Bugs that ‘Bugged’ us in 2021

2022 Advanced Crop Advisors Workshop

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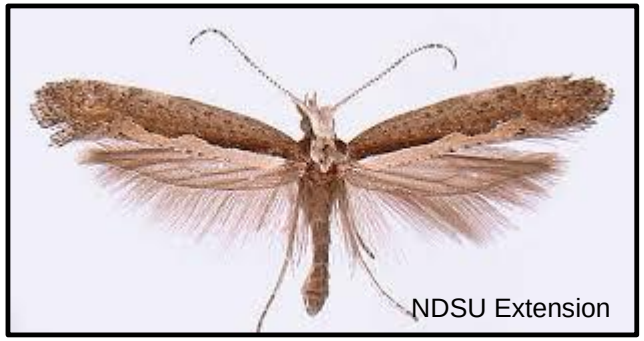
Diamondback Moth
Plutella xylostella


NDSU Extension

- Introduced into North America from Europe
- Occasional pest in canola
- Host range is restricted to plants of the family Brassicaceae – canola, mustard, cabbage, cauliflower, broccoli, kale

Economic Importance

- One of the worlds most widely distributed lepidopteran and most difficult insect to control
- 877 documented cases of insecticide resistance in populations from around the world (*Sanches and Wise 2020*)
- Developed resistance to nearly 100 unique active ingredients including carbamates, pyrethroids, and spinosyns
- Estimated annual cost of damage and management worldwide is as high as $5 billion

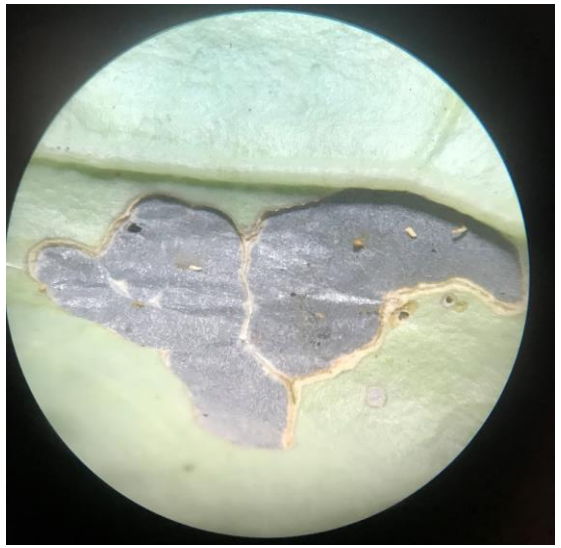
Diamondback Moth
Plutella xylostella

Diamondback Moth Feeding Damage

Canola Council of Canada

Flower and pod damage by DBM larva

Leaf damage “window pane effect’ by DBM larva



Canola Council of Canada

White scarring on pods by DBM larvae

Diamondback Moth Life Cycle

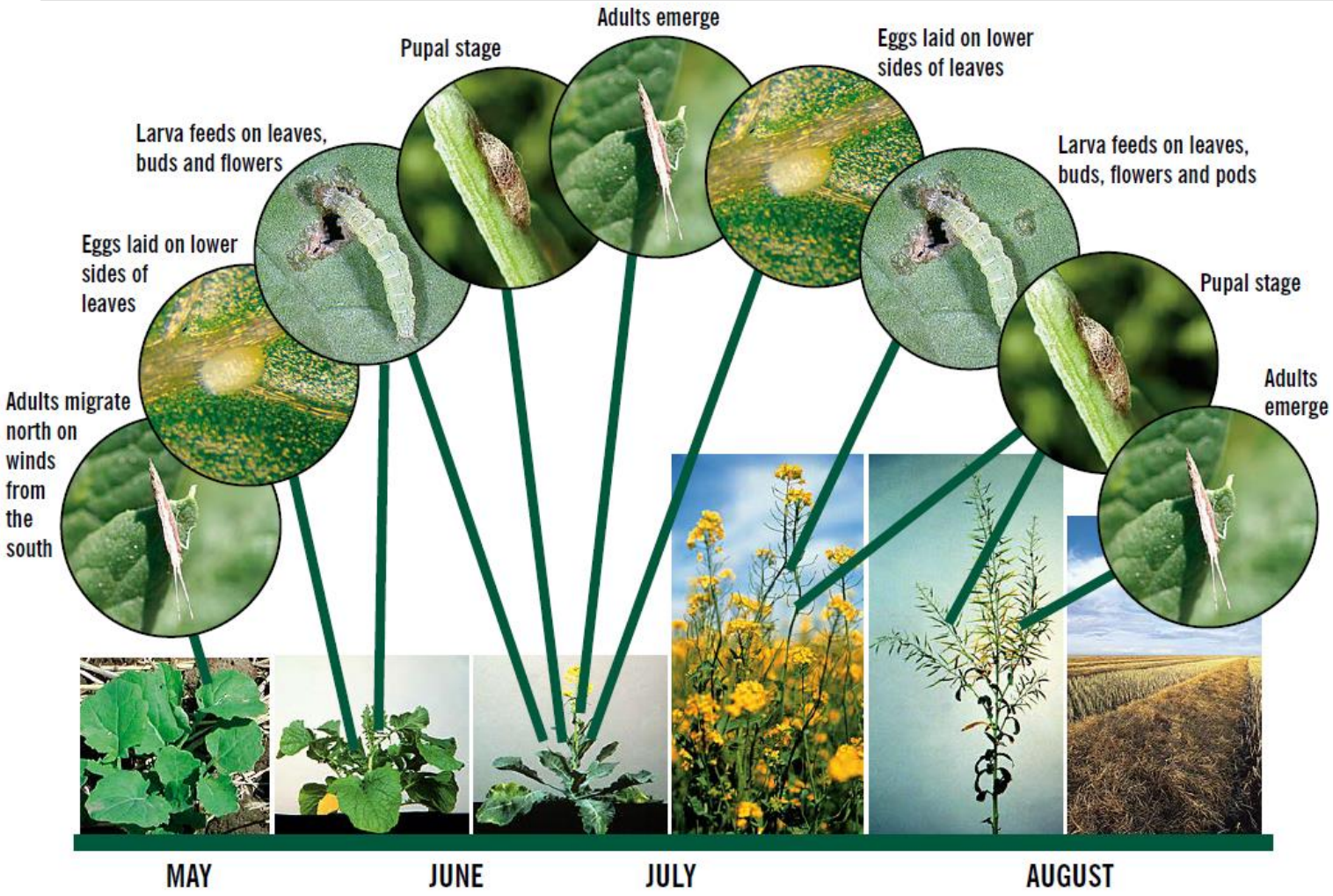


Figure 5. Life cycle of diamondback moth. (Adult moth – Cranshaw, Colorado State University, Bugwood.org)

Source: NDSU Extension Publication E1346

Management

Detection:

Sex pheromone traps for monitoring the flights of moths

>100 moths/week/trap during bloom to early pod development = early warning that significant larval infestation may follow

Sampling:

- Pull out all plants from 1-square-foot area
- Beat collected plants onto a clean surface or into a white bucket
- Count the number of larvae dislodged from plants
- Repeat at 5 locations for average number of larvae/ square foot

Economic Threshold

Flowering stage:10 to15 larvae/square foot

Pod stage: 20 to 30 larvae/square foot

Is Pyrethroid Resistance in DBM Real???

