- Several specific growers in central Wisconsin all reported problems with the material at the same time during this window. Usage limited since.
- Growers wanted to know whether we could replicate this historical concern in the modern era with modern acephate formulations.



Why use Orthene at all if you're a WI grower?

- Organophosphates have a broad spectrum of control that includes all significant Wisconsin pre-bloom insect pests. Lorsban was heavily favored until usage was revoked.
- Resurgence of the blunt-nosed leafhopper at several Wisconsin marshes in 2020 lead to increased attention to rotational use of broad spectrum pre-bloom chemistries.
- Unlike most organophosphates, Orthene is a systemic, translaminar material. This means that once the material has time to be taken up by the plant it is more resistant to wash-off and degradation than most other pre-bloom materials.

The design

- Three pairs of beds in central Wisconsin identified
- Each pair was same age, variety, and relative yield history.
- Stevens and GH-1
- One bed in each pair randomly selected for Orthene (acephate) before bloom. Other bed Lorsban (note – this was prior to the removal of Lorsban usage in cranberry. This product is no longer legal for use).
- Six 1m square honeybee observation plots placed per bed – 0, 5, 10, 15, 20 and 25m from bed center.
- All plots observed for honeybee activity 6-8 different times during bloom after applications were made. Berry count/ft^2 and weight/ft^2 collected from all plots at end of the season.
- Study was replicated in 2020 and 2021

1.) Does Orthene reduce honeybee activity?

2.) Does Orthene reduce yield?

3.) Is this consistent across seasons?

1.) Spray Lorsban vs. Orthene across multiple fields

2.) Observe pollinator activity 6-8 times during bloom

3.) Collect square foot yield data from same plots

Evaluation: the numbers

× 6

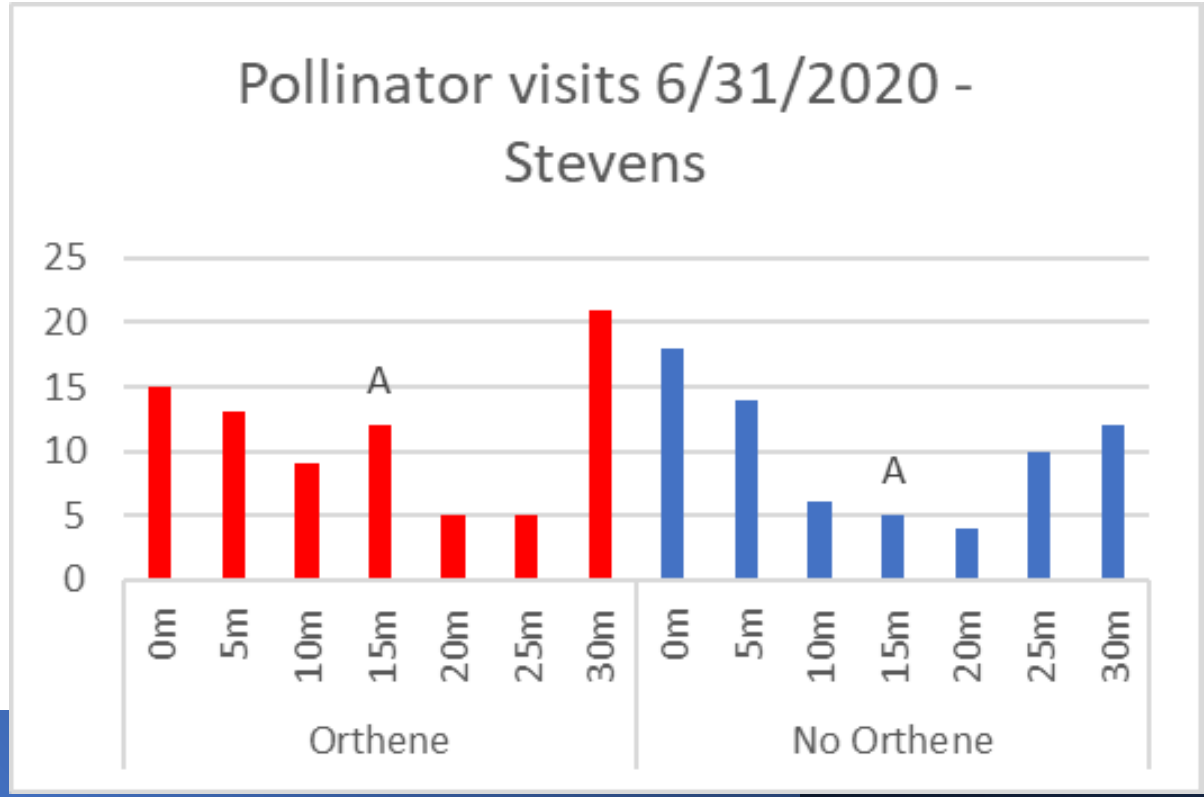
- Six plots 0-25m from edge/bed
- 1ft square harvest/plot

