Canola Insect Pests to Scout for in 2022

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Minnesota Canola Council Symposium

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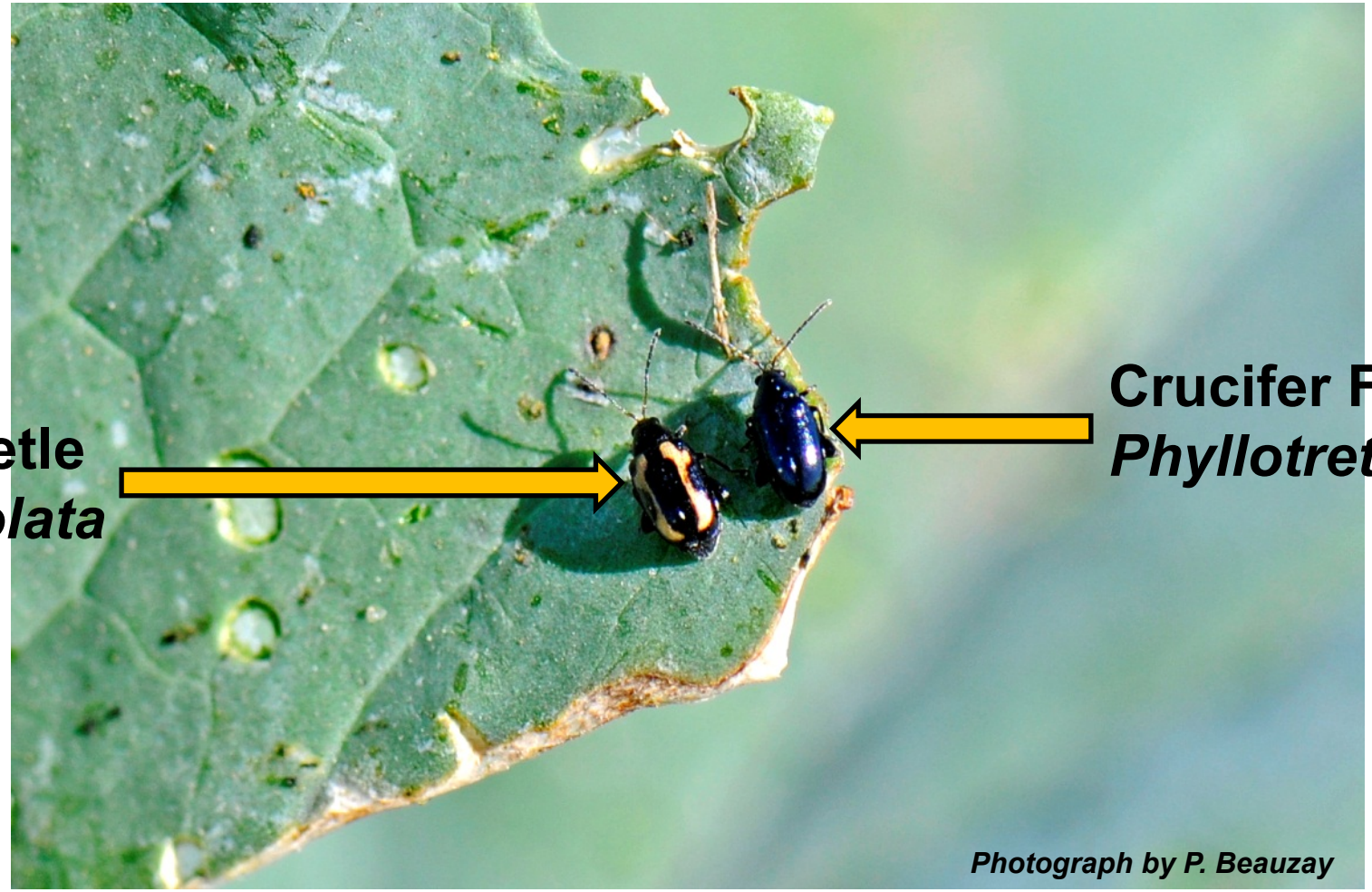
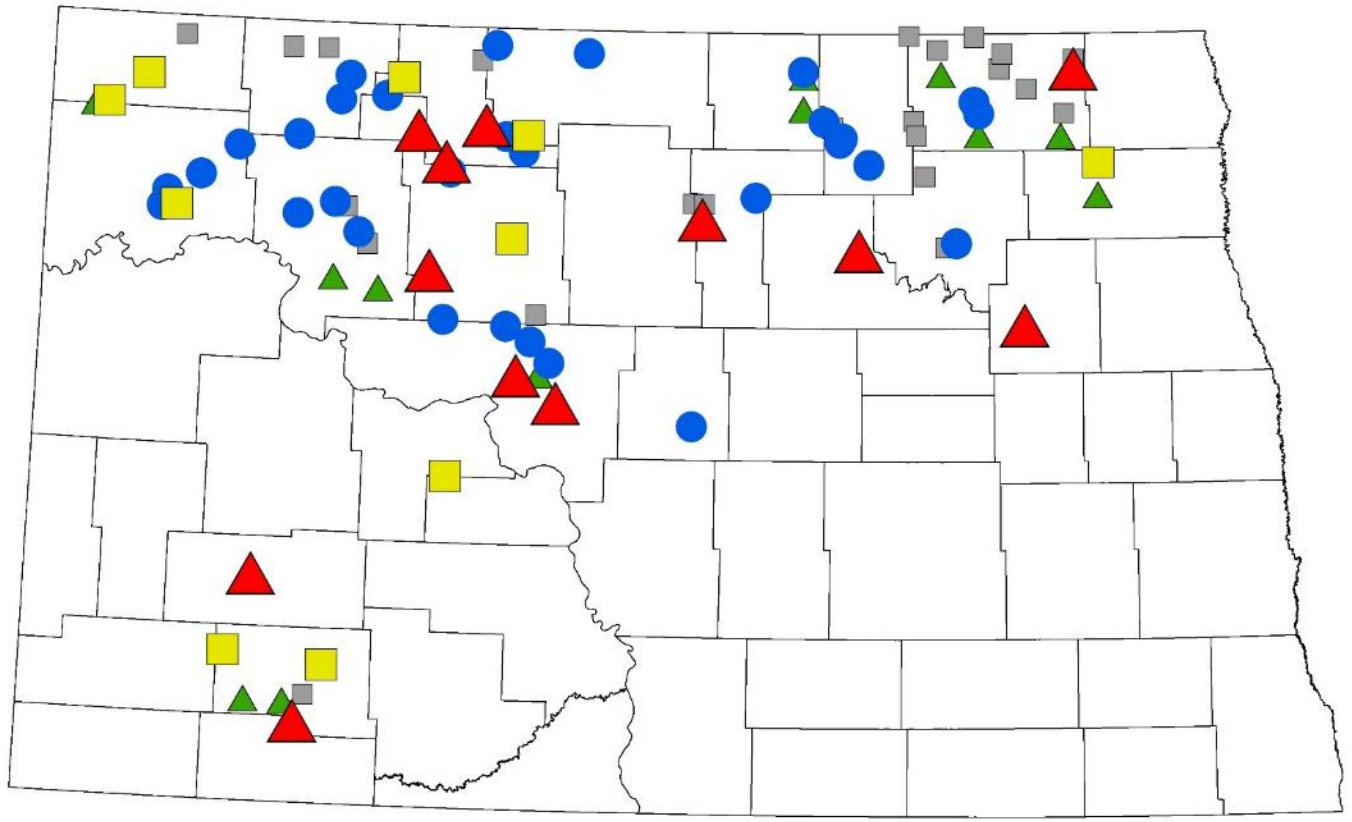
NDSU | EXTENSION