YES

However……

- Multiple generations/stages may be present
- Time of spraying and spray volume
- Rate of spraying
- Migrant pest

Foliar Insecticides for DBM Control

Insecticide	Class	IRAC Group
Bt *Bacillus thuringiensis*	**Microbial Disruptor**	**11A**
Bifenthrin Deltamethrin Lambda-cyhalothrin Zeta-cypermethrin	**Pyrethroids**	**3A**
Chlorantraniliprole Cyantraniliprole	**Diamides**	**28**
Chlorantraniliprole + lambda-cyhalothrin	**Diamide + Pyrethroid**	**28 + 3A**
Bifenthrin + sulfoxaflor	**Pyrethroid + Sulfoximine**	**3A + 4C**

2022 ND Field Crop Insect Management Guide

Canola Flea Beetles

Canola Flea Beetles

Crucifer Flea Beetle
Phyllotreta cruciferae

Striped Flea Beetle
Phyllotreta striolata

Canola

Insecticide Recommendations

Registered Insecticides - 2022

Seed Treatment Insecticides

** Restricted Use Pesticide*

Neonicotinoid (Group 4A):

- **thiamethoxam** - Helix Vibrance, Helix XTra
- **clothianidin** - NipsIt INSIDE, Prosper EverGol
- **imidacloprid** - Attendant 480FS, Dyna-Shield Imidacloprid 5, Gaucho 600, Senator 600 FS

Diamides (Group 28):

- **cyantranilliprole** - Fortenza, Lumiderm

Butenolides (Group 4D):

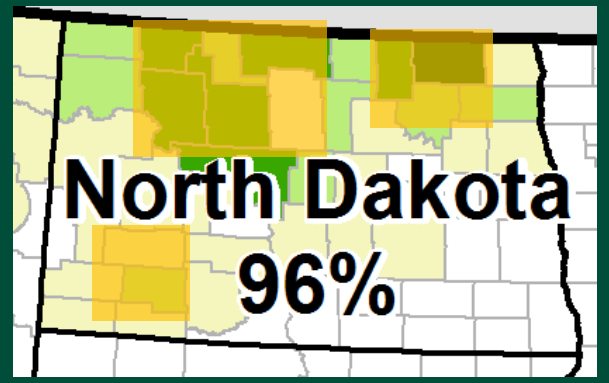
- **Flupyradifurone** – Buteo Start

Always Read and Follow Labels.

Source: Janet J. Knodel

Efficacy of Seed Treatment Insecticides on Canola Flea Beetles

Lesley Lubenow's Ph.D. Project



Three geographic canola growing regions (USDA NASS)

Objectives

- ✔ Determine efficacy of current insecticide seed treatments for control populations of *P. cruciferae and P. striolata* originating from three geographic canola production areas of ND.

- ✔ Compare efficacy of seed treatments between *P. cruciferae* and *P. striolata*.

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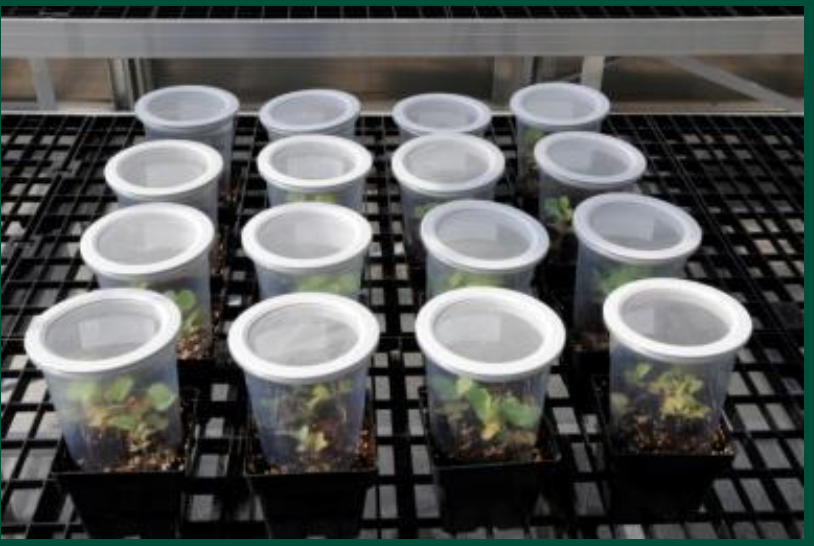
Source: Janet J. Knodel

Efficacy of Seed Treatment Insecticides on Canola Flea Beetles

Lesley Lubenow's Ph.D. Project

Seed Treatments

- Clothianidin (Prosper FX), 200.8 g ai per 100 kg seed
- Thiamethoxam (Helix XTra), 400 g ai per 100 kg rate
- Cyantraniliprole (Lumiderm), 1000 g ai per 100 kg seed
- Untreated check



(Source: Janet J. Knodel)