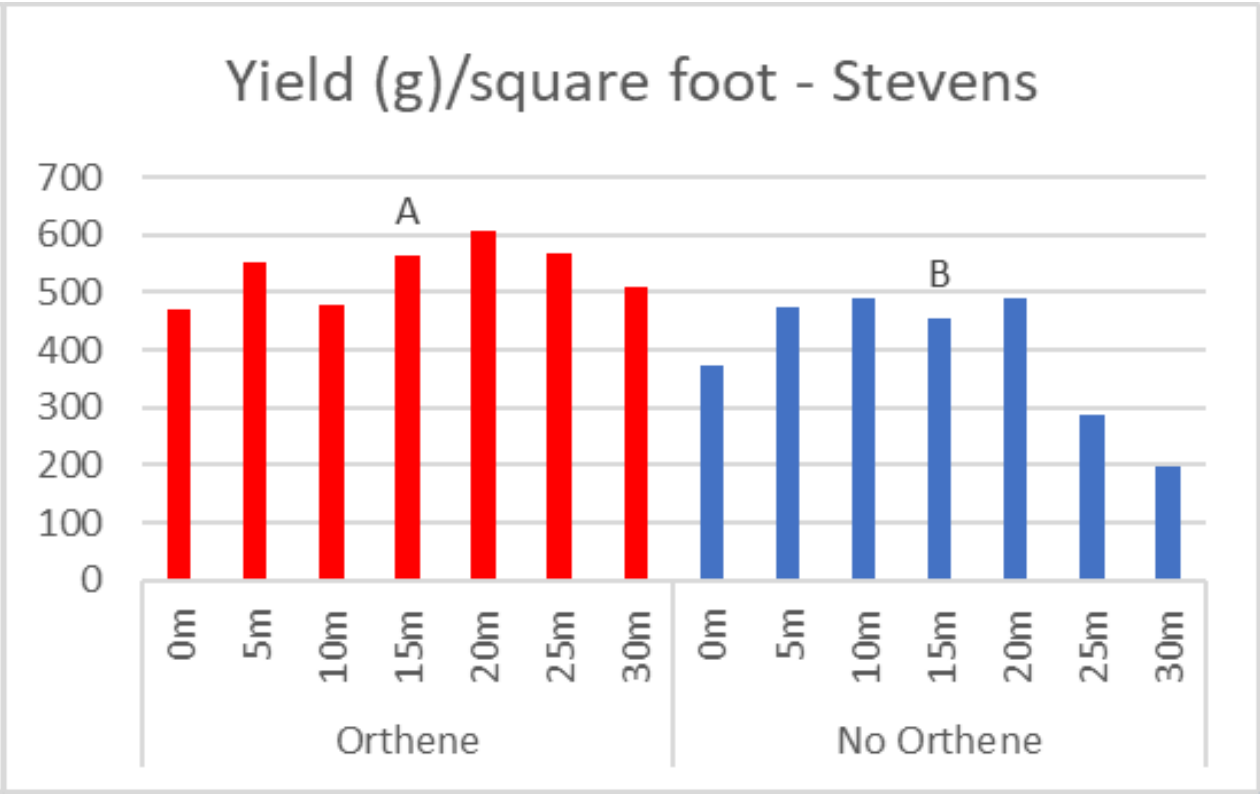
(36 plots x 7 observation dates) x 2 years = 504 plot observations