Flea Beetles of Canola



2018 Canola Flea Beetle Survey
Crucifer Flea Beetle (*Phyllotreta cruciferae*)



Total number of Flea Beetles Collected per 100 Sweeps

• 0 ■ 1-50 ▲ 51-100 ● 101-500 ■ 501-1000 ▲ >1000

- 45,434 total specimens
- 98.2% of flea beetles collected
- 100% of the fields positive
- 22 counties out of 22

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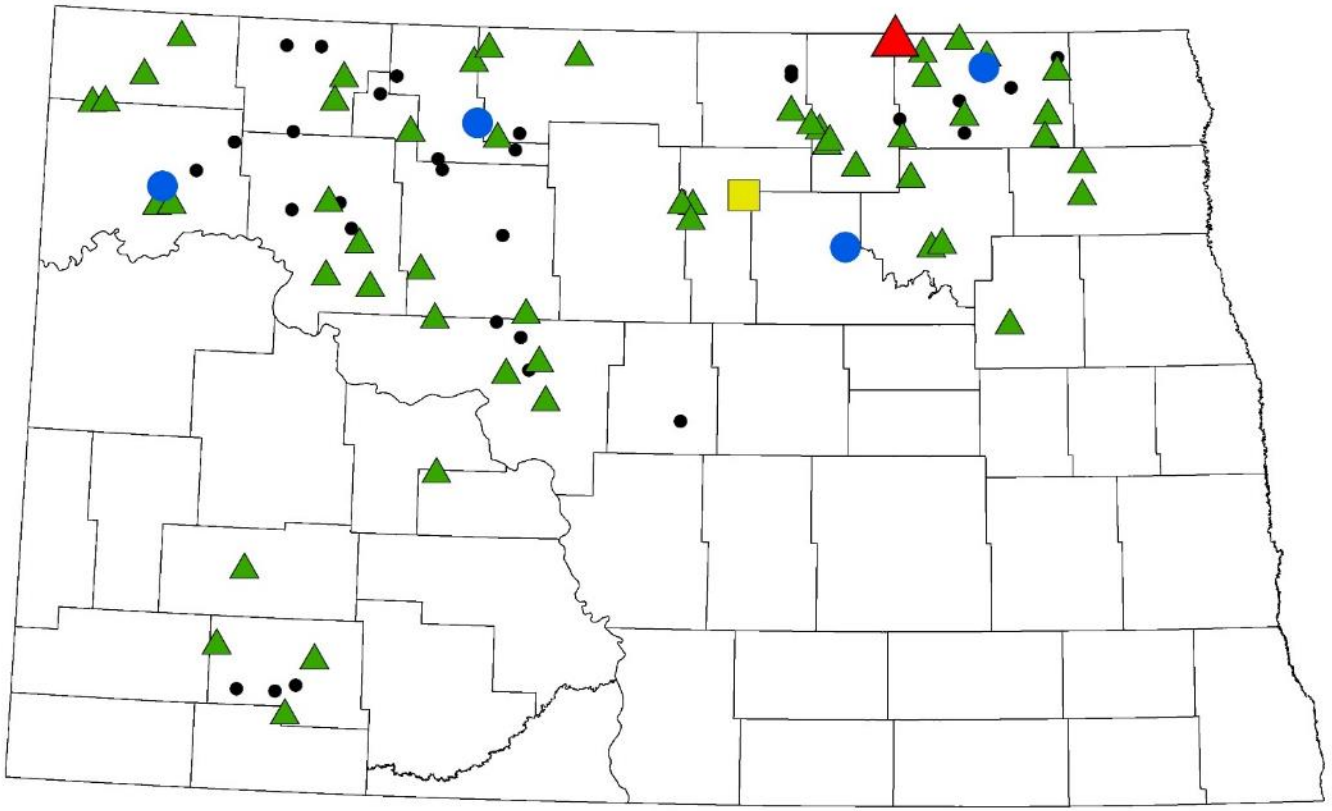
2018 Canola Flea Beetle Survey
Striped Flea Beetle (*Phyllotreta striolata*)



Total number of Flea Beetles Collected per 100 Sweeps

• 0 ▲ 1-25 ● 26-50 ■ 51-75 ▲ > 75

- **656 total specimens**
- **1.4% of flea beetles collected**
- **66% of the fields positive**
- **18 counties out of 22**