RCBD with factorial arrangement

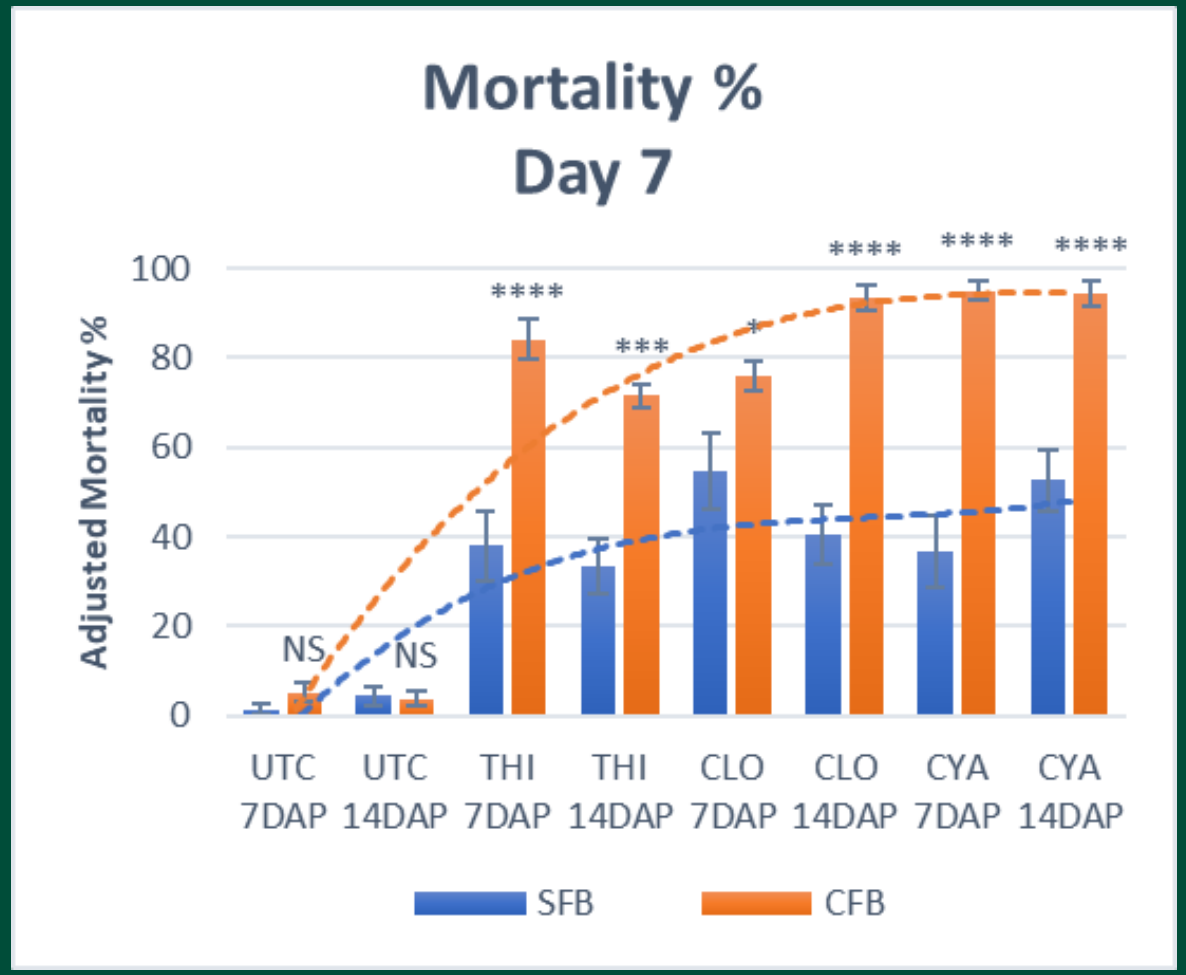
*6 reps, ran twice

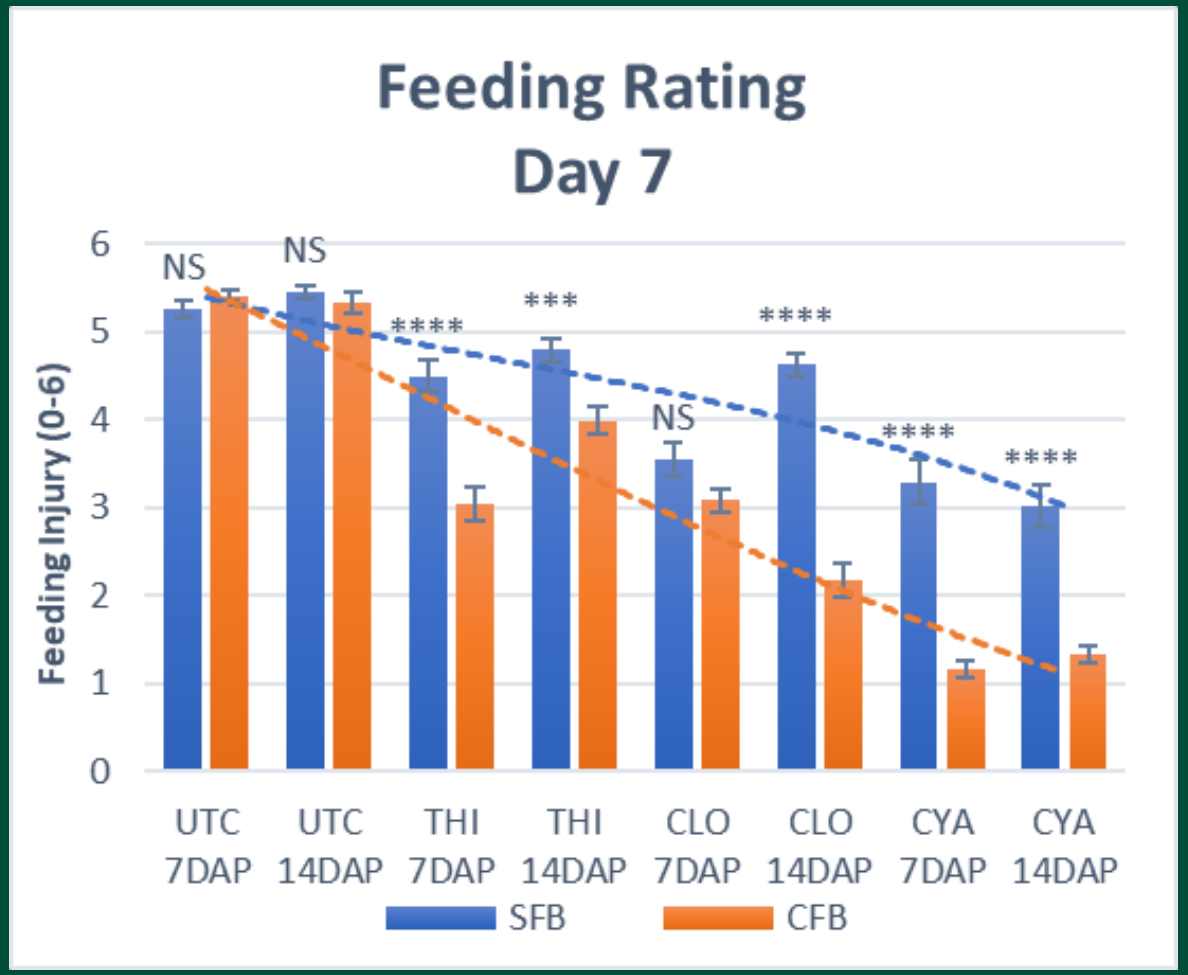
Days after planting (DAP) infestation timing

*7 DAP and 14 DAP

- 10 flea beetles were introduced on 5 plants per cup
- Conducted live counts and feeding injury ratings at 3, 7 and 10 days after infestation

Crucifer FB versus Striped FB – Day 7





Significance at α=0.05 CLO = clothianidin, CYA = cyantraniliprole, THI = thiamethoxam, UTC = untreated control

Asterisks mean significant differences between paired SFB and CFB plots according to a t-test with equal variances ($P \leq 0.05$) where * is $P \leq 0.05$,** is $P \leq 0.01$, *** is $P \leq 0.001$ and **** is $P \leq 0.0001$.