36 plots x 2 years =72 harvested plots

Results 2020

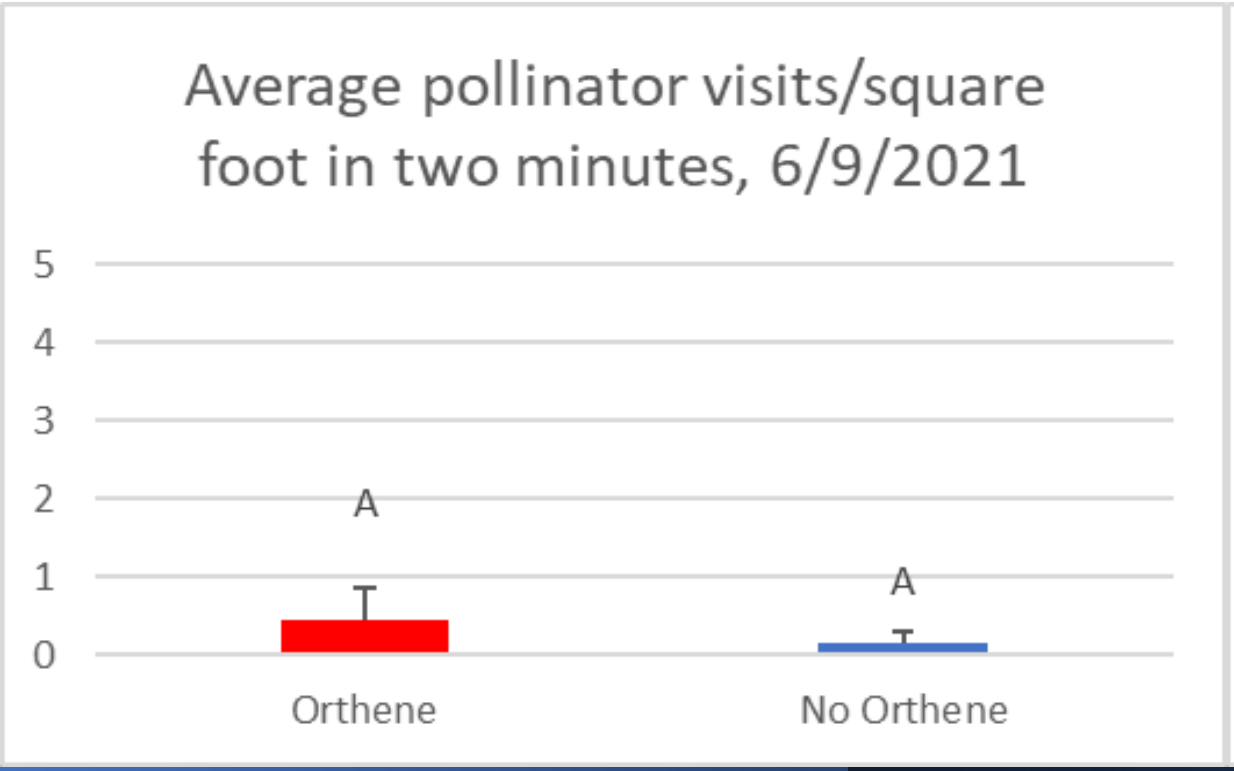
- No significant difference in honeybee activity between Orthene and non-Orthene-treated beds at any plot position, on any date, or across varieties when pooled by treatment ($p>0.05$)
- No significant differences in yield (g/ft^2) between any pair of beds ($p>0.05$) except for the Stevens bed treated with Orthene, which had significantly more fruit.

