

Mating disruption to control the Blackheaded fireworm

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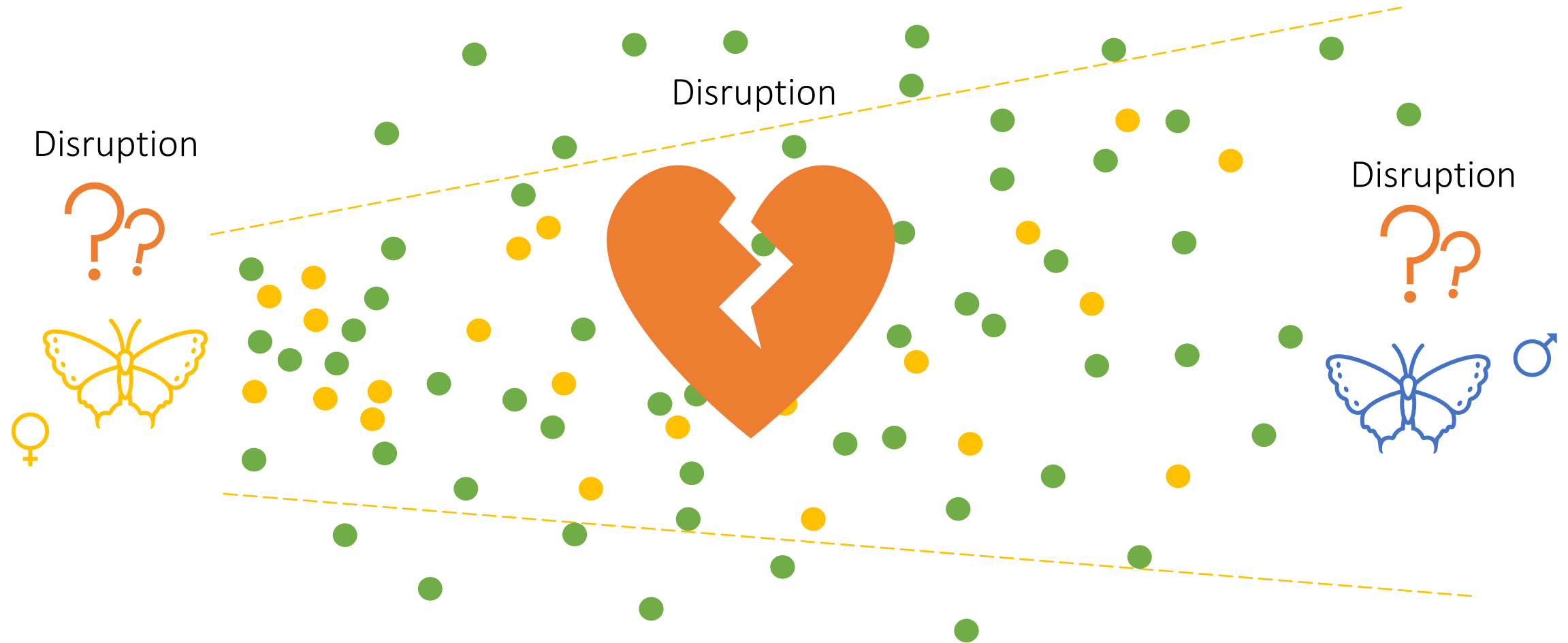
Blackheaded fireworm

Rhopobota naevana (Hübner) (Lepidoptera: Tortricidae)

- Cranberry specialist pest
- 2 generations per year
- Damages done to buds, floral buds, leaves and fruits (up to 95% of yield loss)
- Mating age of the female negatively impacts its reproductive abilities