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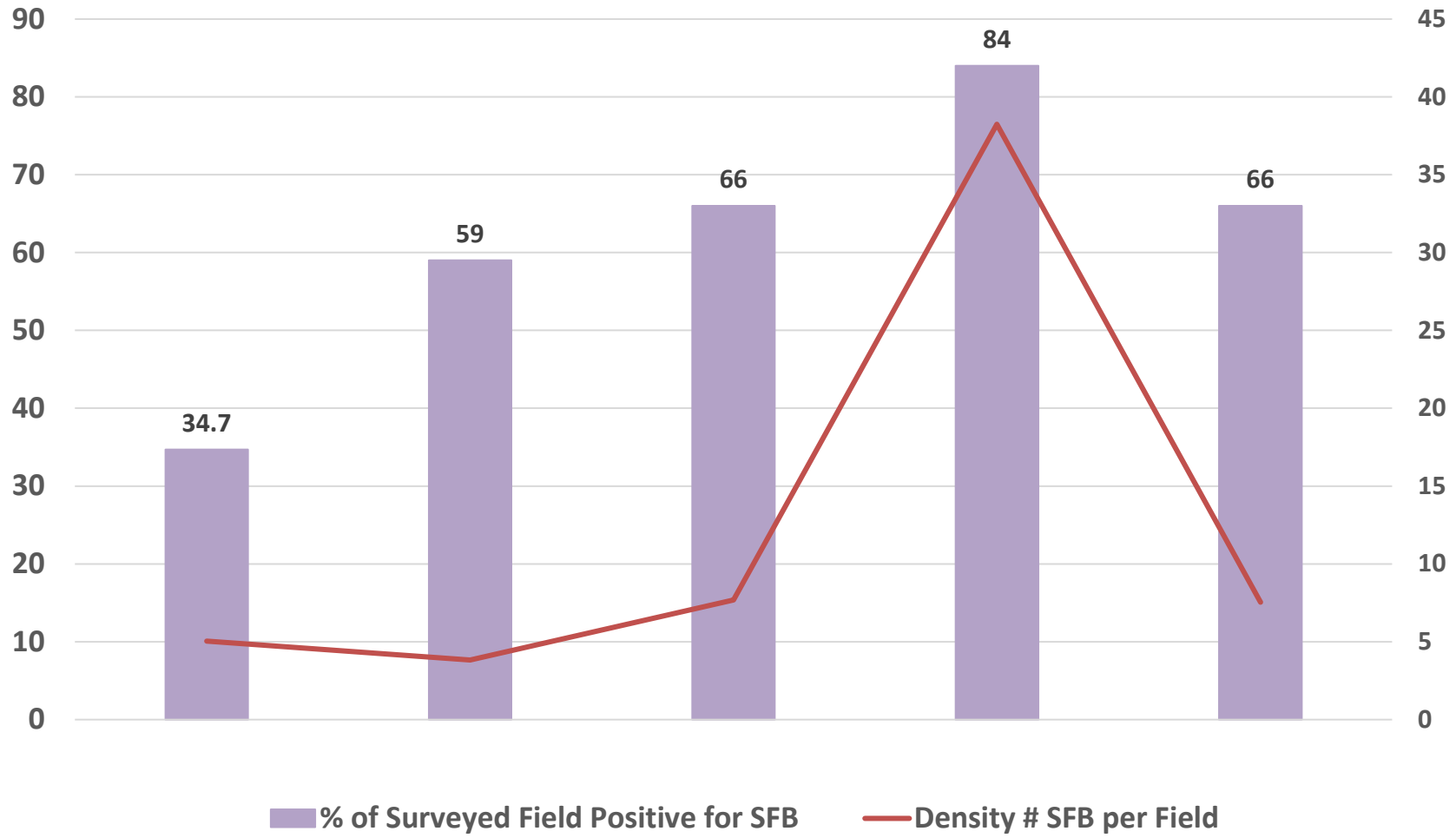
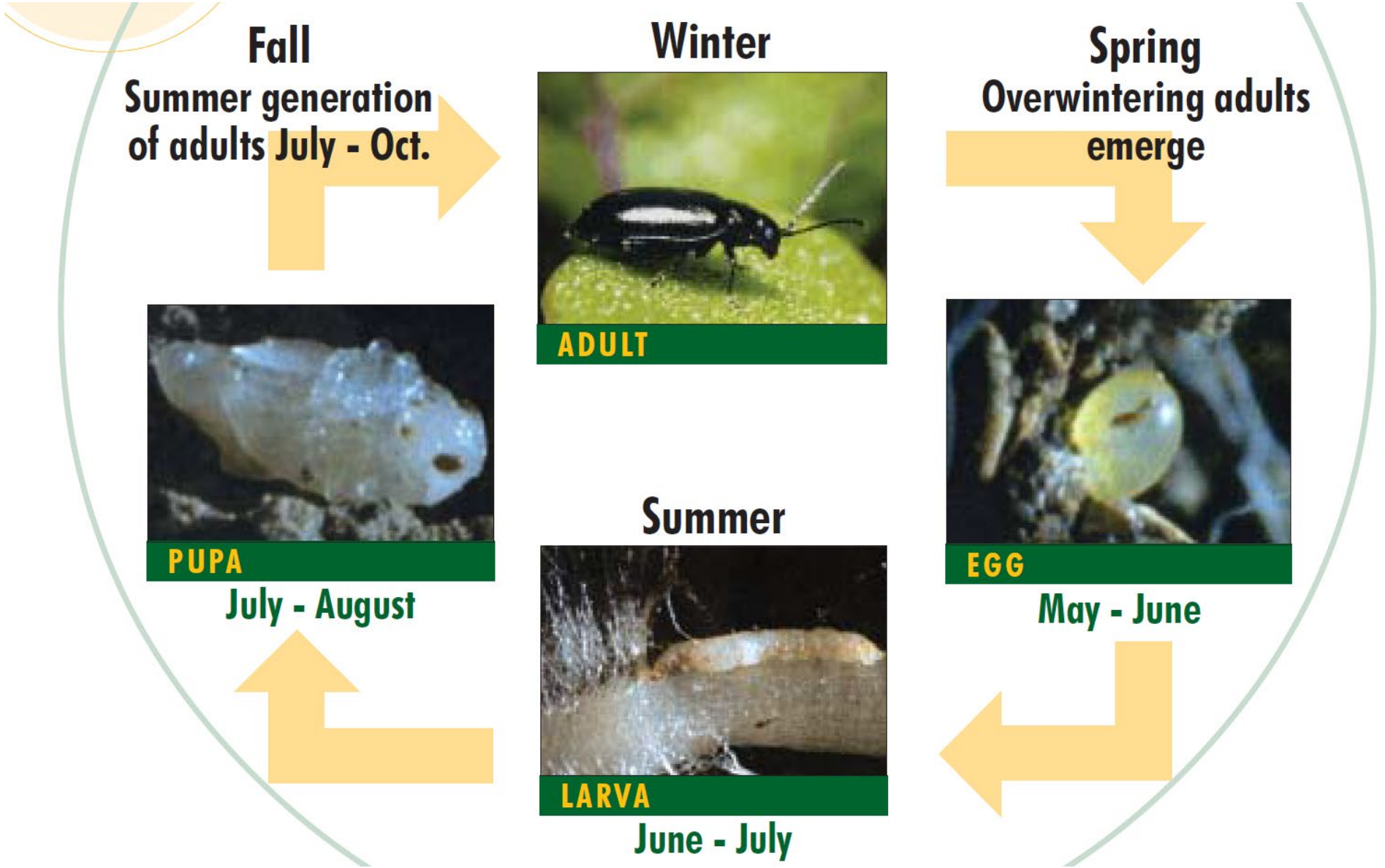
Striped Flea Beetle (SFB) Populations in Canola from 2014-2018

