



Alternative strategies to control of striped cucumber beetle, *Acalymma vittatum*, with mass trapping in cucumber greenhouses

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Outline of the presentation


- Overview of vegetables greenhouses in Québec, Canada
- Striped cucumber beetle in cucumber greenhouses
- Objectives of the project
- Laboratory and greenhouses experiments
- Discussion and next steps


Overview of vegetables greenhouses in Quebec, Canada

 313 ha of greenhouses (151 ha in vegetables)


 676 producers of vegetables and fruits in greenhouses

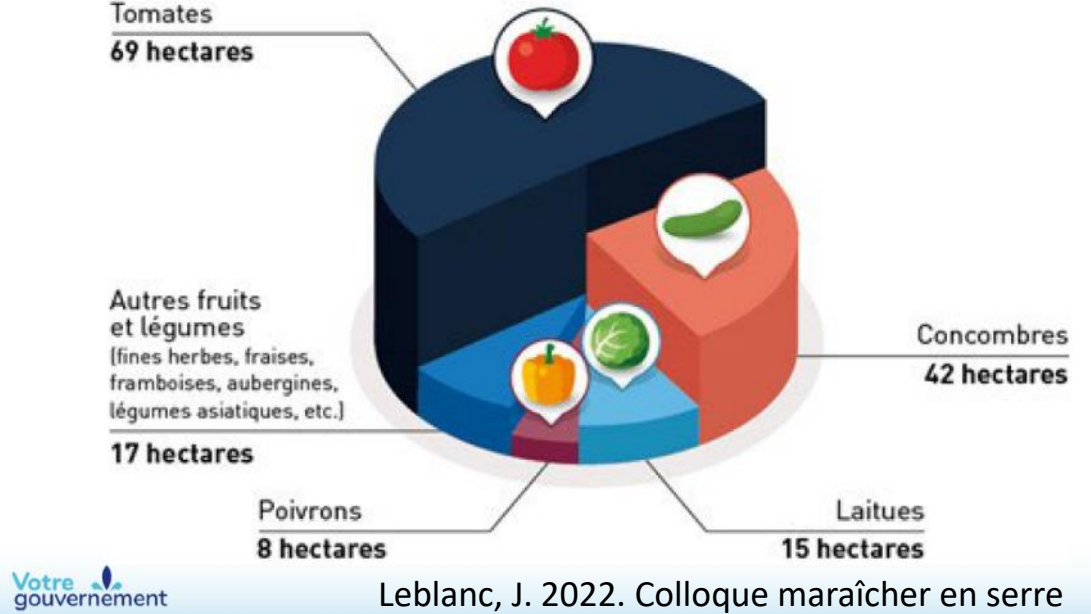
 467 < 1000 m² (69% of producers) = 9% total greenhouses area

 209 producers (31%) > 1000 m²

 16% in organic production

24 ha of tomato, cucumber, pepper, lettuce
25 ha of diversified crops

 Greenhouses provide 50% of fruit and vegetable consumption of the province





Striped cucumber beetle (SCB) (*Acalymma vittatum*)

- Important damages by the transmission of the bacterial wilt (*Erwinia tracheifila*)
- Few control methods, mainly for organic producers
- Highly attracted by olfactive stimuli (cucurbitacin, aggregative pheromone)
- Attract and kill strategy developed in fields with attractive lures (Tinsley et al. 2022; Fournier et al. 2019)



Objectives of the project

- **General objectives:**

To develop a mass trapping strategy with attractive lures to reduce the abundance and damage of SCB on cucumber plants in greenhouses

- **Specific objectives:**

- 1) Evaluate the preference of SCB for commercial lures by olfactometry trials (2020-2021).
- 2) Determination of the number of attractive traps in greenhouse (2021-2022)
- 3) Trials of the best attractive lure in commercial greenhouse (2022-2023).