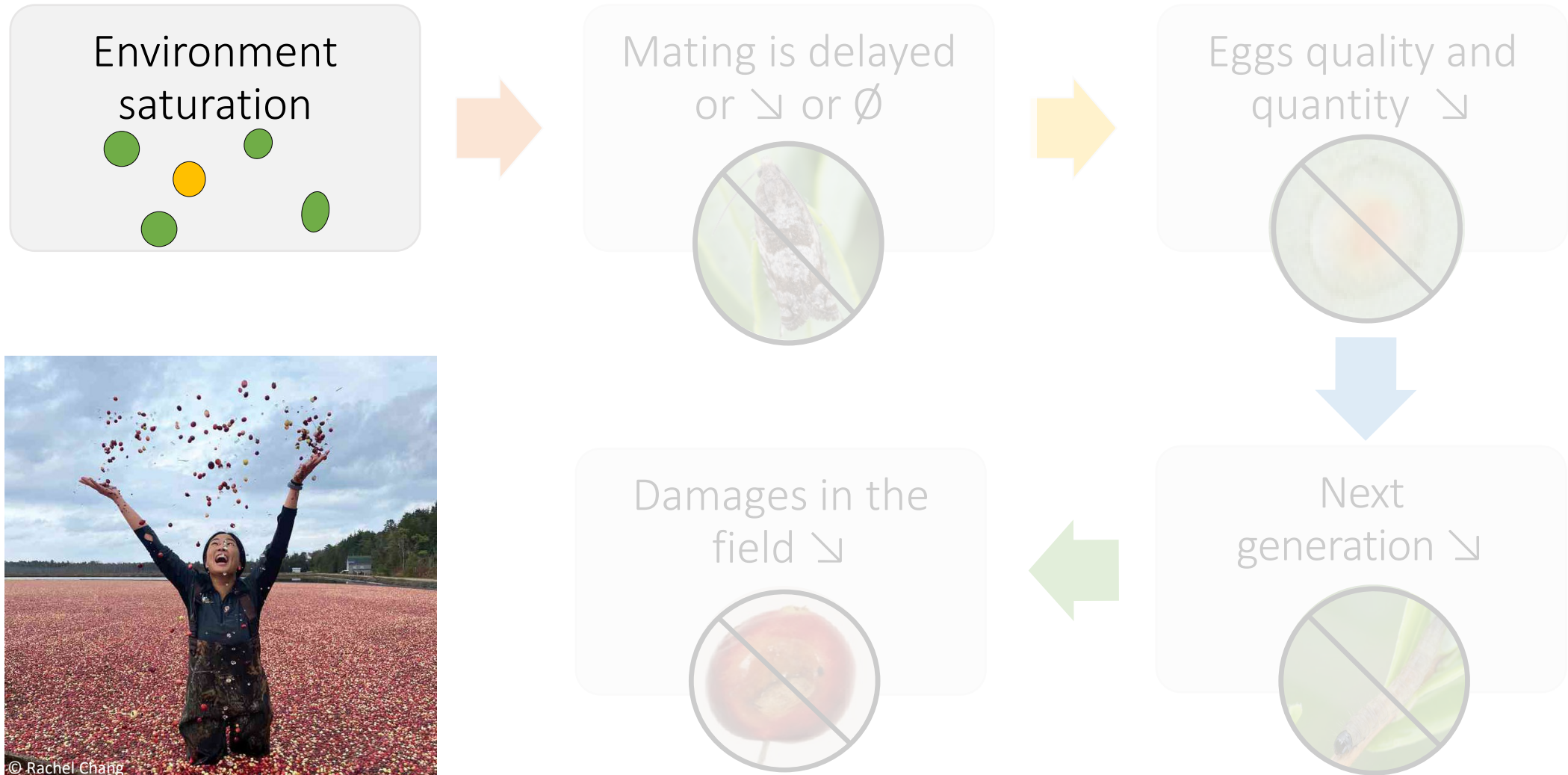


Mating disruption : principle



The environment is saturated with synthetic pheromone

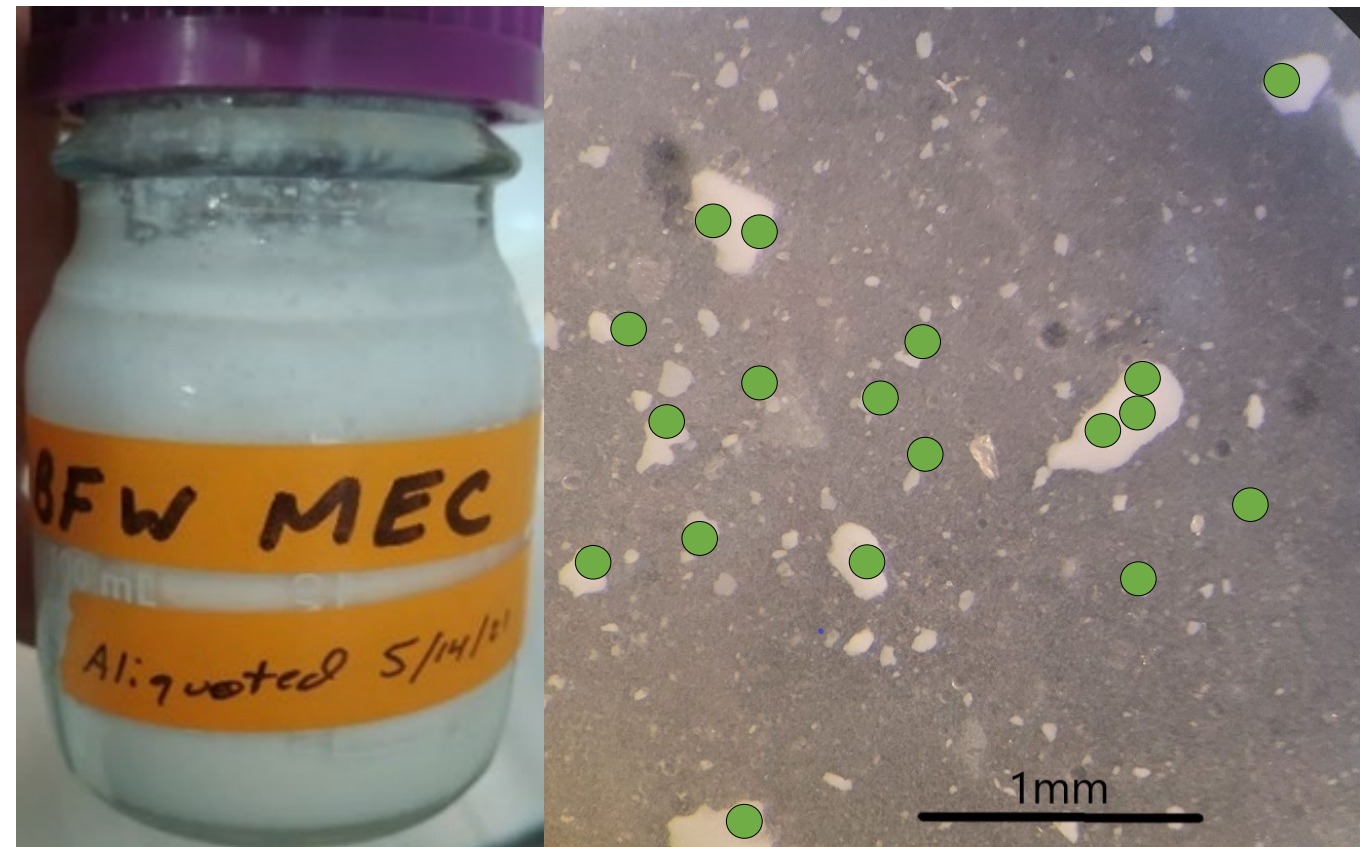
Mating disruption : a chain reaction