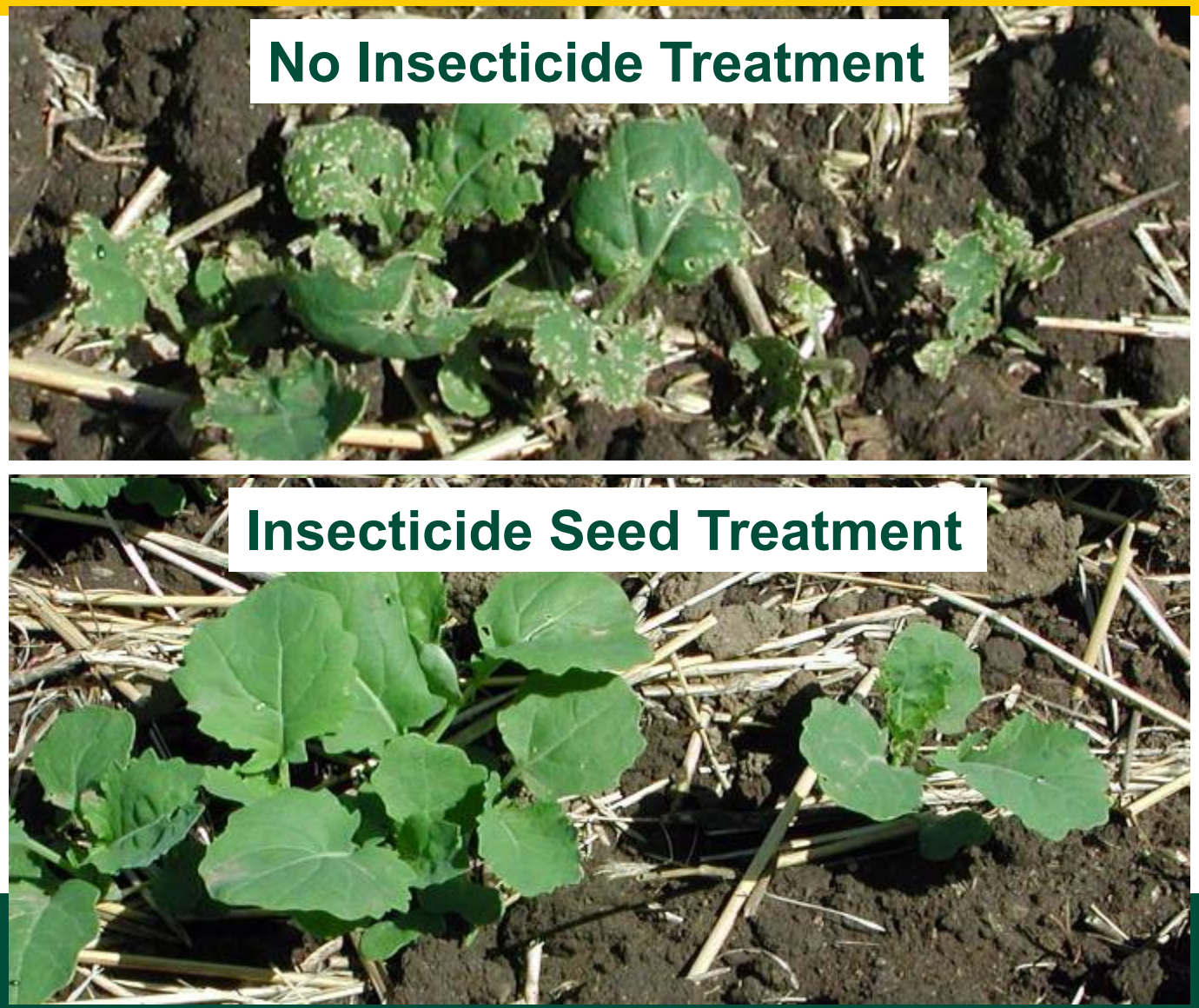


Life Cycle of the Crucifer Flea Beetle



Source: Crucifer Flea Beetle: Biology and IPM in Canola, E1234, NDSU Ext.

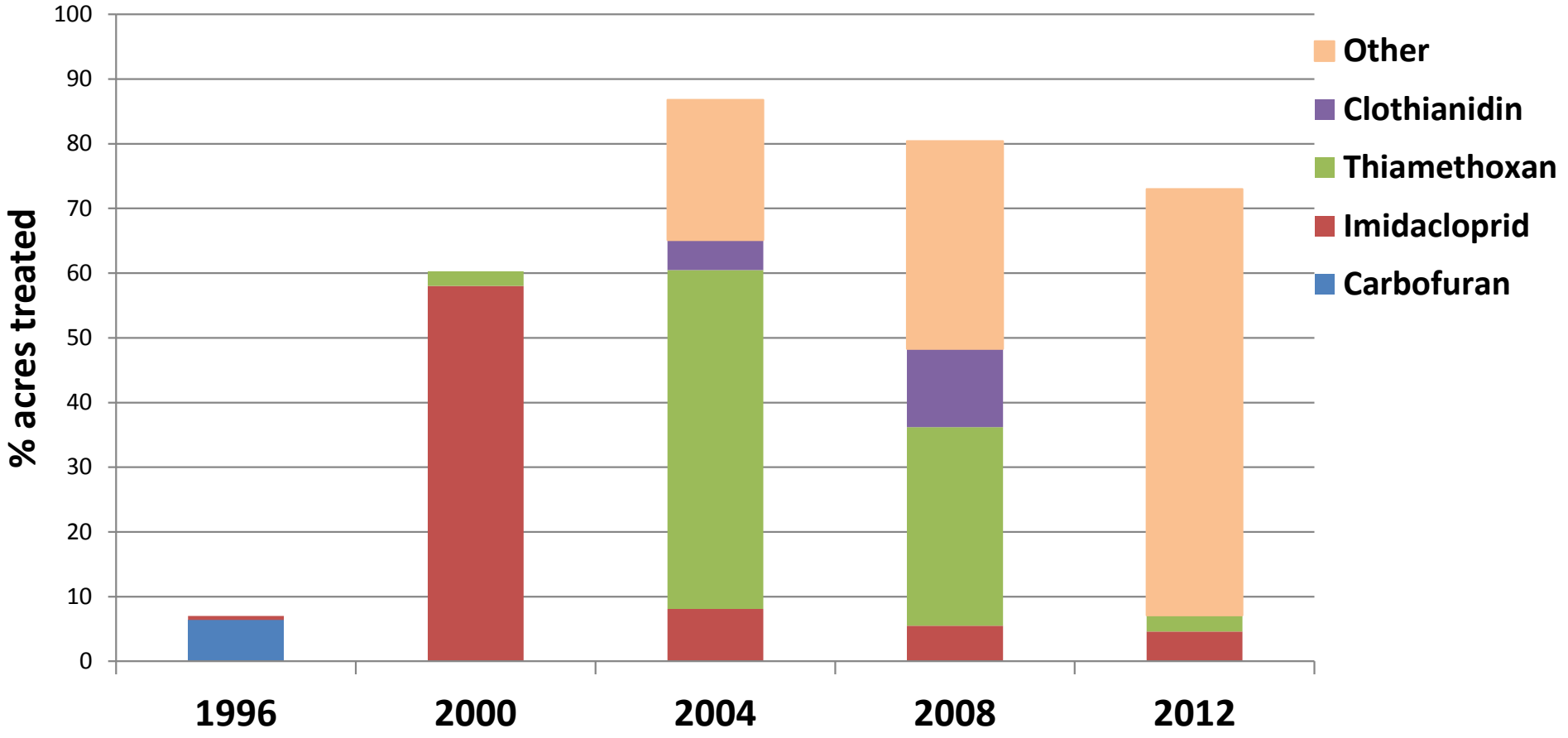
Canola seedling damage, pitting, caused by flea beetle feeding (top) and undamaged seedling (bottom).



Insecticide Seed Treatments in Canola

- **Neonicotinoids – Group 4A (flea beetles & wireworms)**
  - Thiamethoxam (Helix XTra, Helix Vibrance)
  - Clothianidin (Prosper EverGol)
- **Diamides – Group 28 (flea beetles & cutworms)**
  - Cyantraniliprole (Lumiderm, Fortenza)
- **Butenolides, Group 4D (flea beetles only)**
  - Flupyradiforuone (Buteo Start)

Estimated Percentage of Canola Acres in ND Treated with Insecticide Seed Treatments from 1996-2012



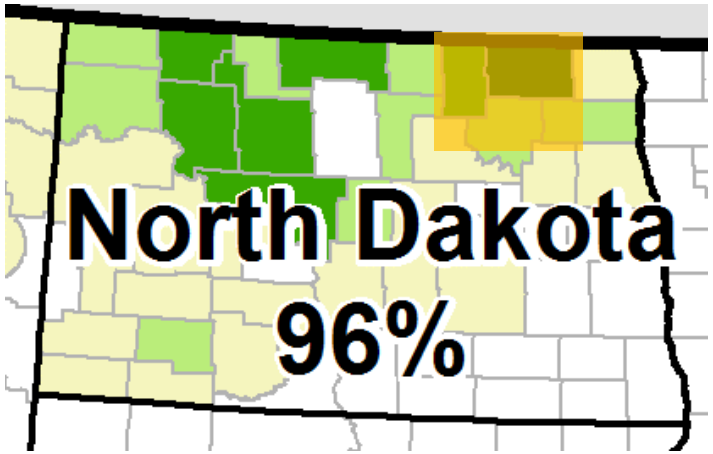
Source: Zollinger et al. Pesticide Use and Pest Management Practices in North Dakota 1996, 2000, 2004, 2008, 2012

Pesticide Resistance

- Over 500 insects worldwide
- Cross-resistance becoming more prevalent

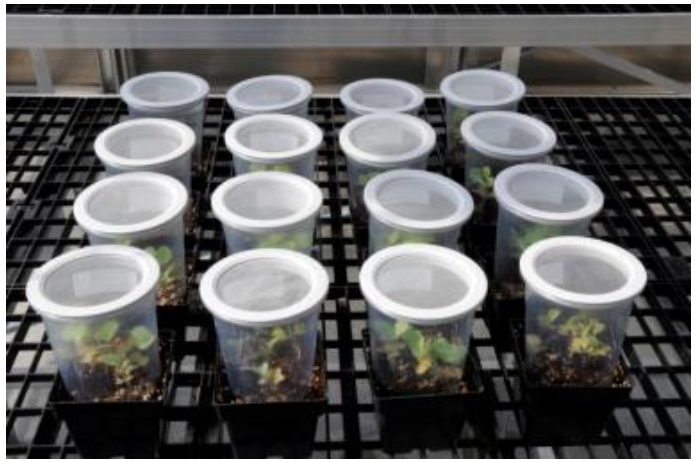
Objective of Greenhouse Bioassays

- **Determine the susceptibility of current neonicotinoid and diamide seed treatments for control of spring populations of *P. cruciferae* versus *P. striolata* in canola.**