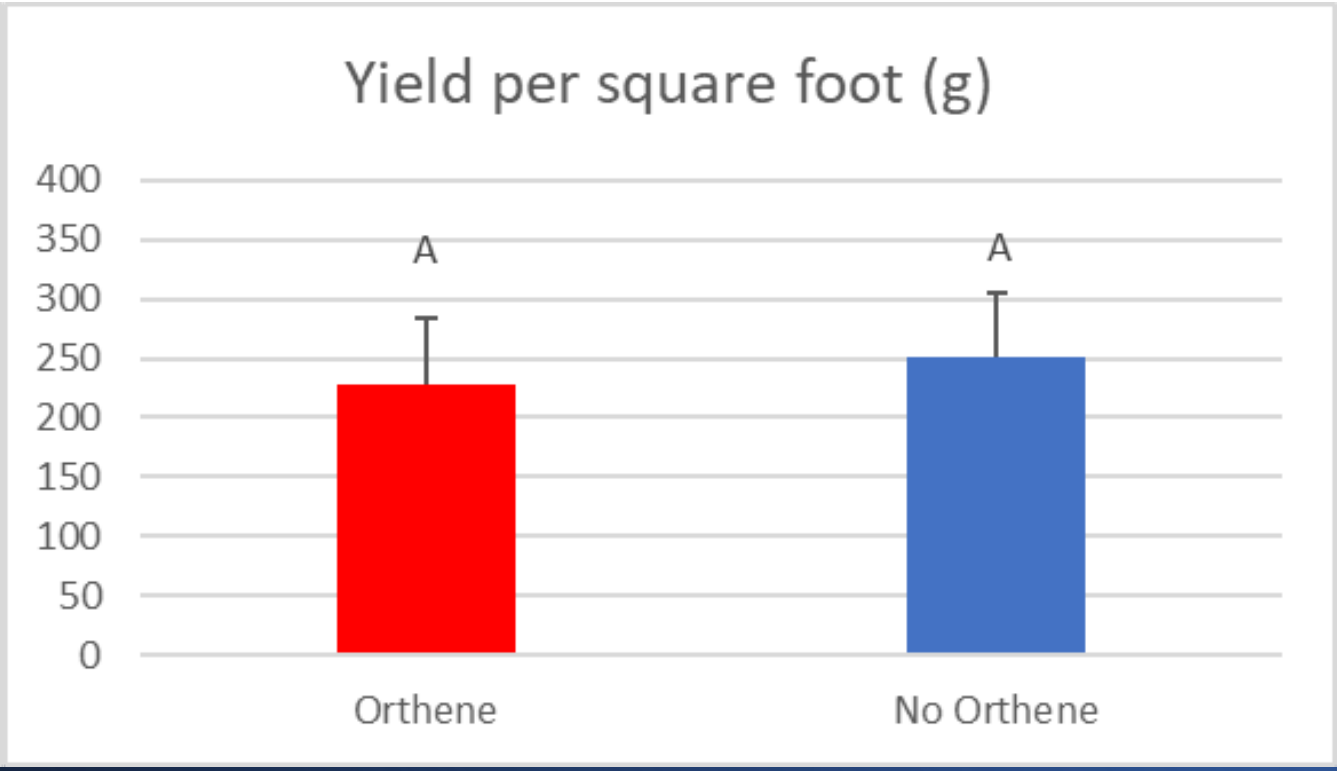




Results 2021

- No significant difference in honeybee activity between Orthene and non-Orthene-treated beds at any plot position, on any date, or across varieties when pooled by treatment ($p>0.05$).
- No significant differences in yield (g/ft^2) between any pair of beds ($p>0.05$).





Final thoughts

- Doesn’t invalidate grower observations in WI from the late 80s and 90s
- Times change – and so do formulations and application strategies!
- Boom app vs. aerial
- Other variables

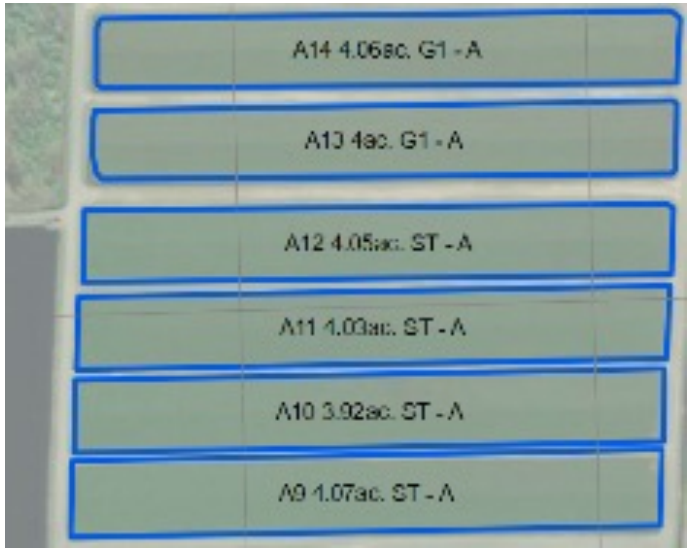
Does using Proline (prothioconazole) application during bloom result in fewer visits by honeybees to flowers or a reduction in yield?

The background

- Previous UW research indicated reduced pollen collection by honeybees foraging in Proline treated beds compared to Indar+Abound.
- No work on connection to subsequent yield or visits to flowers – only pollen deposition.
- Anecdotal grower concern was limited, but present.
- Proline is one of the most widely used fungicides in Wisconsin cranberry.

The design

- Two pairs of beds at two central Wisconsin locations identified.
- Each pair was same age, variety, and relative yield history.
- Mullica Queen, Crimson Queen, BG, GH-1
- One bed in each pair randomly selected for Proline during bloom. Other bed received Indar + Abound.
- Seven 1m square honeybee observation plots placed per bed – 0, 5, 10, 15, 20, 25, and 30m in from bed center.
- All plots observed for honeybee activity 6-8 different times during bloom after applications were made.
- Berry count/ft2 and weight/ft2 collected from all plots at end of the season.
- Study was replicated in 2022 and 2023.