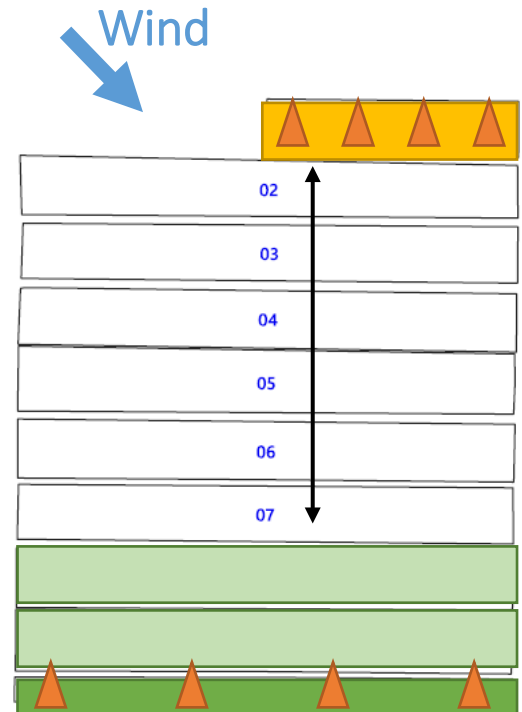
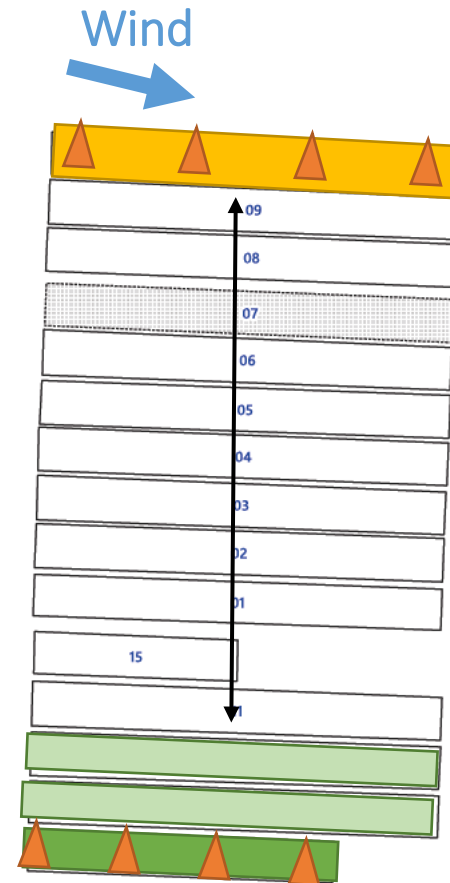
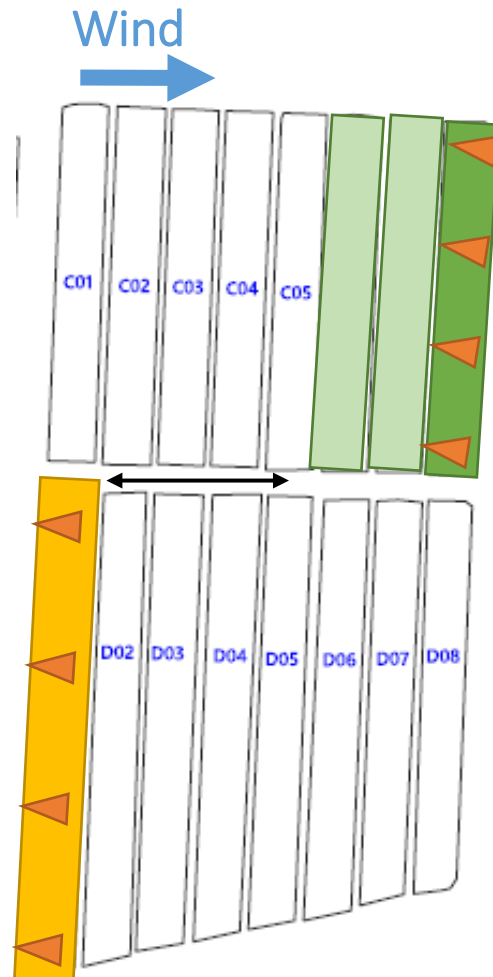
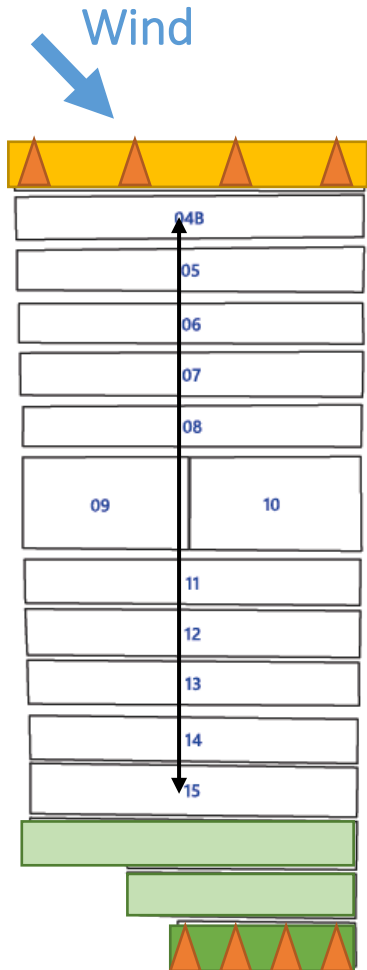
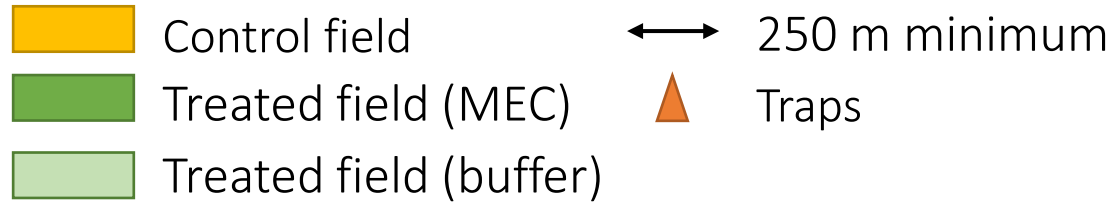
Finding the right dispenser



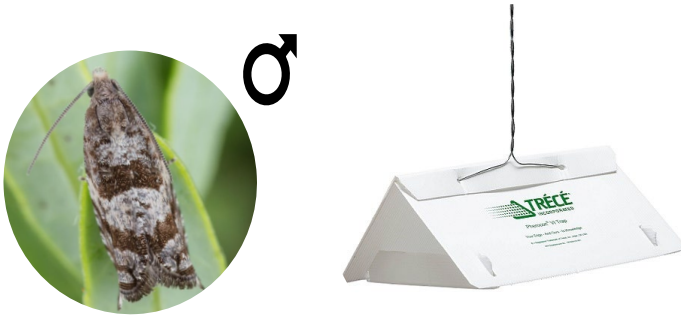
The tested dispenser is microencapsulated (MEC)



Study sites



Dispenser efficiency assessment



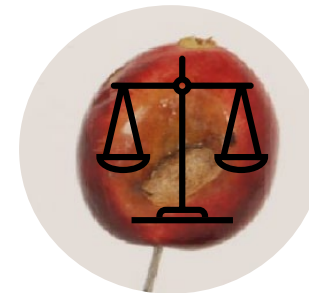
Bi-weekly trap reading
(4 traps per cranberry filed)