Greenhouse Bioassay – Insecticide Seed Treatment Susceptibility between Crucifer Flea Beetles and Striped Flea Beetles

- **RCBD factorial arrangement**
  6 reps, ran twice



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

Bioassay for Insecticide Seed Treatments

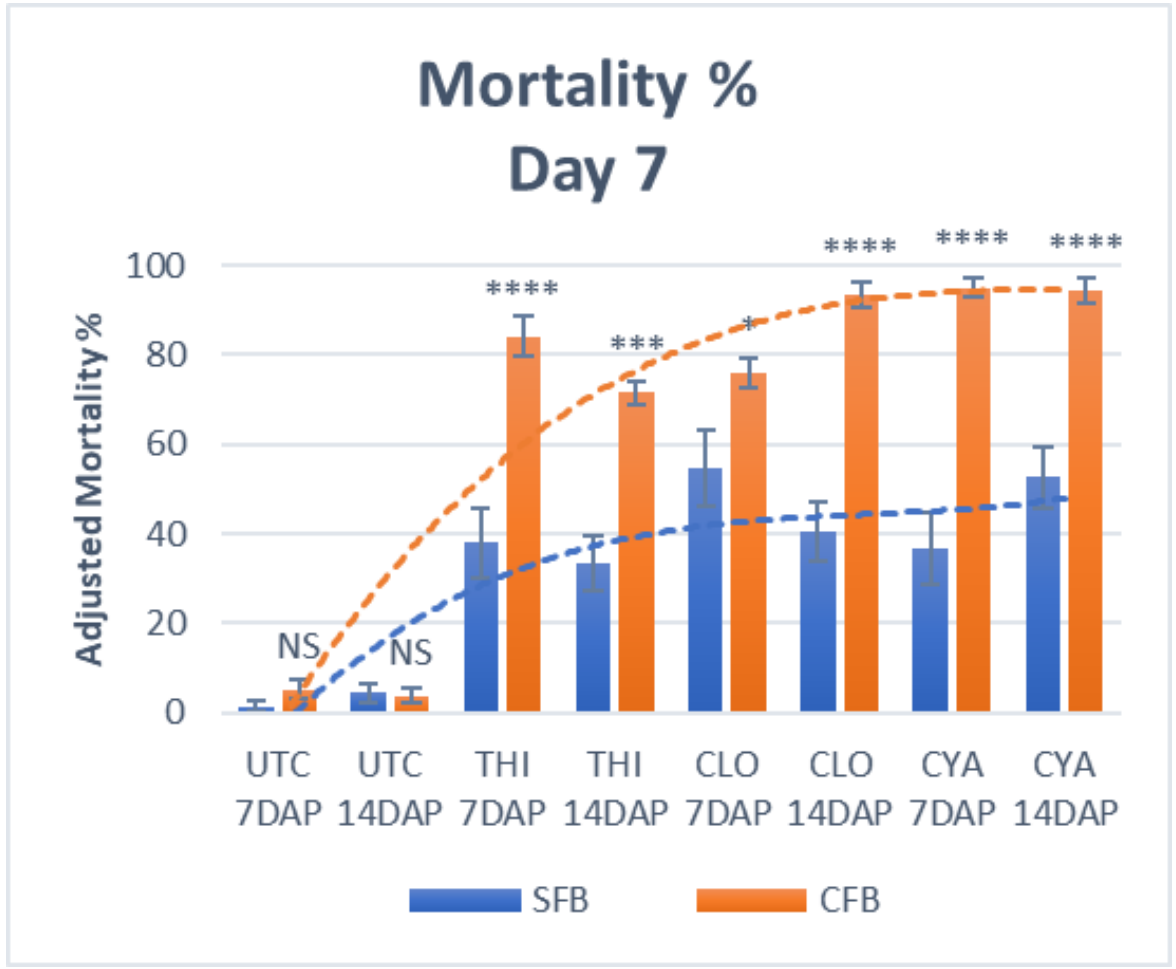
- **10 flea beetles were introduced on 5 plants per cup.**
- **Conducted live counts and feeding injury ratings at 3, 7 and 10 days after infestation.**

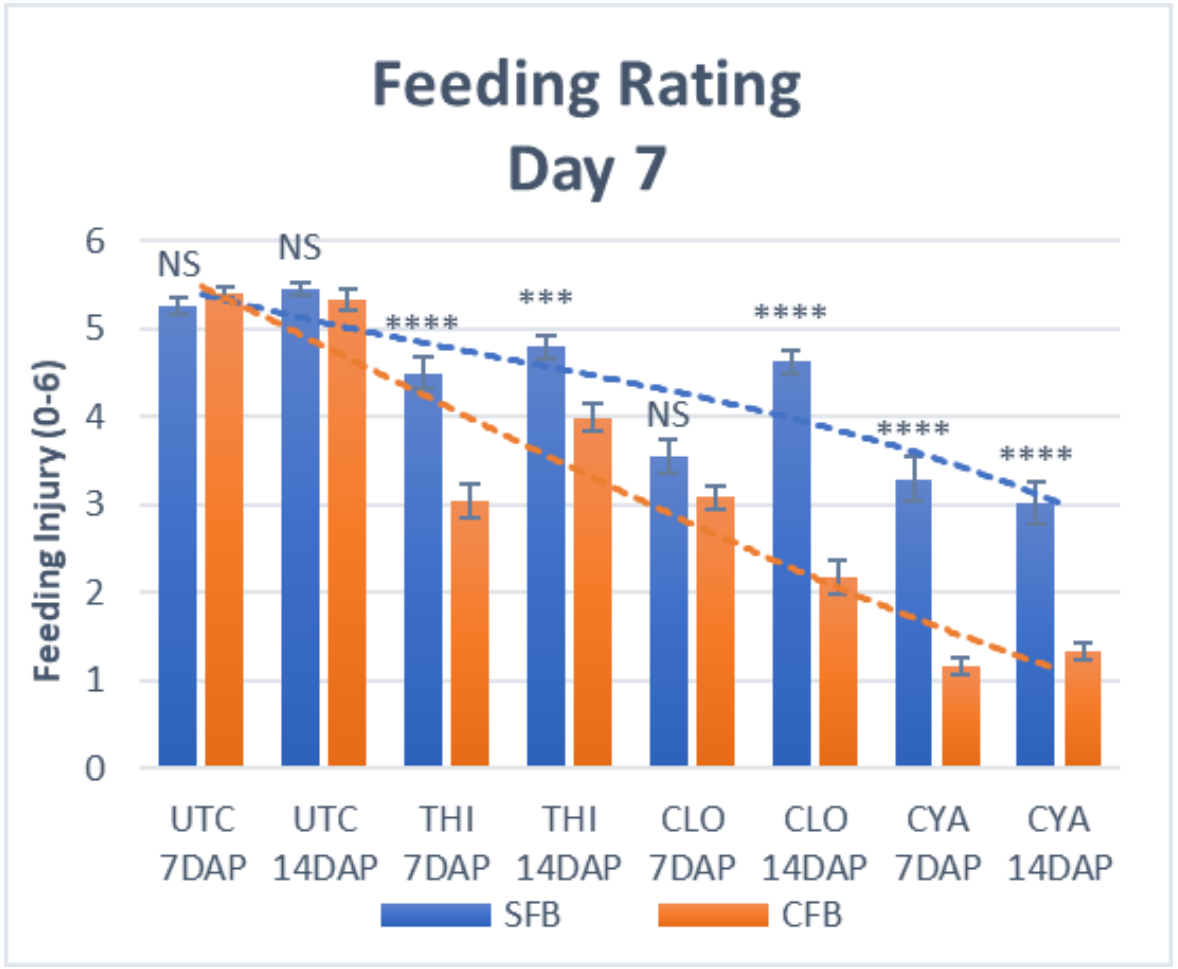
Bioassay for Insecticide Seed Treatments