Methodology – Olfactometry

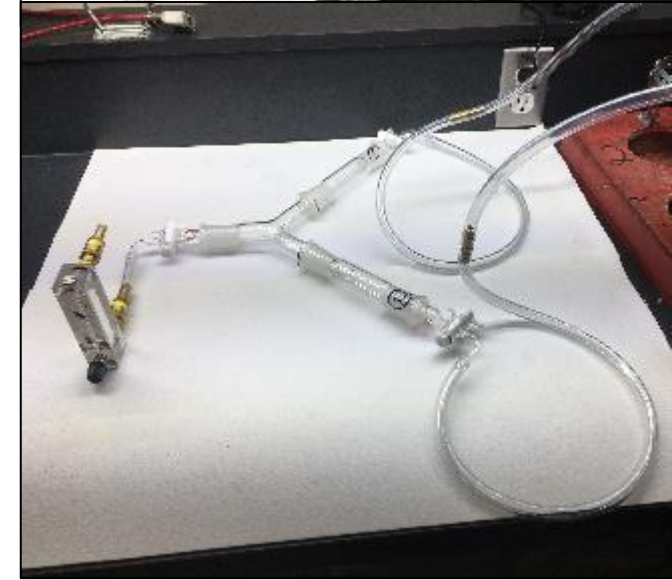
Commercial lures tested:

Seven lures tested:

- 1) Cucumber Hyb. Magic (main crop)
- 2) Blue Hubbard squash (attractive control)
- 3) Commercial lure AG Bio
- 4) Commercial lure Alpha Scent
- 5) TRE8274 (TRÉCÉ Inc)
- 6) TRE8276 (TRÉCÉ Inc)
- 7) KPL (Calsomon®)



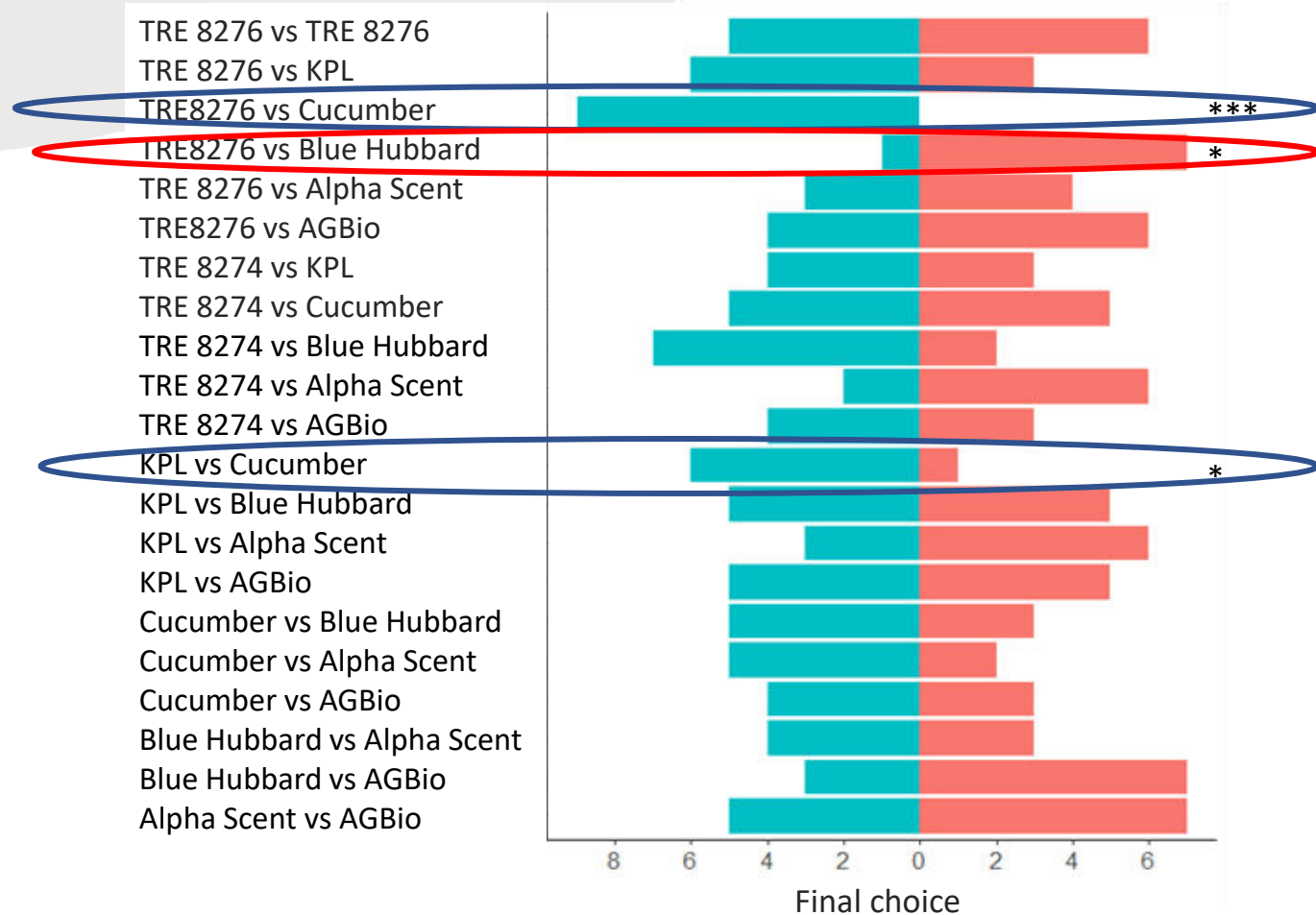
- 21 combinations (6 males and 6 females ($N_T = 252$))
- Time spent and choice after 10 minutes
 - Jwatcher™ software
 - Wilcoxon and G-Tests