Evaluation: the numbers

× 8

- Seven plots 0-30m from edge/bed
- 1ft square harvest/plots

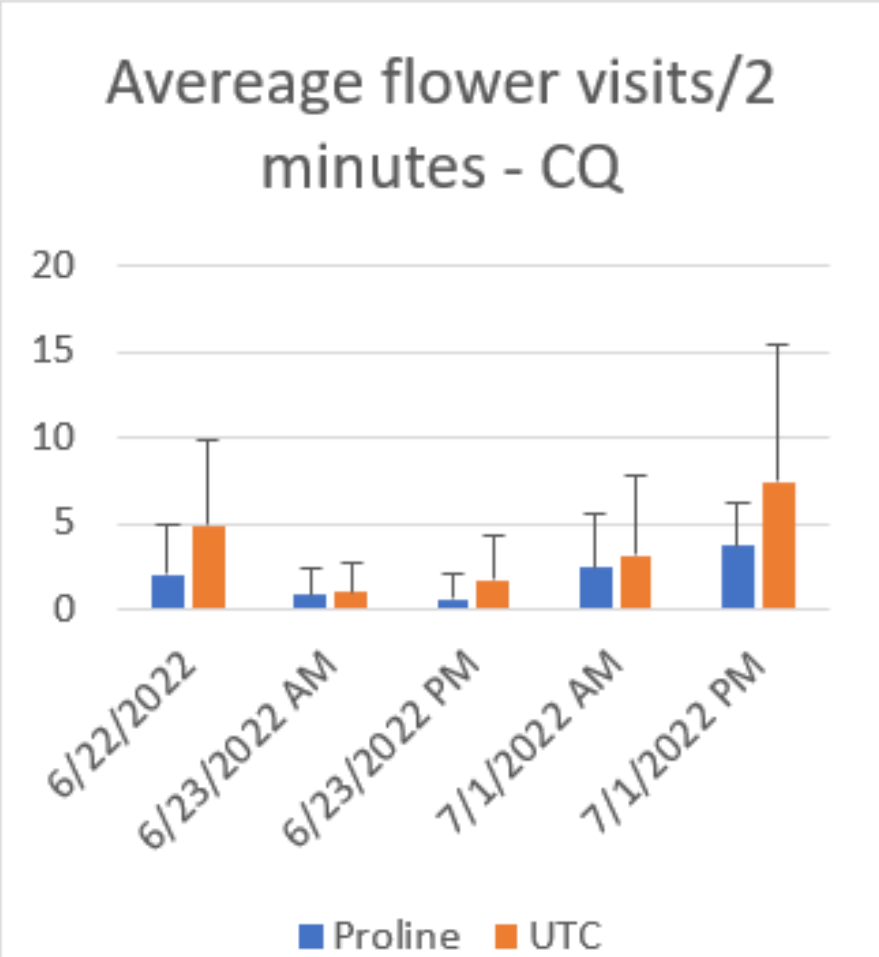
(49 plots x 7 observation dates) x 2 years = 686 plot observations

