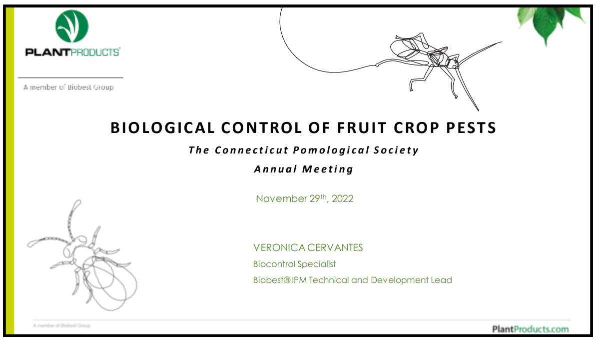
PLANTPRODUCTS
A member of Biobest Group
BIOLOGICAL CONTROL OF FRUIT CROP PESTS
The Connecticut Pomological Society
Annual Meeting
November 29th, 2022
VERONICA CERVANTES
Biocontrol Specialist
Biobest® IPM Technical and Development Lead
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What is Biological Control?
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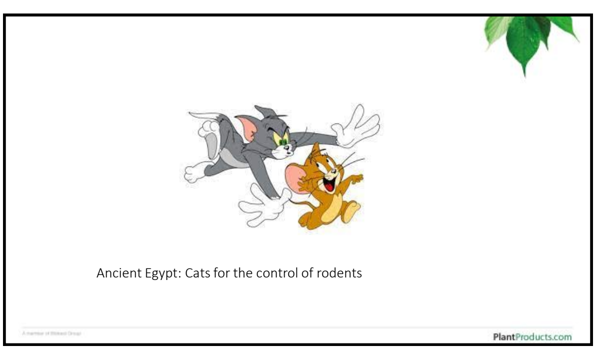
Ancient Egypt: Cats for the control of rodents
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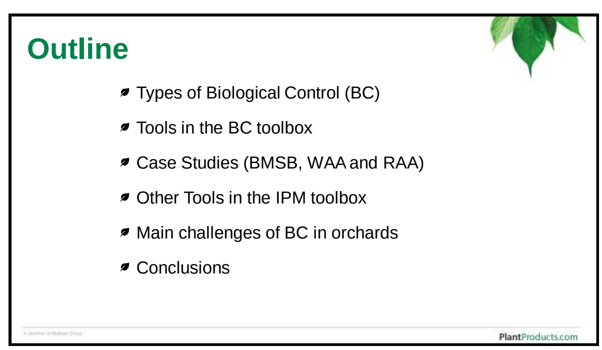
Outline
Types of Biological Control (BC)
Tools in the BC toolbox
Case Studies (BMSB, WAA and RAA)
Other Tools in the IPM toolbox
Main challenges of BC in orchards
Conclusions
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Types of Biological Control

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Types of Biological Control

- Classical (Government)
  - *Introduction of an exotic BCA to control an exotic pest*
- Conservation (Preserve naturally occurring BCAs)
  - *Banker Plants, Cover Rows, Bug Gardens*
  - *Food Supplements*
  - Selective, short residual chemicals
- Augmentative (Commercial)
  - *Inundative*
  - *Inoculative*

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Biological Control Tools

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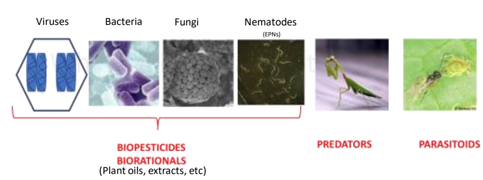
Beneficial organisms to control pests



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BIOPESTICIDES AND BIORATIONALS
BLUESTIM®
ASPERELLO
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Apple Bitter Pit.
Picture by OMAFRA
Sweet Cherry Cracking
Picture by OSU
How Does Bluestim Work?
Biobest YouTube Channel
Glycine betaine 97%
Extracted from Sugar Beet
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Predators
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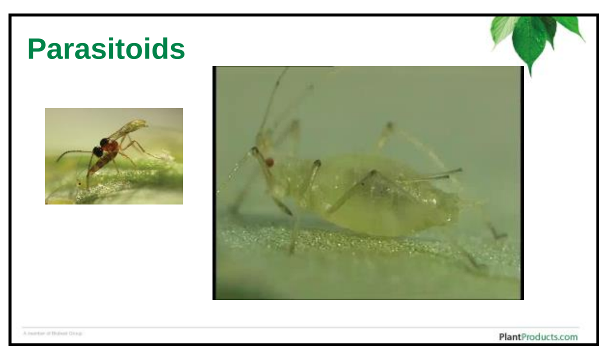
Parasitoids
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FOOD SUPPLEMENTS

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What are Food Supplements?