Results – Olfactometry

➤ Significant choices:

- **TRE8276 > cucumber** (G = 12,48; p = 0,0004).
- **KLP > cucumber** (G = 3,96; p = 0,04).
- **Blue Hubbard > TRE8276** (G = 5,06; p = 0,02)



Methodology – Number of attractive lures/greenhouses

- **Treatments:**

- Two lures: TRE8276 and KPL
- Young plants vs old plants (30 plants/sections)
- 1, 2 ou 4 traps/30 plants
- 6 treatments, 4 replicates/treatments
- 50 SCB released/trials

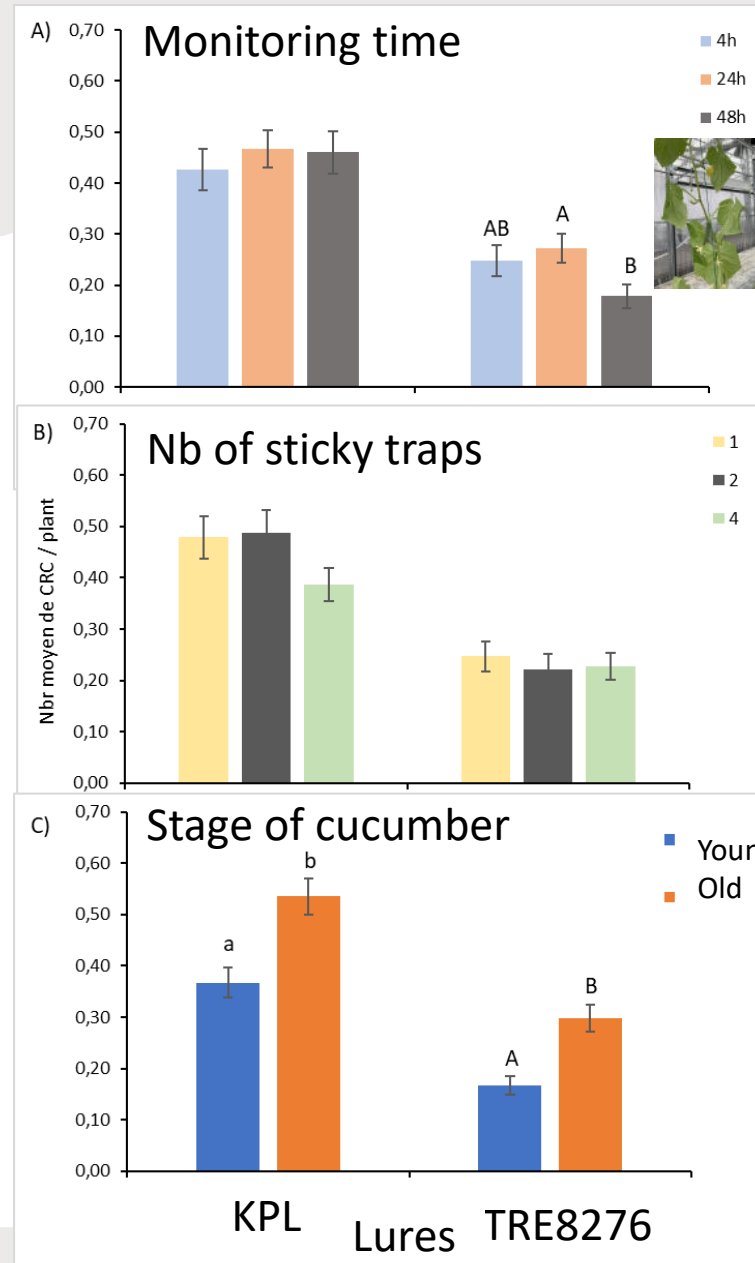
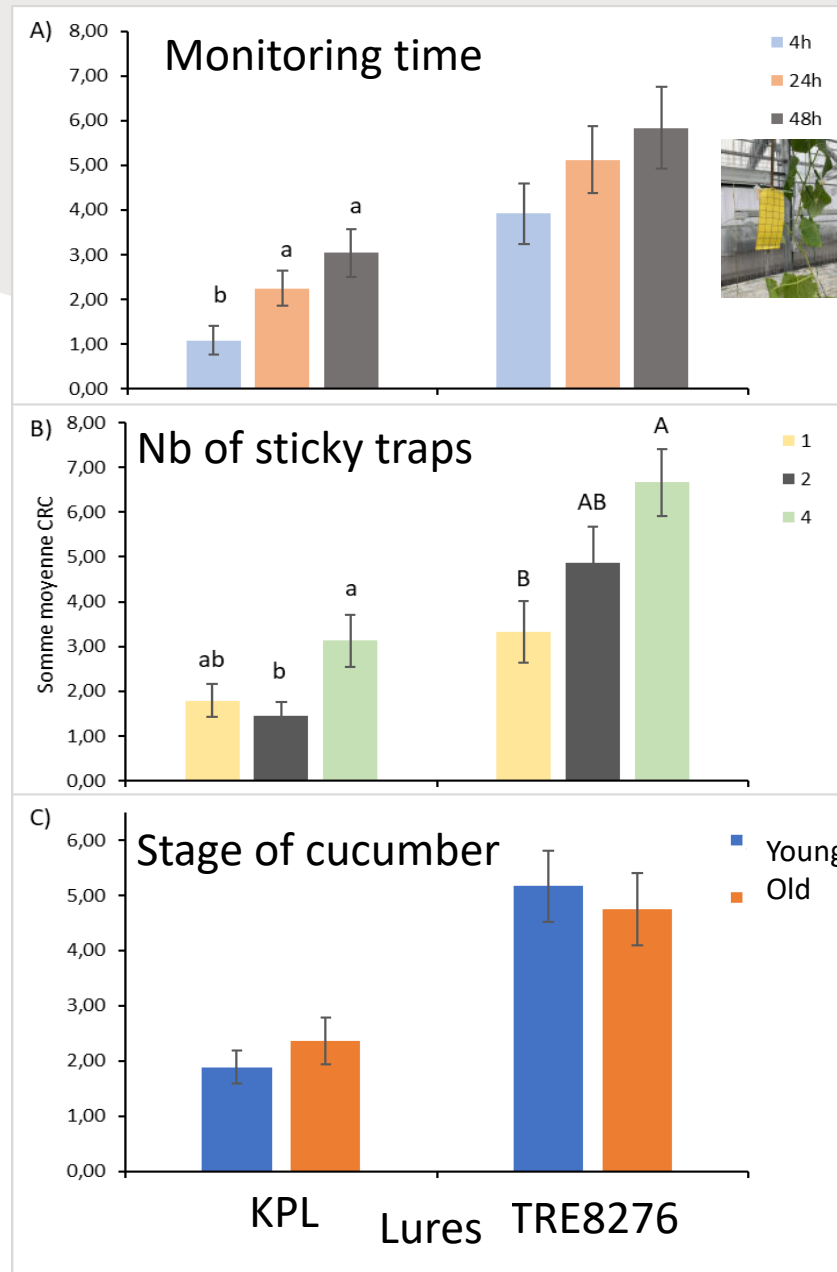
- **Parameters measured:**