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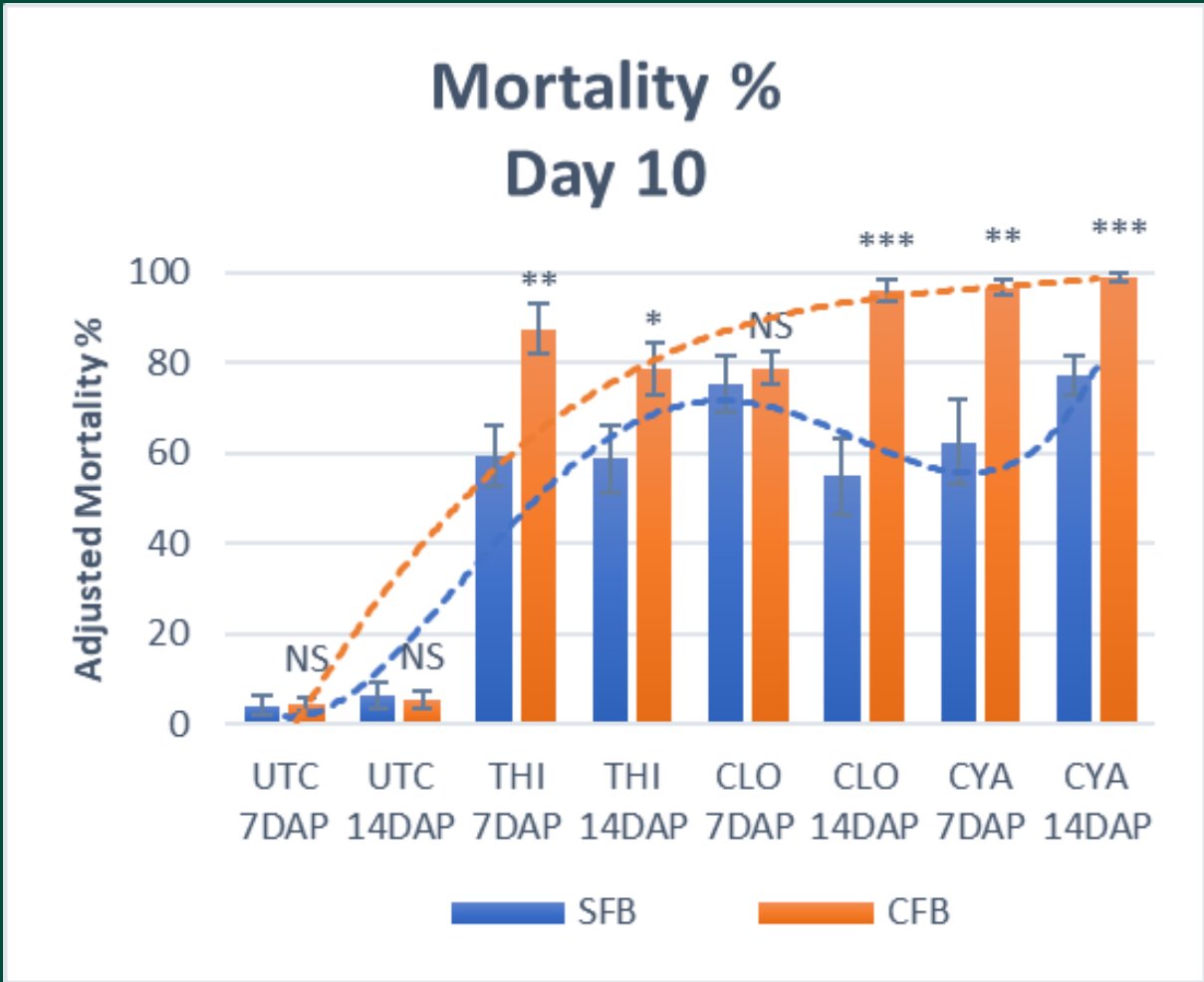
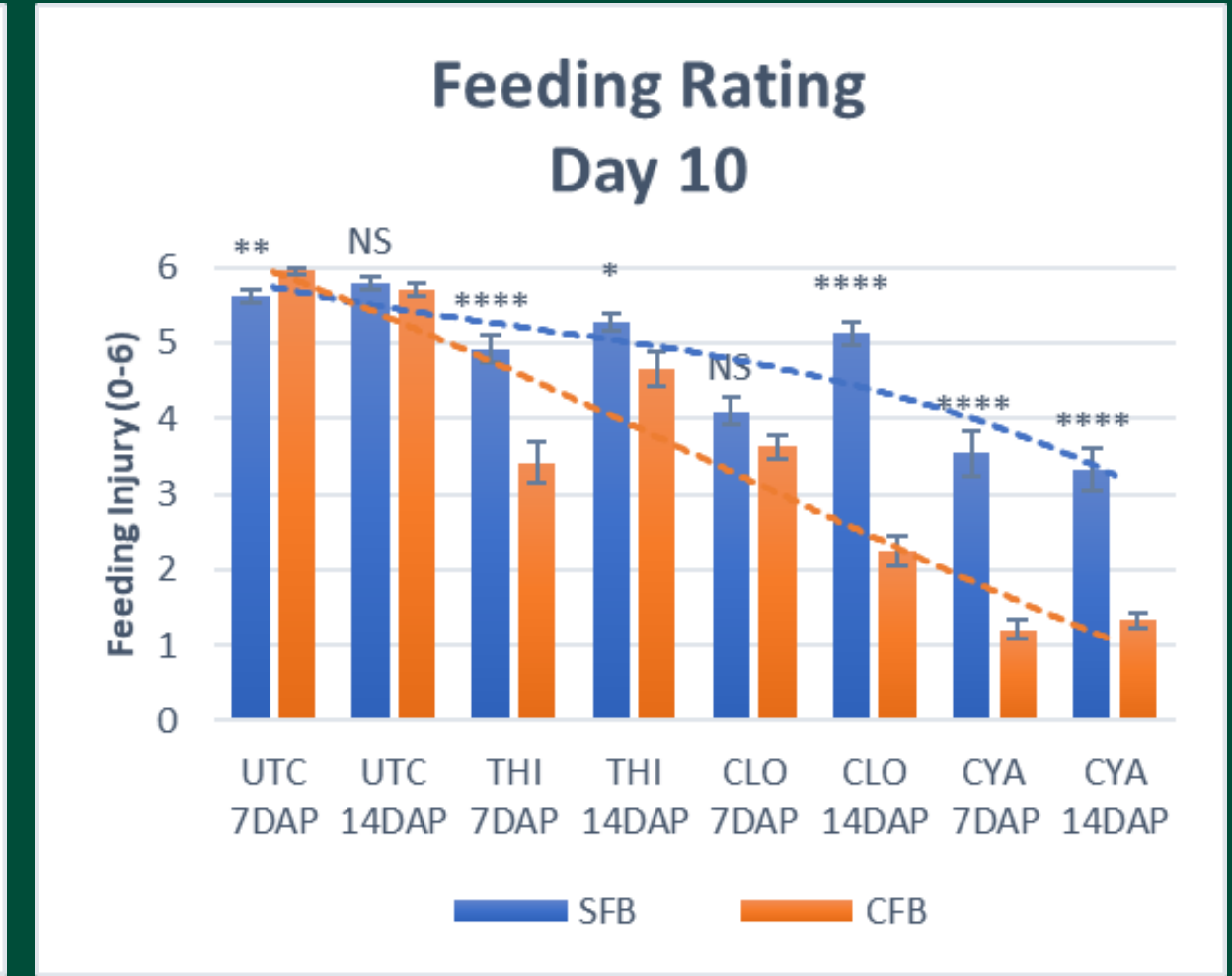
(Source: Janet J. Knodel)

Crucifer FB versus Striped FB – Day 10





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(Source: Janet J. Knodel)

Conclusion

- All insecticide seed treatments tested (THI, CLO, CYA) for control of flea beetles had higher mortality and lower feeding injury ratings than the untreated check

- Newer MOA insecticide (Group 28: Diamide)

  Cyantraniliprole (CYA), was slower to cause mortality, but feeding injury ratings were lower than THI and CLO as well as the untreated check

- Striped flea beetle had decreased mortality and increased feeding injury as compared to crucifer flea beetle.