Random weekly captures
asphyxia + dissections



Weekly observations (30 quadrats)
Tents + damaged fruits = presence of larvae



Harvest at the end of the season
(30 quadrats)
Damage analysis

Results – male adults

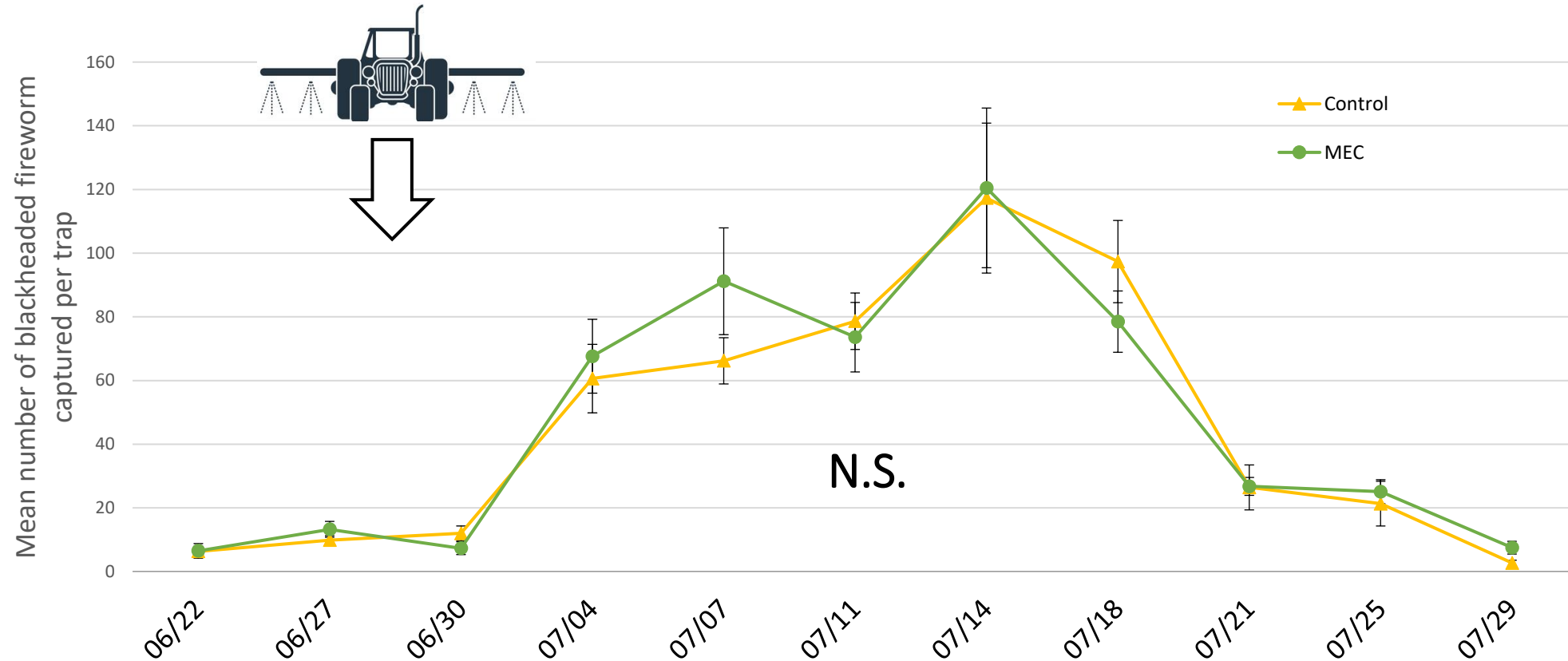


Fig. 1: Average weekly captures of blackheaded fireworm in pheromone traps in treated and control fields. Error bars representing standard errors; with $\alpha=0,05$.

Negative Binomial GLMMs (generalized linear mixed-effects model)