Period of 48h (4h, 24h and 48h after the release)

- Number of SCB on sticky traps with lures
- Number of SCB on 15 plants / treatments
- Feeding damages by SCB (area (cm²), damage severity index)
- Bacterial wilt infection (nb of leaves infected, damage severity index)



Results – Nb of attractive lures



- With KPL: + captures after 24h and 48h
- + captures with 4 traps/30 plants for both lures
- Very few SCB on plants
- ↓ SCB near TRE8276 after 48h
- + SCB on mature cucumbers

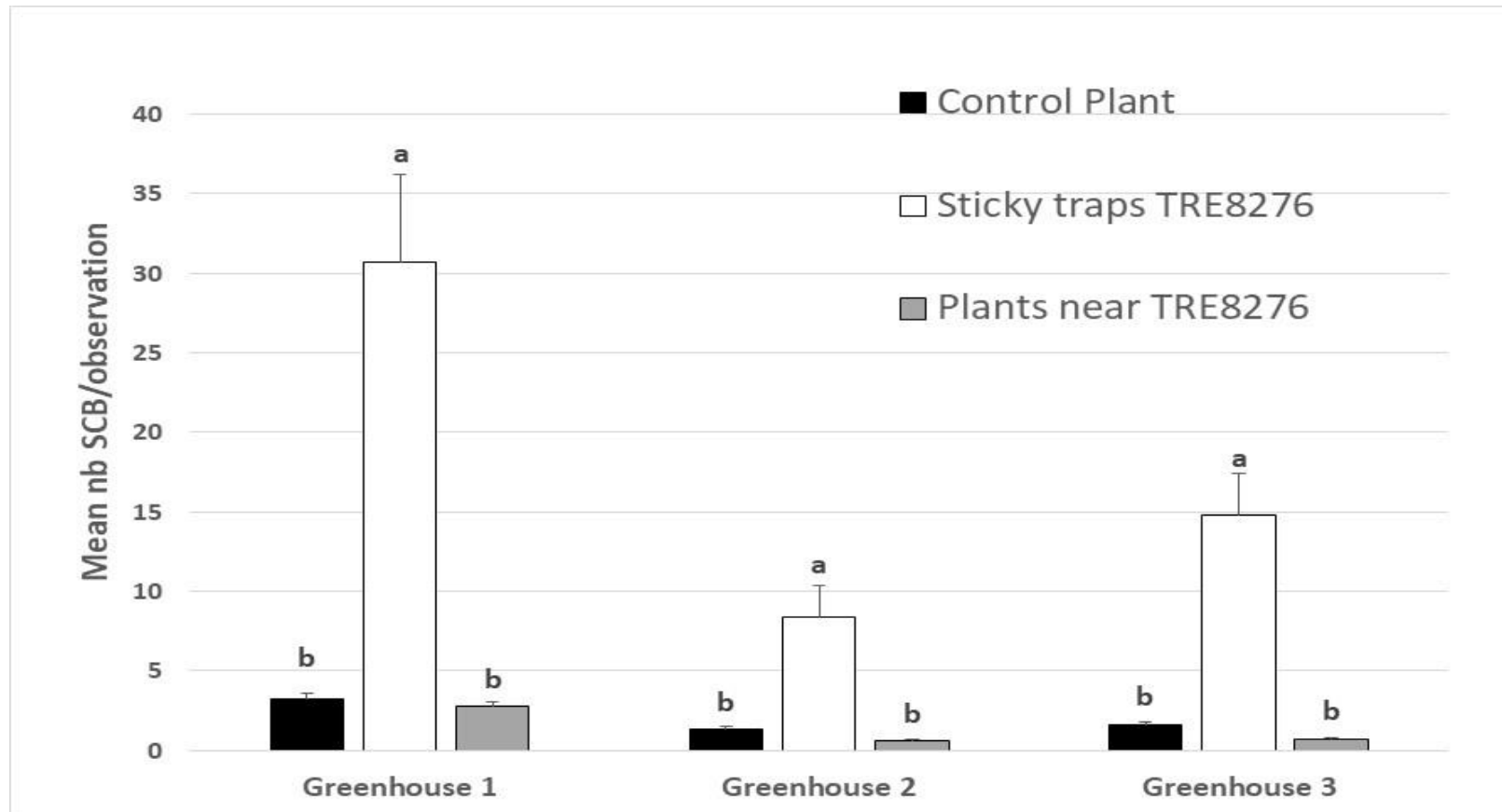
Methodology – Trials in commercial greenhouses