- **Feeding injury score was rated on a 0-6 scale based on cotyledon pitting feeding injury (Knodel et al. 2008).**

0 = 0 pits
1 = 1-3 pits
2 = 4-9 pits
3 = 10-15 pits
4 = 16-25 pits
5 = >25 pits
6 = Plant death

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 $P \leq 0.0001$.

Conclusion

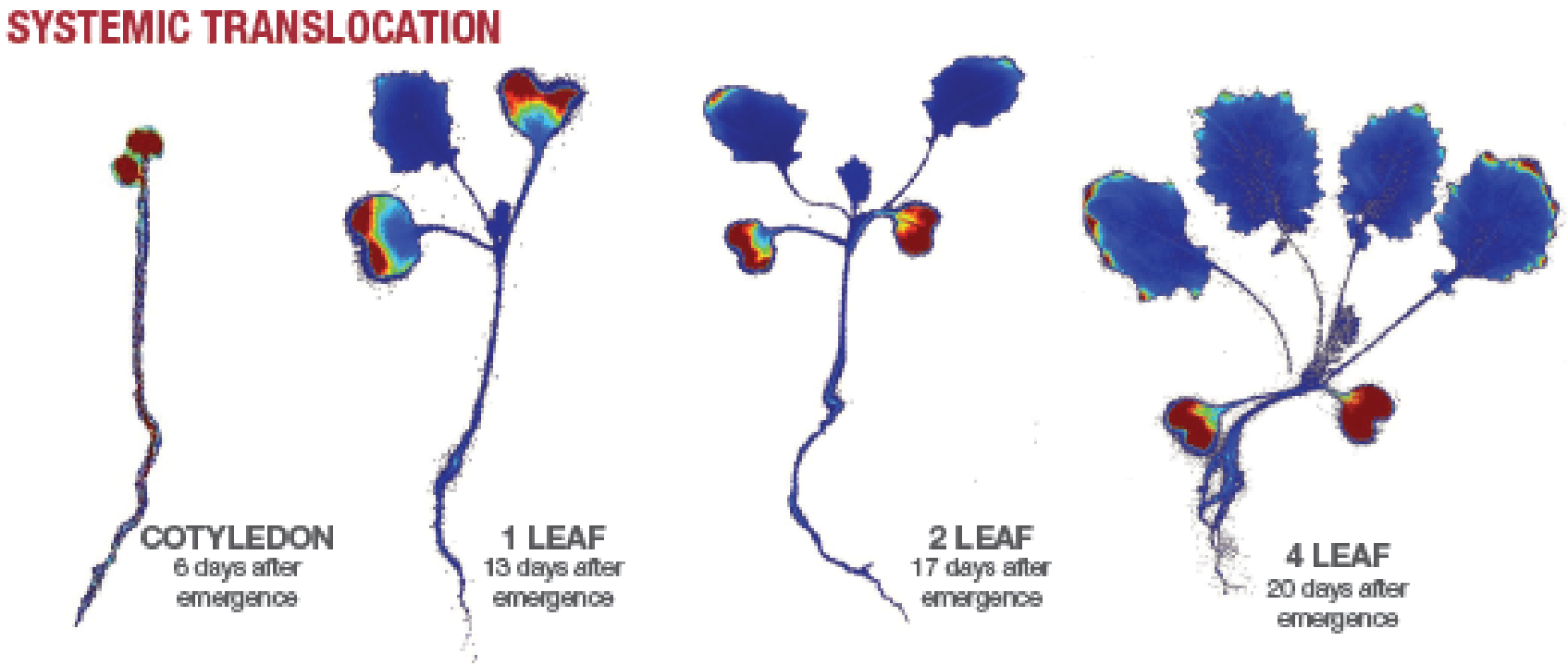
- Striped flea beetle (SFB) had **reduced susceptibility** compared to crucifer flea beetle (CFB)
  - Striped flea beetle had **decreased mortality** and **increased feeding injury**
  - Tansey et al. (2008) found similar response for THI and CLO between the two species of flea beetles in Canada
- Mortality on Observation Day 7