(Source: Janet J. Knodel)

Take Home Message for Canola Growers

- **Insecticide seed treatments do offer the first line of defense against flea beetles- They increase the window of duration for a foliar spray**

- **Striped flea beetles are slowly increasing in canola due to tolerance/resistance of standard insecticide seed treatments (Neonicotinoids, Group 4A) used in canola**

- **New Modes of Action (Diamides, Group 28) show promise for control of both species of *Phyllotreta* flea beetles**

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(Source: Janet J. Knodel)

Efficacy of Buteo Start Seed Treatment Insecticide on Canola Flea Beetles

Janet J. Knodel
Professor and Extension Entomologist
Patrick Beauzay
Extension Entomology Research Specialist

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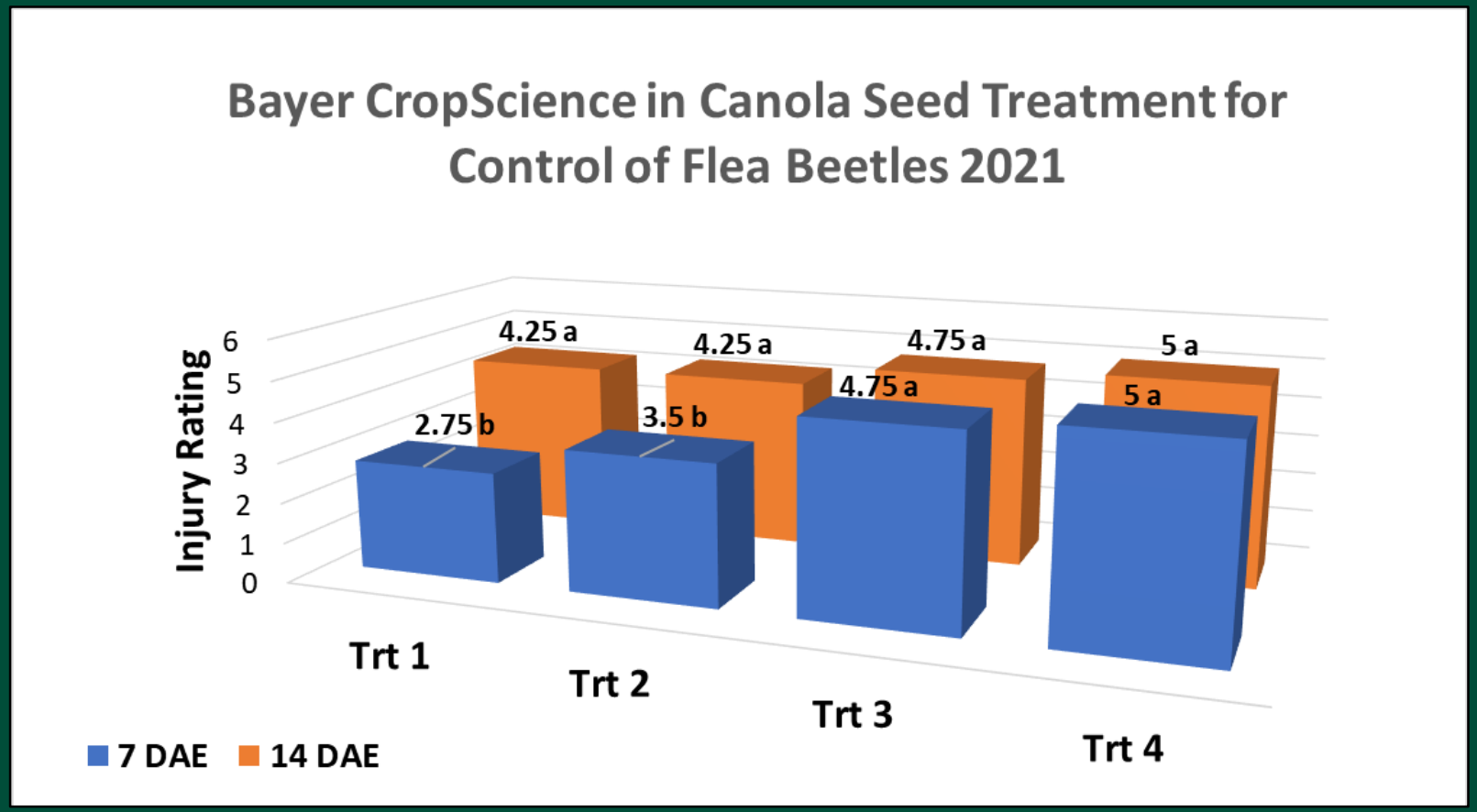
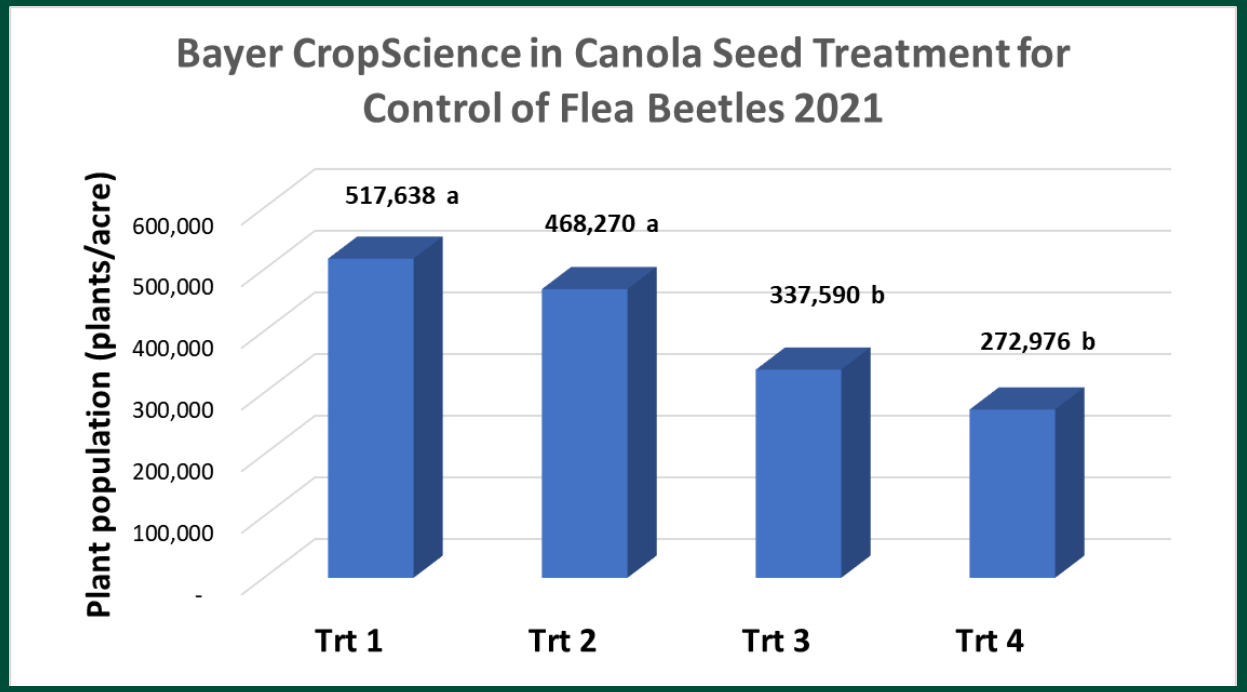
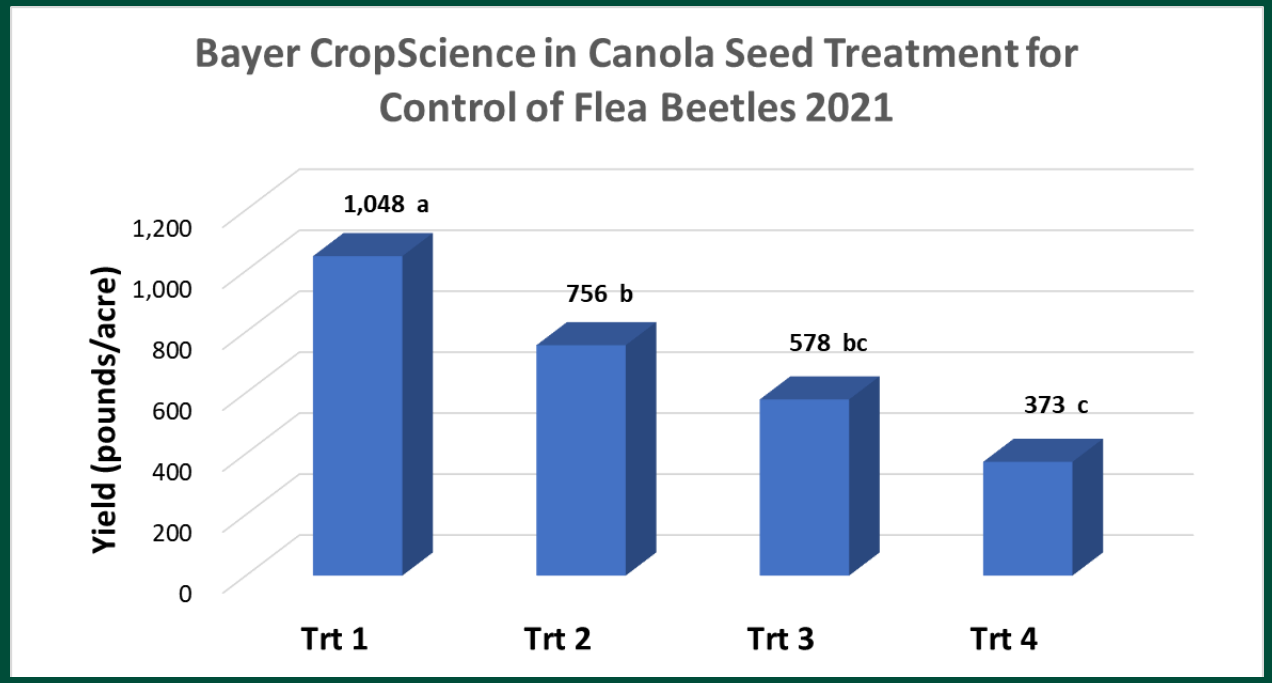
Field - Buteo Start Seed Treatment 2021