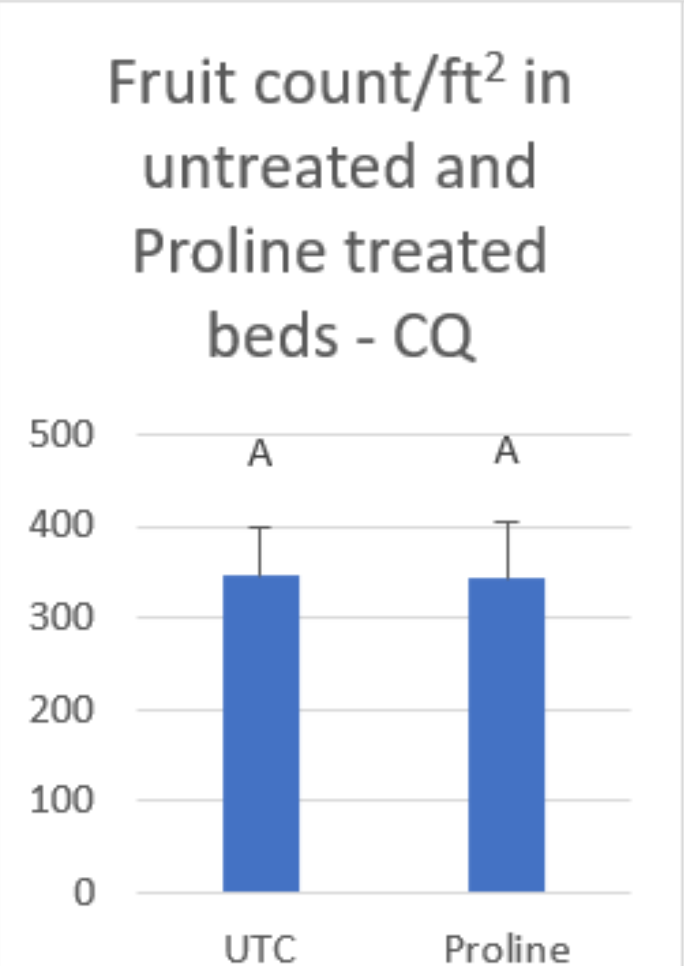
56 plots x 2 years =112 harvested plots

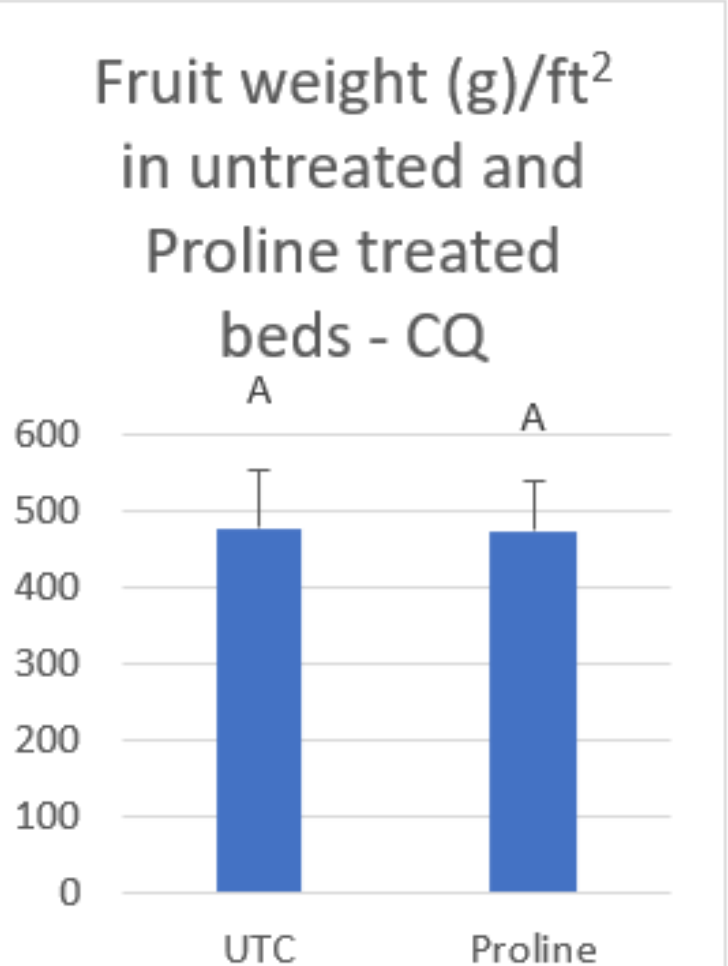
The results in 2022 – a snapshot

- No significant difference in honeybee activity between Proline and Indar+Abound beds at any site, on any date, or when pooled by treatment across varieties ($p>0.05$)
- No difference in yield between Proline and Indar + Abound was observed twice, more yield in the Proline beds once, and more yield in the non-Proline beds once.
- No evidence of any consistent detriment to either honeybee visitation rate or yield.