Fixed effects : treatment and date – Random effect : initial population

Results – female captures and dissections

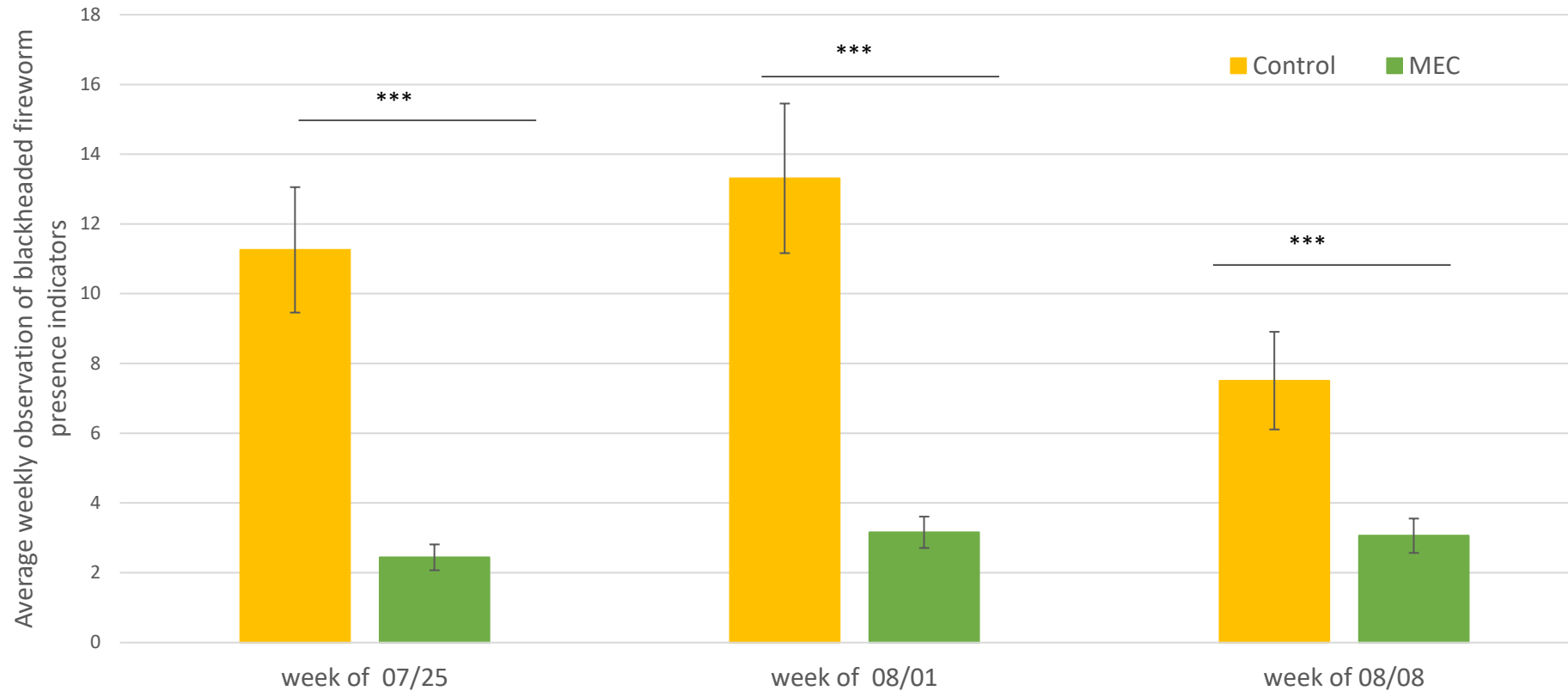


**COMING
SOON**



Dissections will be done this winter

Results – larvae' presence observations



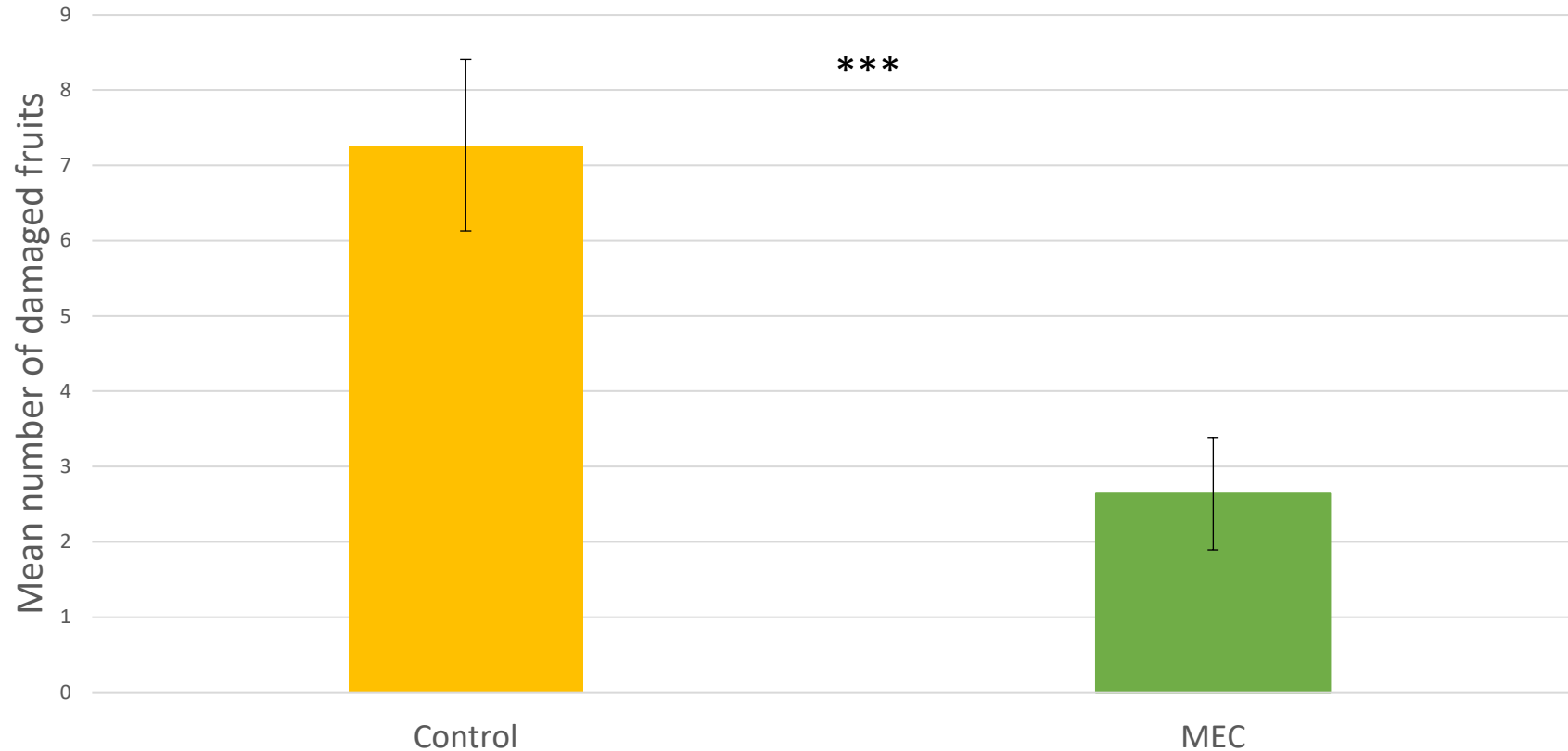
overall
27,01%
decrease

Fig. 2: Average weekly observation of blackheaded fireworm presence indicators (tents and damaged fruits) in treated or control fields. Error bars representing standard errors; with $\alpha=0,05$

Zero-inflated negative binomial GLMMs (generalized linear mixed-effects model)
Fixed effects : treatment and date – Random effect : initial population