Flea Beetles

Treatment	Mortality	
	SFB	CFB
THI	38	84
CLO	55	76
CYA	37	95

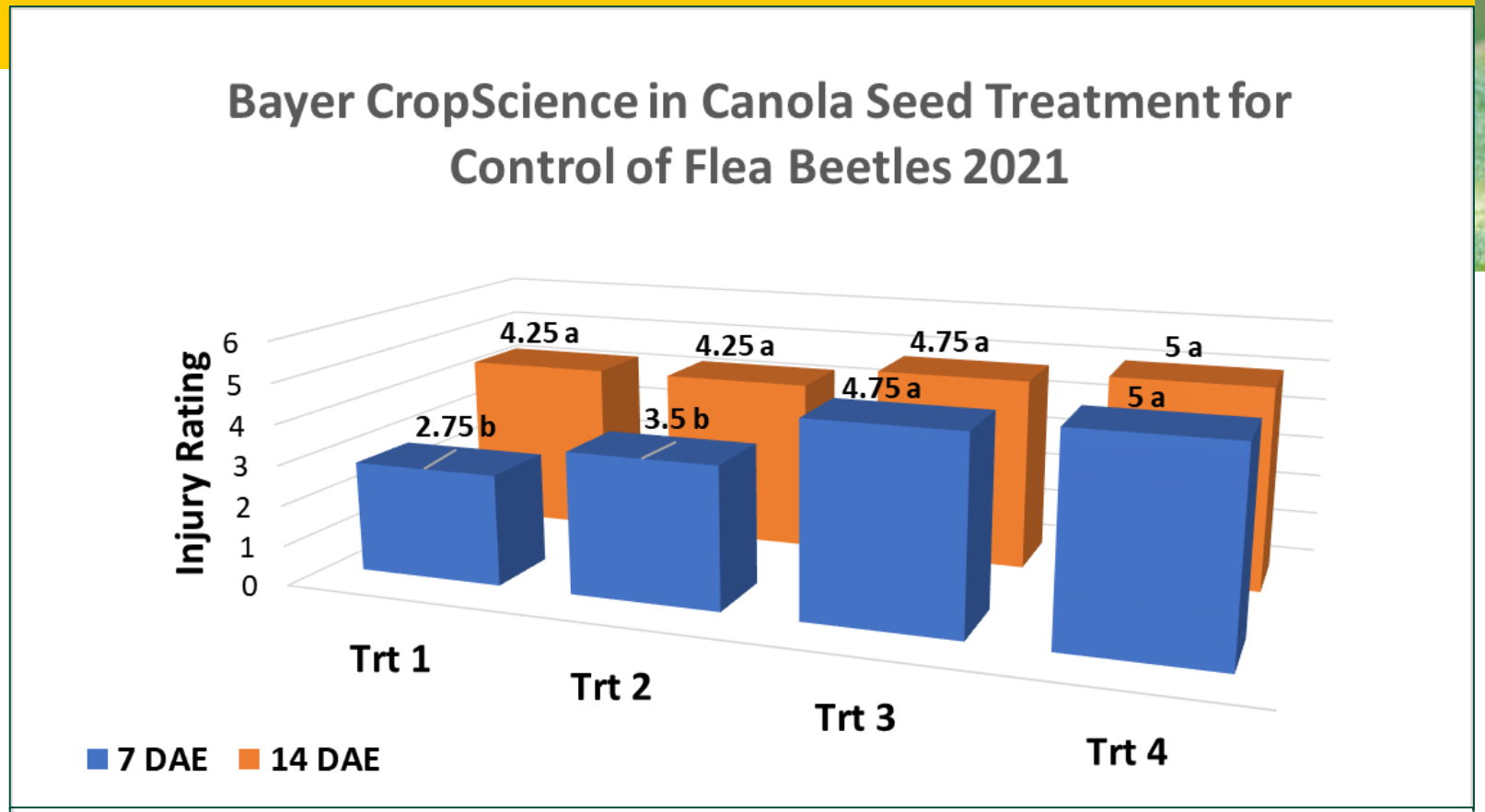
New Insecticide Seed Treatment - Canola

- Bayer Crop Sciences
- Buteo Start, AI – flupyradiforuone, Group 4D (Butenolides)
  - Flea beetles



Source: Bayer systemicity studies: Uptake and translocation of [14C]-flupyradifurone after seed treatment in oilseed rape. Red indicates higher concentration of active.

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

Injury Rating

0 = 0 pits
1 = 1-3 pits
2 = 4-9 pits
3 = 10-15 pits
4 = 16-25 pits
5 = >25 pits
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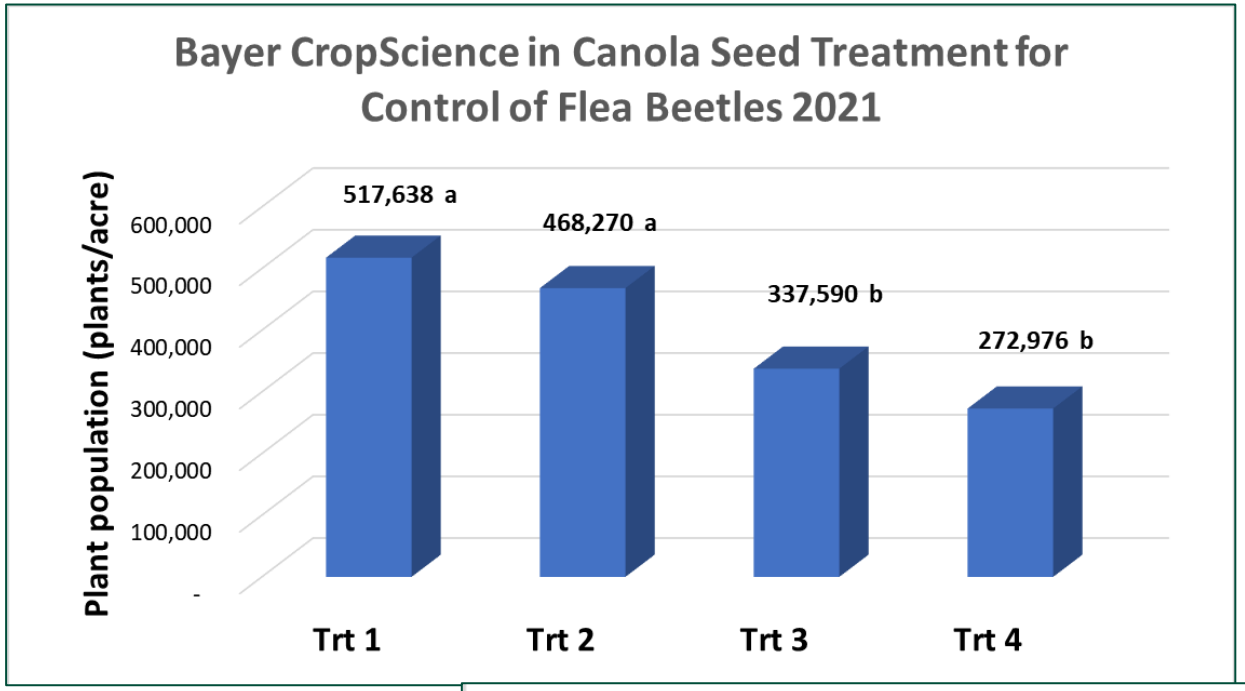
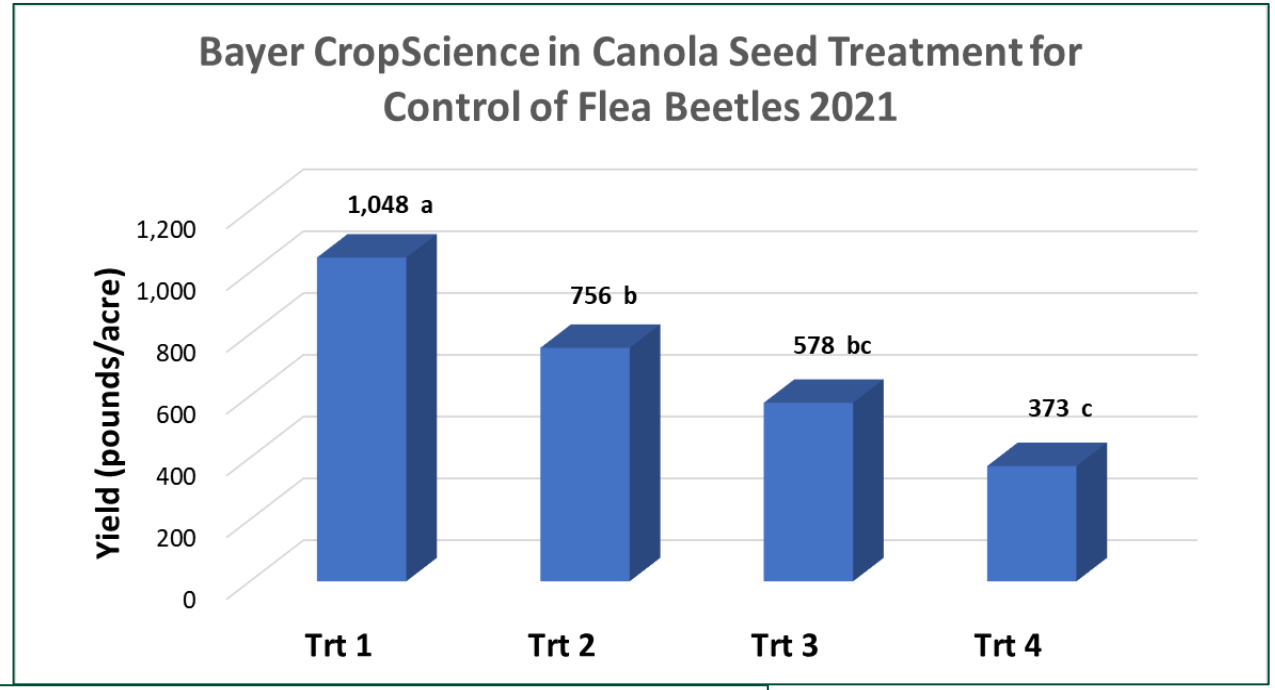
Field - Buteo Start Seed Treatment 2021