- Lure TRE8276 in 3 commercial greenhouses (30 x 100m)
- 4 sticky traps + lure/greenhouse
- Control plots at the other end of greenhouse (30,5m apart)

- Parameters measured 1X/week:
 - Nb SCB/sticky traps
 - Nb SCB/20 plants
 - Feeding damages by SCB (area (cm²), damage severity index)
 - Bacterial wilt infection (nb of leaves infected, damage severity index)

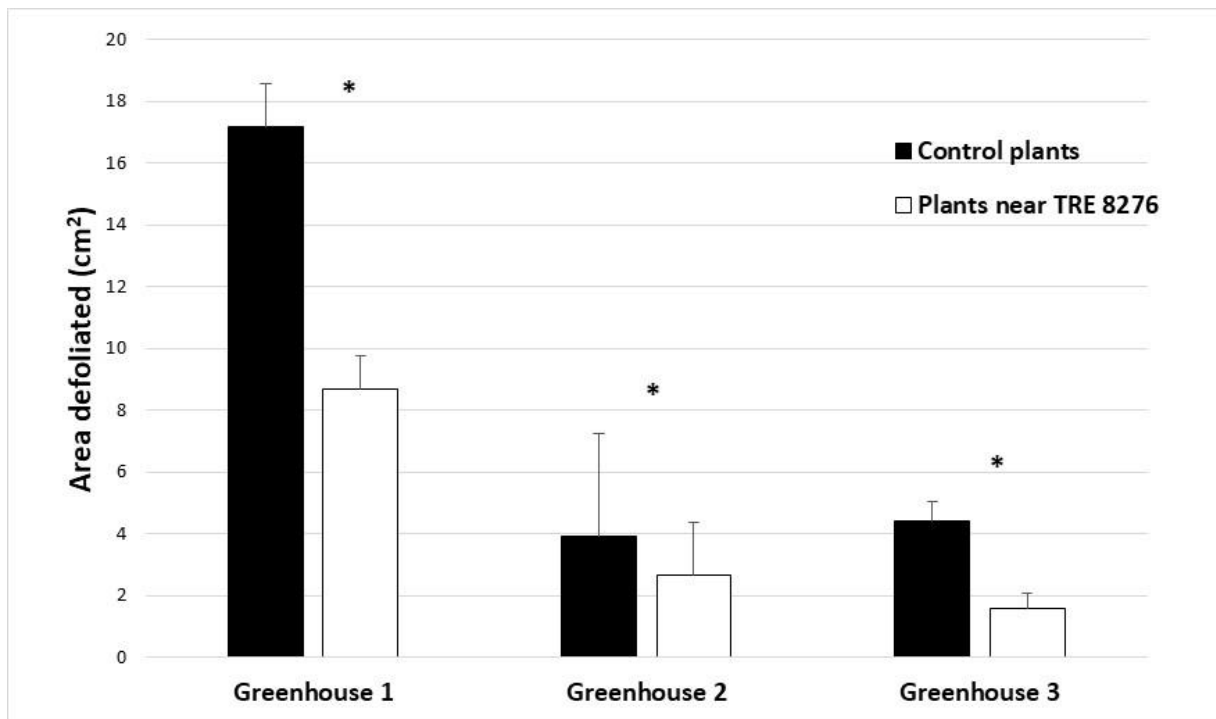
Results – Trials in greenhouse

More SCB on sticky traps with TRE8276

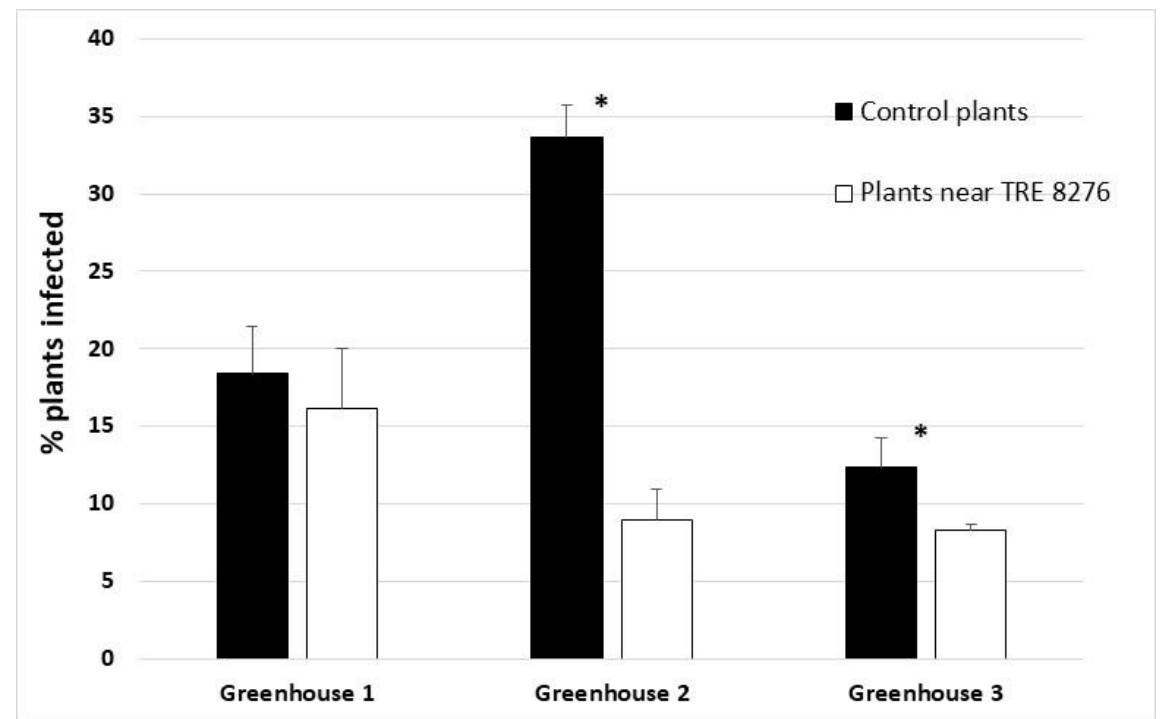


$t_{1,1216} = -26.94; P < 0.05$

Results – Trials in greenhouse



$t_{1,1073} = -2.49, P < 0.05$



$t_{1,1075} = -3.09, P < 0.05$

➤ Significant reduction of feeding damage (10 - 63% following the site) with TRE8276 lure

➤ Significant reduction of bacterial wilt (12 - 73% following the site) with TRE8276 lure

Discussion

- Some of commercial kairomonal lures are attractive to SCB (TRE8276 and KPL)
- 4 traps/30 plants are efficient to attract significant number of SCB (between 4 and 8/attractive - replace each 6 weeks)
- Significant reduction of damage and bacterial wilt with the use of TRE8276
 - Other trials to adjust the number of trap to reduce more the BW infection
- Development of other compounds (aggregation pheromone) will help the use of this attract and kill strategy

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