Results – damages at the end of the season



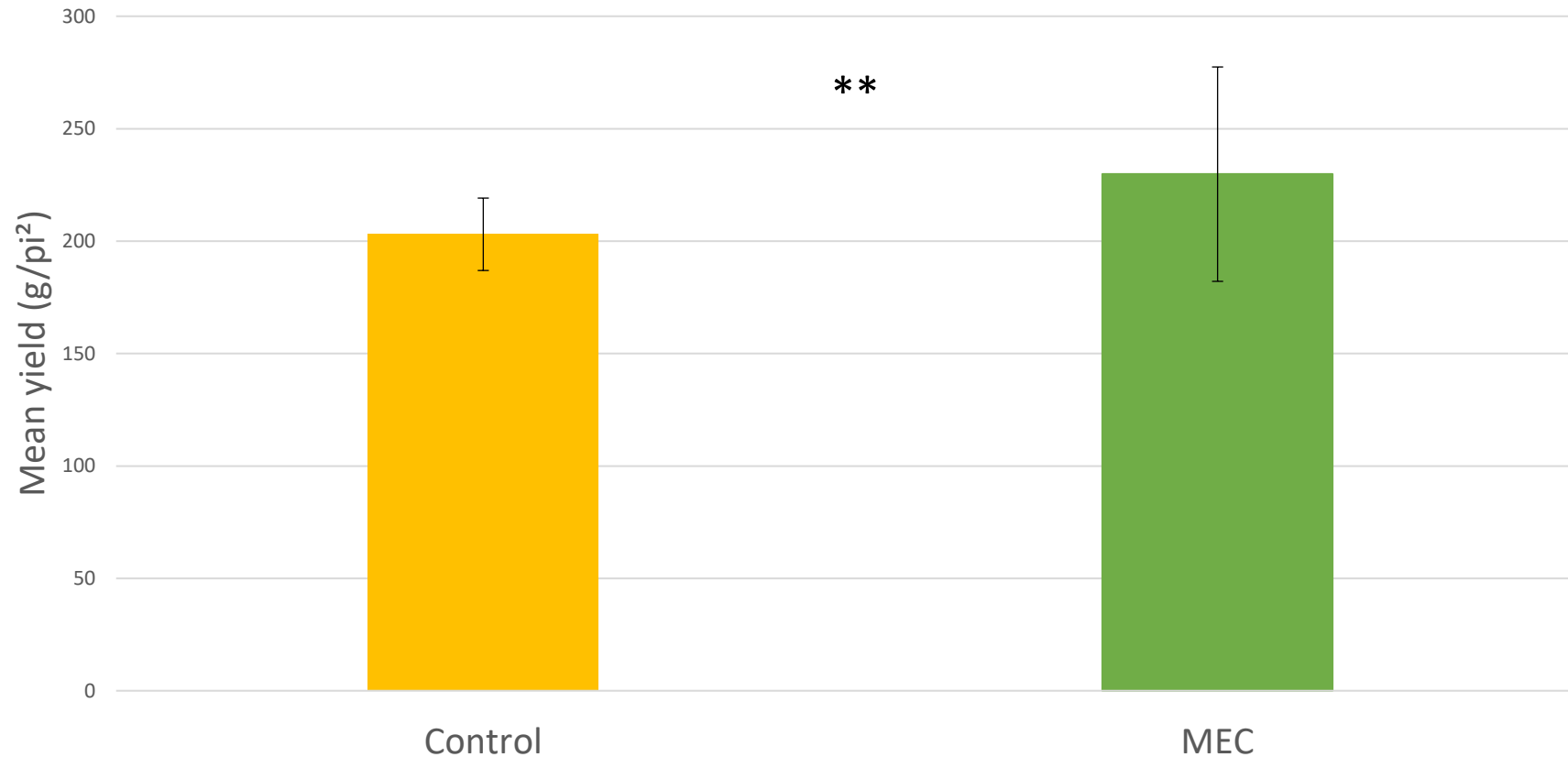
37,6%
damage
reduction

Fig. 3: Mean percentage of blackheaded fireworm damaged harvested in treated (MEC) and control fields. Error bars representing standard errors; with $\alpha=0,05$

Negative Binomial GLMMs (generalized linear mixed-effects model)
Fixed effects : treatment– Random effect : initial population



Results – yield at the end of the season



13,1%
yield increase

Fig. 4: Mean yield of the collected quadrats in treated (MEC) and control fields. Error bars representing standard errors; with $\alpha=0,05$

Negative Binomial GLMMs (generalized linear mixed-effects model)
Fixed effects : treatment– Random effect : initial population

In overall what do we know now ?



♂

No observed effect
Males can locate females in the fields



→ Mating disruption works best at larger scale ?



♀

Pending discussion



- Mating delay ?
- Mating disruption effect on the female ?
- Egg laying on other sites ?
- Sex ratio imbalance ?



Significant decrease of 2nd generation larvae = **mating disruption effect**

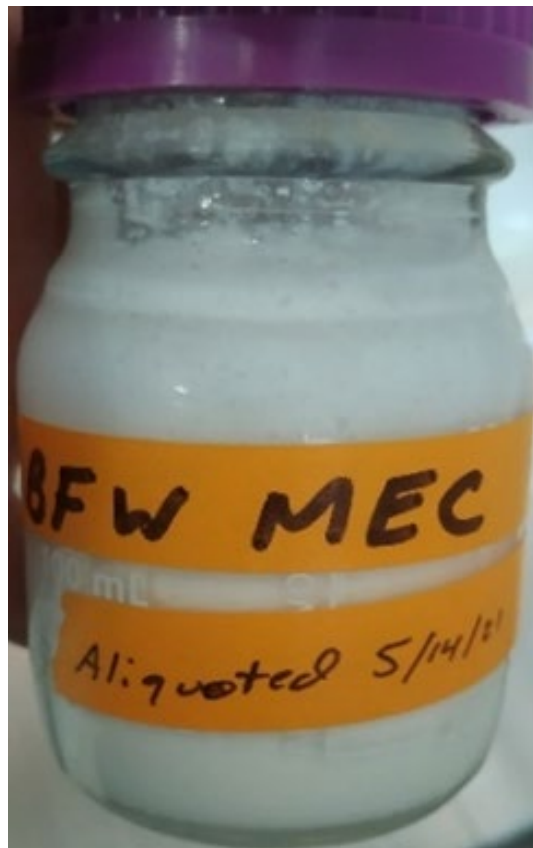


→ Potential second effect of pheromones application



Significant damage decrease + yield increase = **mating disruption effect**

Take-home messages



↘ next generation



↘ damages
↗ yield



Goal reached!





PACIFIC NORTHWEST CRANBERRY CONGRESS 2023

Practical Tips and Information for Growers

Special thanks to all the actors of this project

Ce projet a été réalisé dans le cadre du sous-volet 3.1 du programme Prime-vert 2018-2023 et il a bénéficié d'une aide financière du ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ) par l'entremise de la Stratégie phytosanitaire québécoise en agriculture 2011-2021.





Any questions ?

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