The results 2022



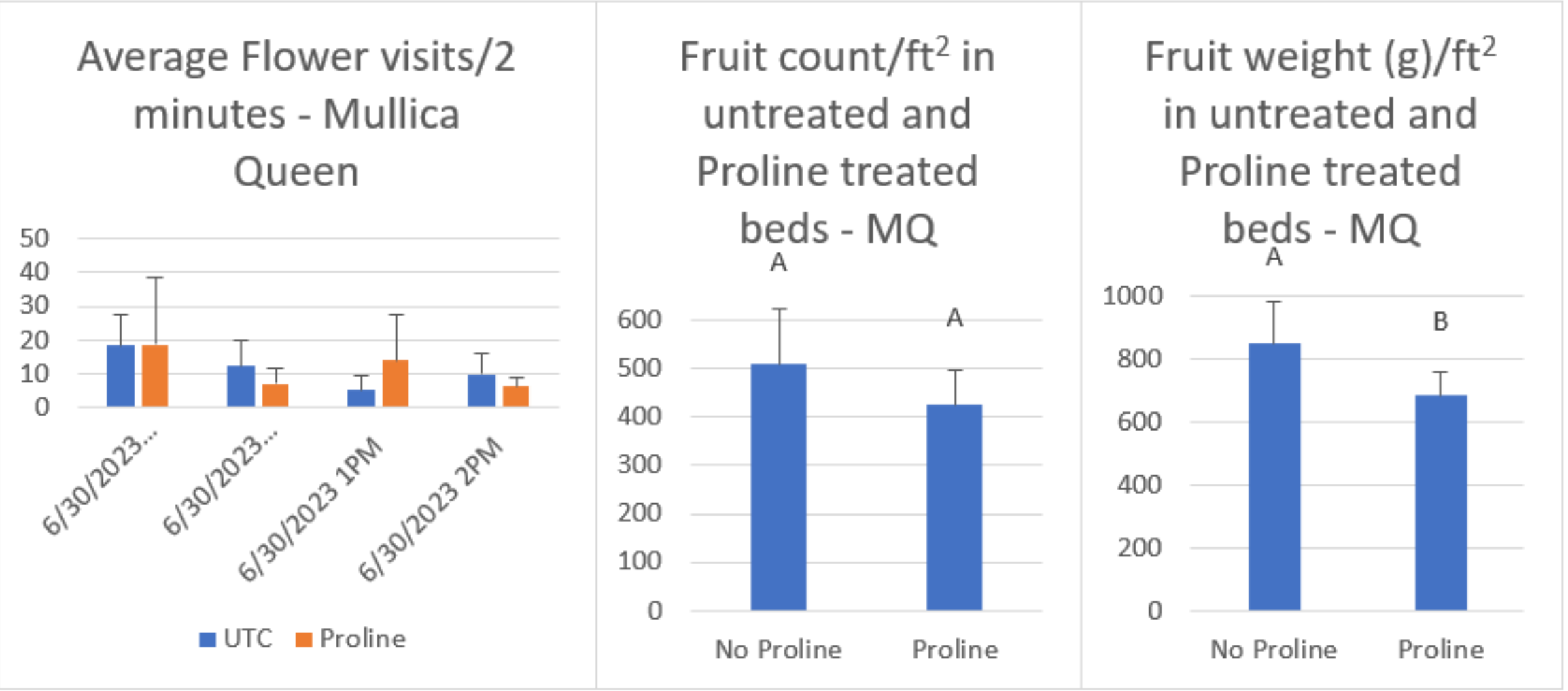




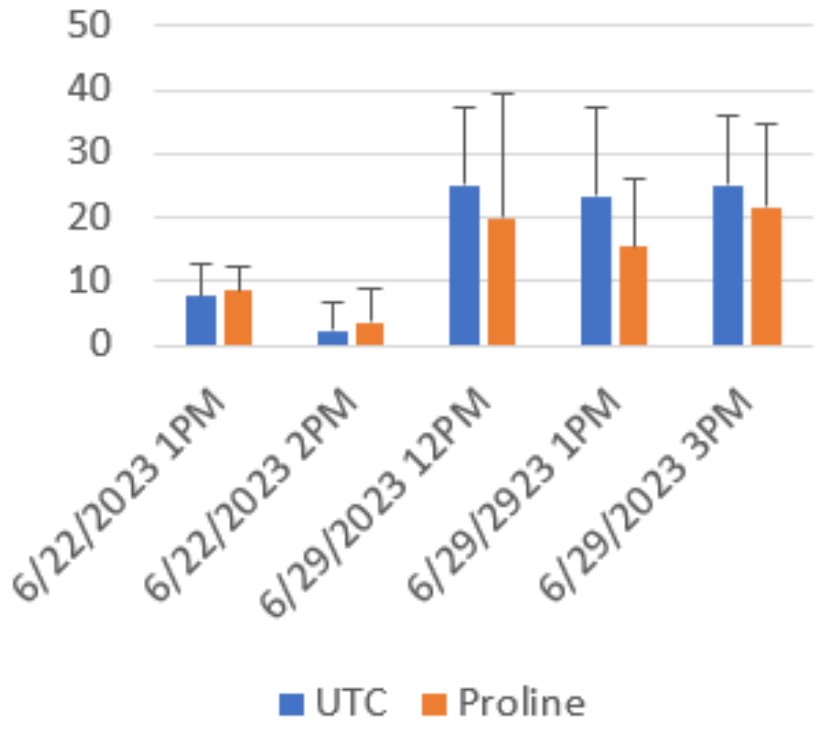
The results in 2023– a snapshot

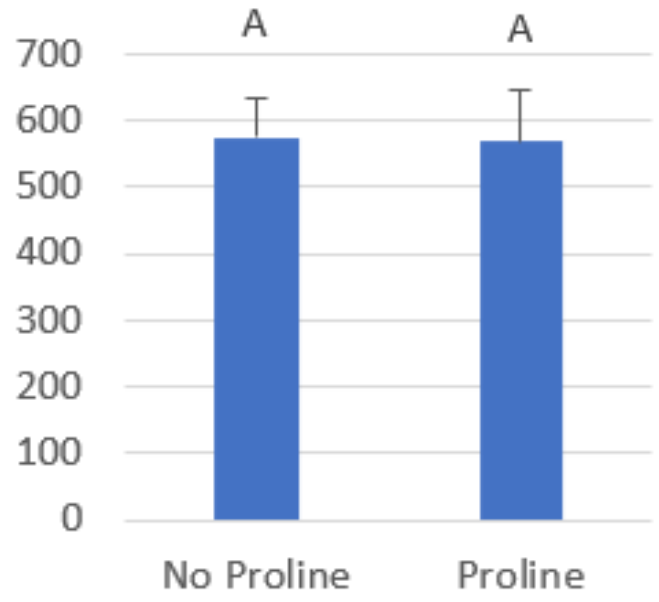
- No significant difference in honeybee activity between Proline and Indar+Abound beds at any site, on any date, or when polled by treatment across varieties ($p>0.05$)
- No difference in yield between Proline and Indar + Abound was observed three times, lower yield was observed in the Proline treated bed once.
- Poor evidence for any consistent detriment to either honeybee visitation rate or yield.