High nutritional foods for predators or parasitoids

- Sustain and reproduce BCAs even with low or no prey/ flowers
- Accelerate and enhance BCAs development
- Achieve an effective and sustained pest control
- Rebuild BCAs population after a chemical treatment
- Increase and establish BCAs at an affordable cost
- Sustain populations of naturally occurring BCAs

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Typha sp. (Cattail pollen)

Ephestia kuehniella eggs

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BANKER PLANTS

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What are Banker Plants ?

Pollinator / BCAs Gardens (MSU)

Plants different from the crop that can host, breed, feed and/or sustain beneficial insects

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Banker Plants

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Companion Plants – Bug Gardens

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Case Study: Brown Marmorated Stink Bug (BMSB)

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Parasitoid of BMSB
(In Italy an example of Classical Biological Control)

Picture Credit: MSU

60-90% of control in Asia
Prefers BMSB eggs over other Stink Bugs
Found in the USA: PA, NY, NJ, DE, WV, ME, VA, OH, CA, MI, UT and WA.
Range: Parasitized eggs found up to 40 meters from release point. *Egger et al., 2022*

Trissolcus japonicus: An Egg Parasitoid of the Brown Marmorated Stink Bug (Halyomorpha halys) - YouTube

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Predator of BMSB
Chrysopa sp.

- Generalist
- Suitable for food supplementation with Ephestia
- Attracted and Reproduced with companion plants
- Can also prey on other key pests
  - Aphids
  - Mites
  - Mealybugs
  - Other stink bugs

From PheroFruits 2022
(IOBC/ WRPS)

Berteloot et al. 2022. Chrysopa carnea preferred nymphs of Green Stink Bug (Nezara viridula) than BMSB. First instars of both stink bugs were preferred over older stages. 3rd instar larvae of Lacewings consumed more of both pests than 2nd instars.

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Other Complementary Strategies

From PheroFruits 2022
(IOBC/ WRPS)

- 1) **Drape Net** reduced damage by 50% and worked better than successive pyrethroid applications (at 5 day interval).
- 2) **Cultivars:** Early maturing **cultivars** (Gala) less preferred and less damage than late maturing ones (Pink Lady and especially **Granny Smith**)
- 3) **Spray timing**: Applications of the insecticide Deltamethrin in peaches were more efficacious when applied at 6PM, as opposed to 6AM and 12 PM. 12 PM was the least efficacious (2- yr trials).
- 4) **SIT (Sterile Insect Technique) of males** by an innovative radiation technique, reduced egg hatching by 95% and the viability of the F1 nymphal offsprings by 80-88%.

Physical Control (Use of nets), **Cultural Control** (Timing of applications) and **Genetics** (to help escape the pest). That along with Biological Control are other components of an IPM Program

Citations: 1 and 2. Walgenbach et al. 2022; 3. Preti et al. 2022; 4. Rosselli et. al.

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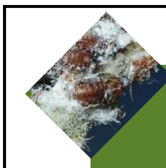

Case Study:
Wooly and Rosy Apple Aphids

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Earwigs | Parasitoids | Syrphid flies | Ladybirds

Forficula auricularia

Aphelinus mali

Ephisyrphus balteatus

Exochomus quadristipulatus & Harmonia axyridis

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Main Challenges for the Adoption of Biological Control

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Main Challenges

- Use of old chemistry (disrupts IPM programs)
  - Broad spectrum products
  - Long residual products
- Methods of applications of BCAs (macros)
- Availability of commercial BCAs (macros) for Augmentative releases

On the + side: Biopesticides and Biorationals excellent transition products (low residual + most have some specificity), to fill in the gaps left by banned/soon to be banned pesticides.
Progress being made with drone applications of BCAs (helicopter applications of nematodes in the past).
Automated scouting and AI + Machine learning

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Bumblebee Pollination

When we help preserve pollinators by using softer chemistry, monitoring to better time applications or reduce the frequency of the applications, we also help protect natural beneficial insects.

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Compatibility of Chemicals with BCAs

Free Phone Application

Side Effects
www.biobestgroup.com

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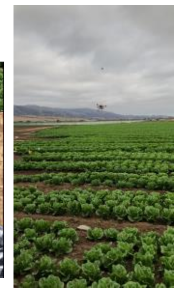
Drone application



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Arugga System – Robot pollination

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Conclusions

- Protect and Promote Natural Enemies by
  - *Using companion plants (flowering strips, hedgerows)*
  - *Using food supplements to sustain natural or introduced populations of predators/parasitoids*
  - *Timing applications based on proper monitoring/scouting*
  - *Reducing the frequency of sprays when possible*
  - *Using selective, short residual chemicals / biorationals*
  - *Releasing beneficial insects*
  - *Be patient, technology-AI will catch up soon*

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Thank You!
Questions?

Contact us for further information or to set up demos

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