Trt 1 = Prosper Evergol @ 21.5 fl oz/cwt + Buteo Start @ 16 fl oz/cwt
Trt 2 = Prosper Evergol @ 21.5 fl oz/cwt + Buteo Start @ 9.6 fl oz/cwt
Trt 3 = Prosper Evergol @ 21.5 fl oz/cwt
Trt 4 = Untreated Check

Field - Buteo Start Seed Treatment 2021





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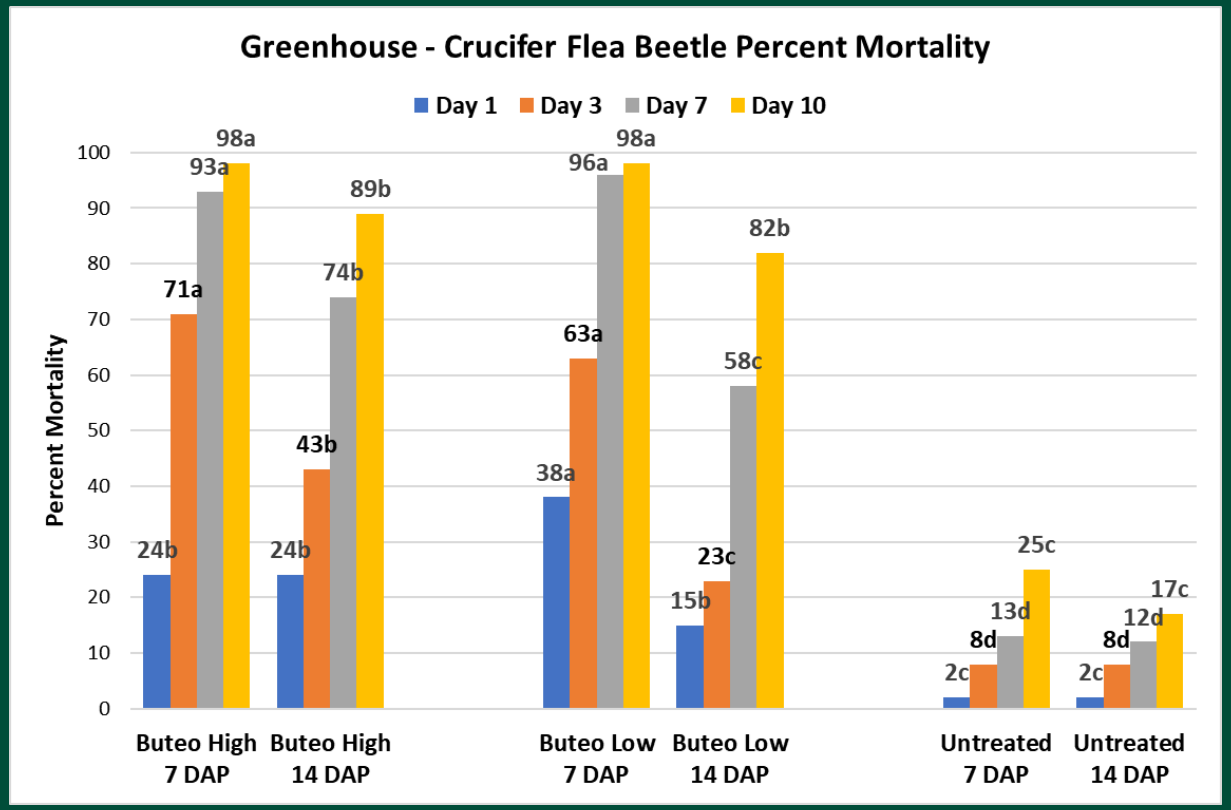
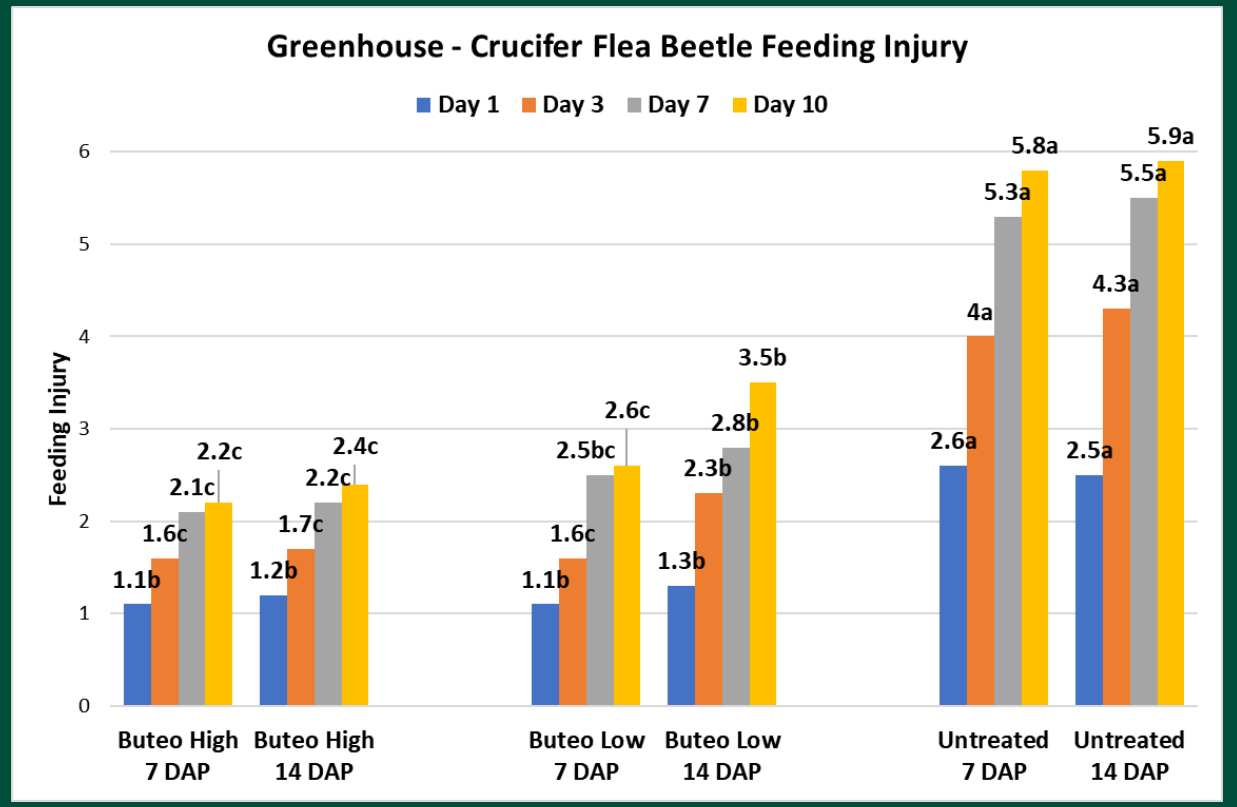
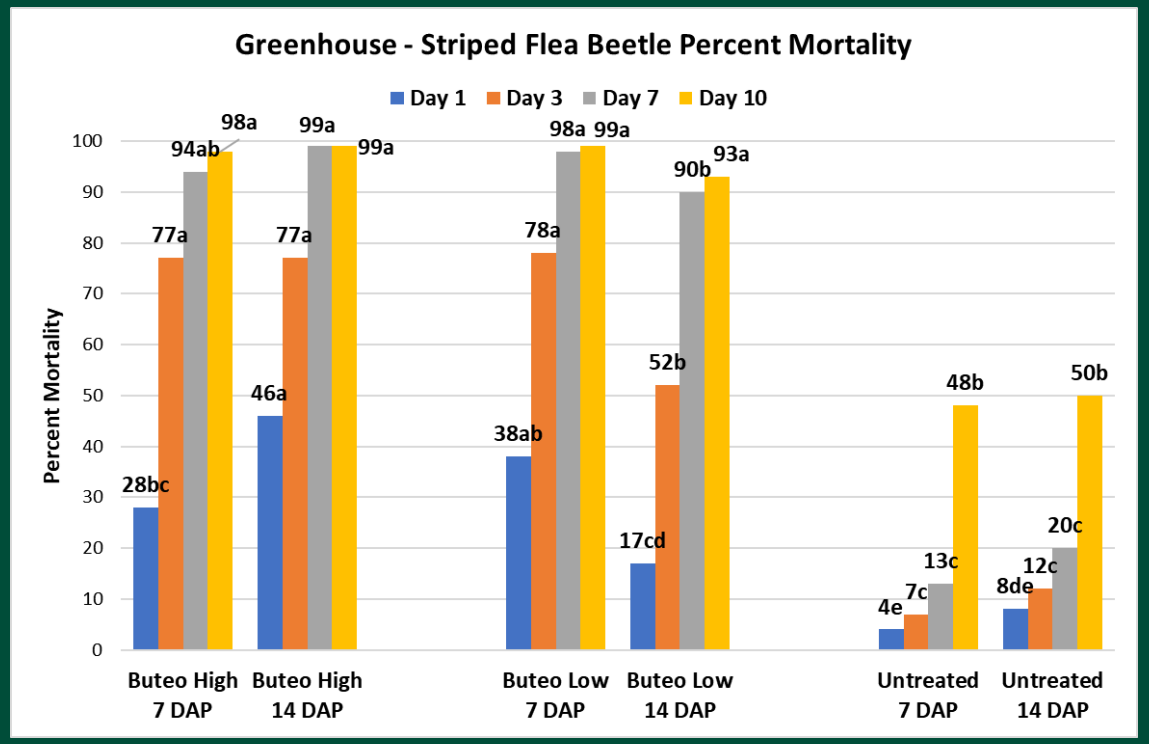
Greenhouse - Buteo Start Seed Treatment 2021