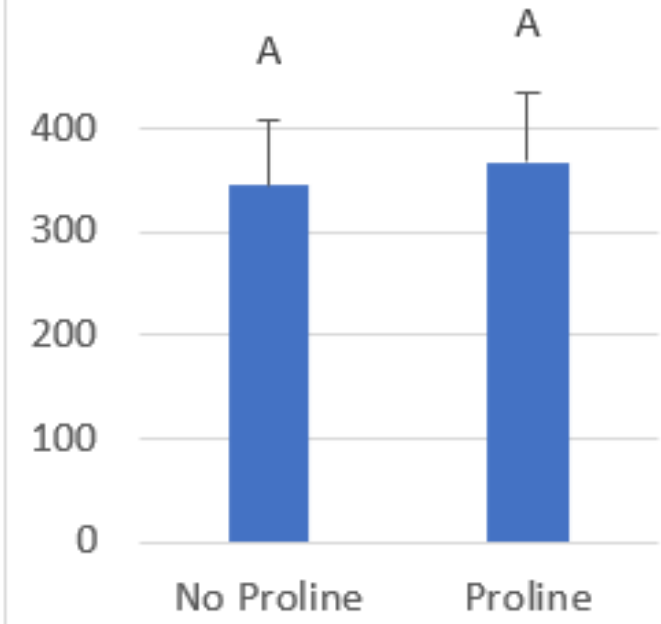
The results in 2023



The results in 2023







Summary

- Proline does not appear to be associated with any consistent, measurable detriment to honeybee activity during bloom.
- Proline does not appear to be associated with any consistent, measurable detriment to yield in treated fields.
- Some variability between two beds is expected, even when all factors heading in to season are considered “equal.”
- Proline remains among the most popular and effective fungicides used in Wisconsin and will continue to be going forward.

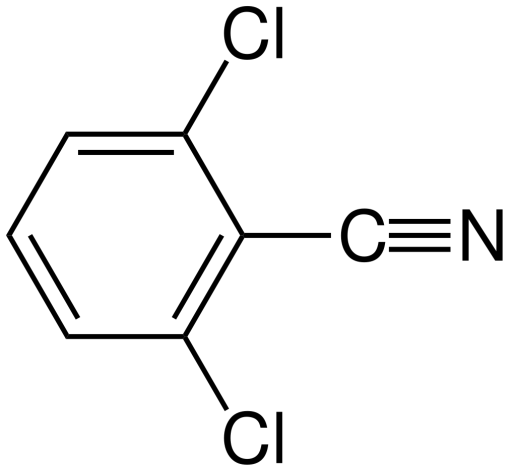
Do post-harvest applications of Casoron (dichlobenil) control or suppress field horsetail?

Fall Casoron for field horsetail

- *Equisetum arvense*
- Perennial bryophyte (spore producing plant).
- Casoron in spring effective in spore germination prevention, but not in eliminating established stands.
- Rhizome structures under ground.
- Particularly problematic in WI on younger plantings, but can be found anywhere.

Why fall Casoron?

- Cellulose biosynthesis inhibitor
- Field horsetail rhizomes grow and expand in the fall.
- Would shutting this process down in the fall months slow or stop the emergence the following season?



Experimental design

- Bed of Crimson King identified in fall 2022 with heavy field horsetail infestation.
- Three replicated treatments:

    - 1.) No fall Casoron
    - 2.) 30lbs/acre fall Casoron
    - 3.) 40lbs/acre fall Casoron

    All applications applied just prior to arrival of about ½” of natural rainfall.

Results

- Both 30-40lbs/acre of Casoron (dichlobenil) were effective in management of field horsetail.
- 40lbs/acre resulted in less field horsetail in treatment plots.
- Horsetail that emerged in the 30lb plots was stunted and yellow.

Take-aways

- Fall Casoron is a viable tool in battling this difficult weed species
- Results should be considered as representative on Wisconsin sand culture – higher rates would likely be required for high OM sites.
- Seasonality of applications may differ across regions – post-harvest (September/October) in Wisconsin is a different set of conditions that those experienced on the coast.
- Apps must be timed with natural rainfall since irrigation lines are pulled for harvest – ½”+ is preferable.
- Apply in cool conditions.
- Age and strength of the bed matters.

Acknowledgements

- Sara Potter – Agricultural Sciences Specialist, OSC
- Dr. Leslie Holland, University of Wisconsin – Madison Dept. of Plant Pathology
- Grower collaborators
- OSC Summer Ag. Science Interns:
  - Emma Mechelke
  - Riley Slade
  - River Laack
  - Nathan Fitzgerald
  - Lucas Prange

Questions?