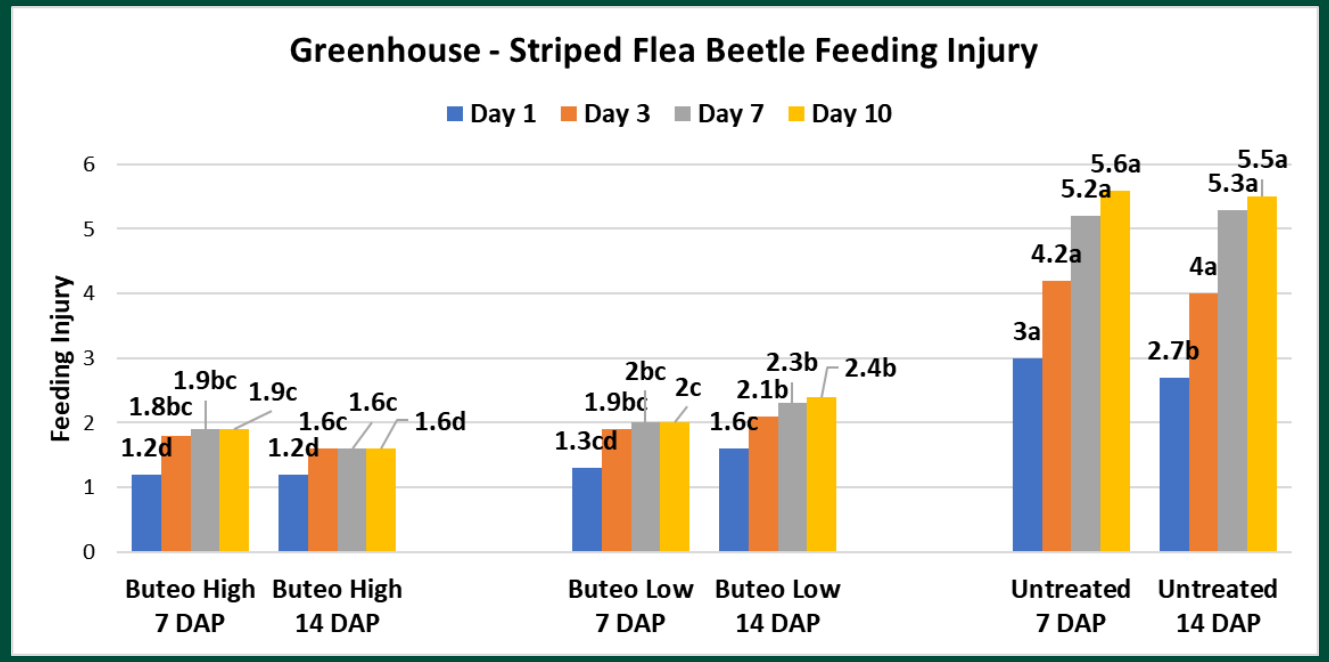




Treatment	Rate
Buteo Start (low rate)	9.6 fl oz/acre
Buteo Start (high rate)	16 fl oz/acre

Greenhouse - Buteo Start Seed Treatment 2021





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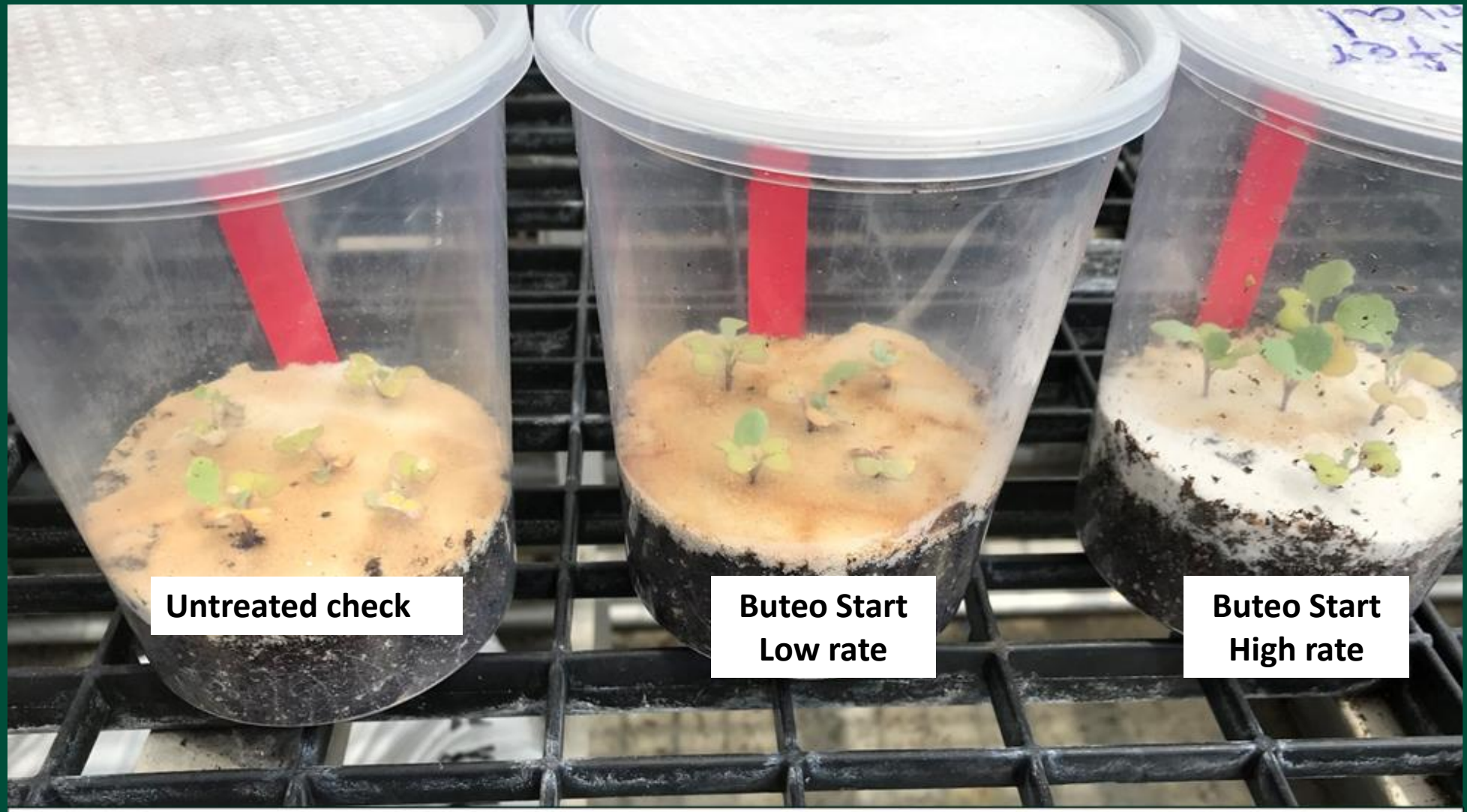

From left to right: Untreated check, Buteo Start low rate and Buteo Start high rate assessed at day 10 (7 DAP).

Thank You!!!

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