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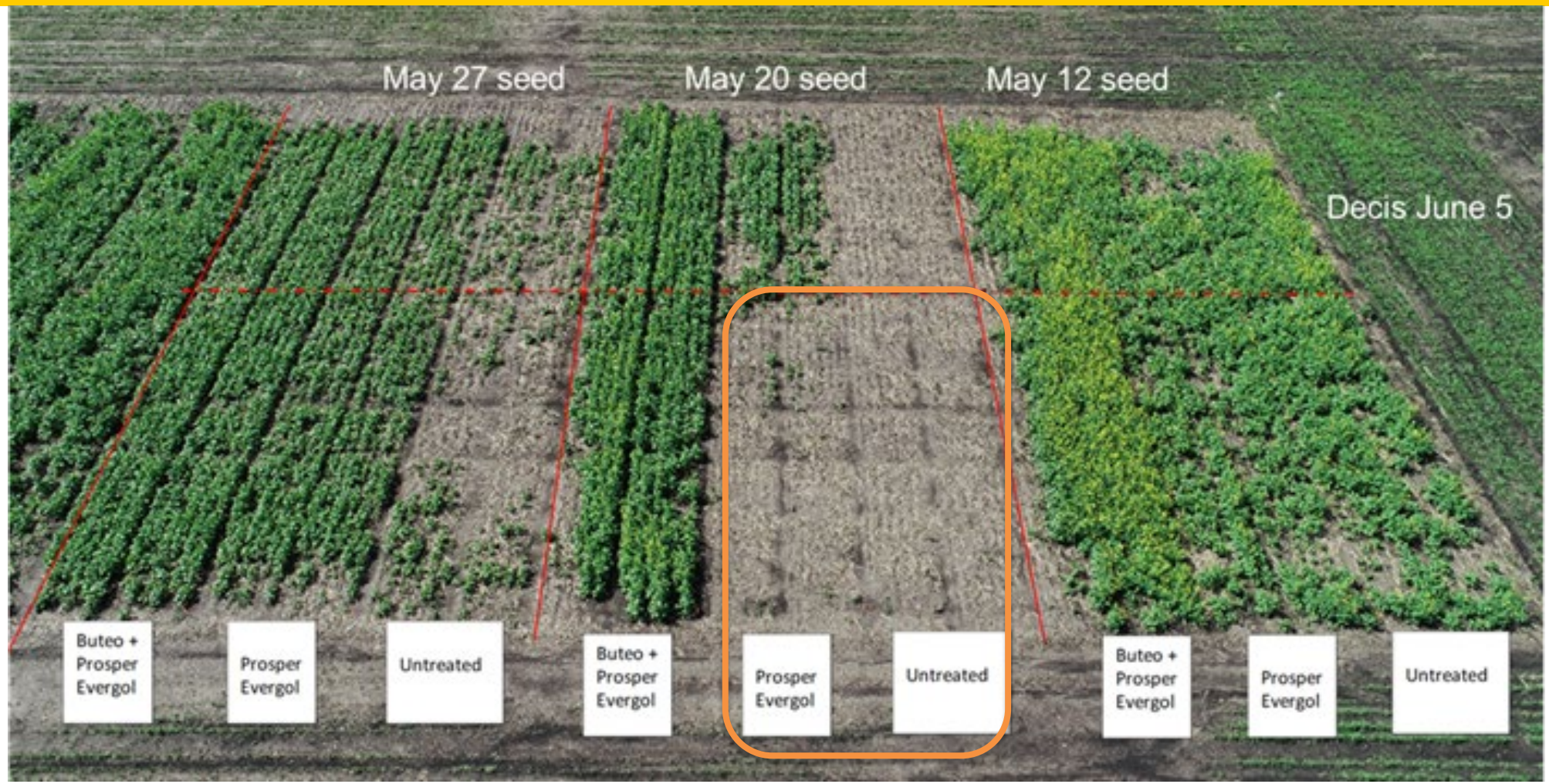
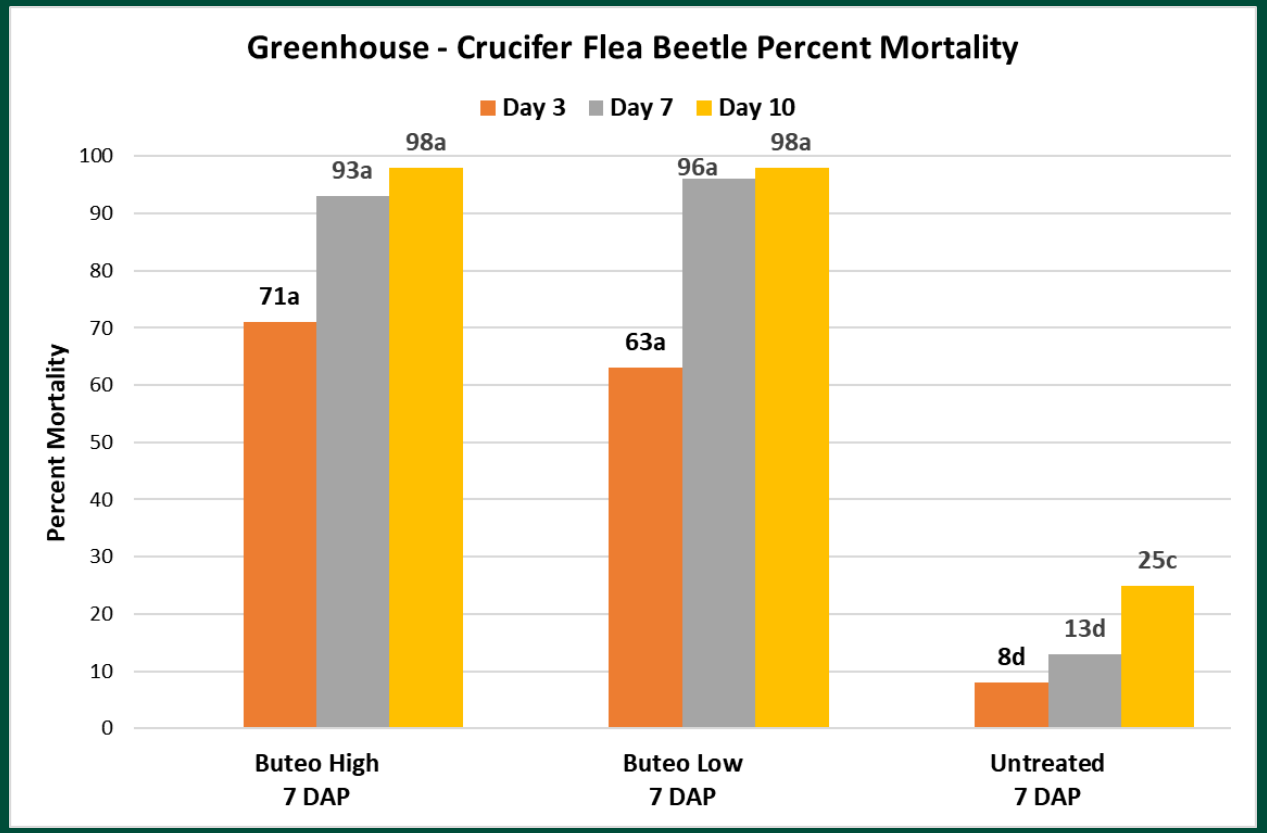
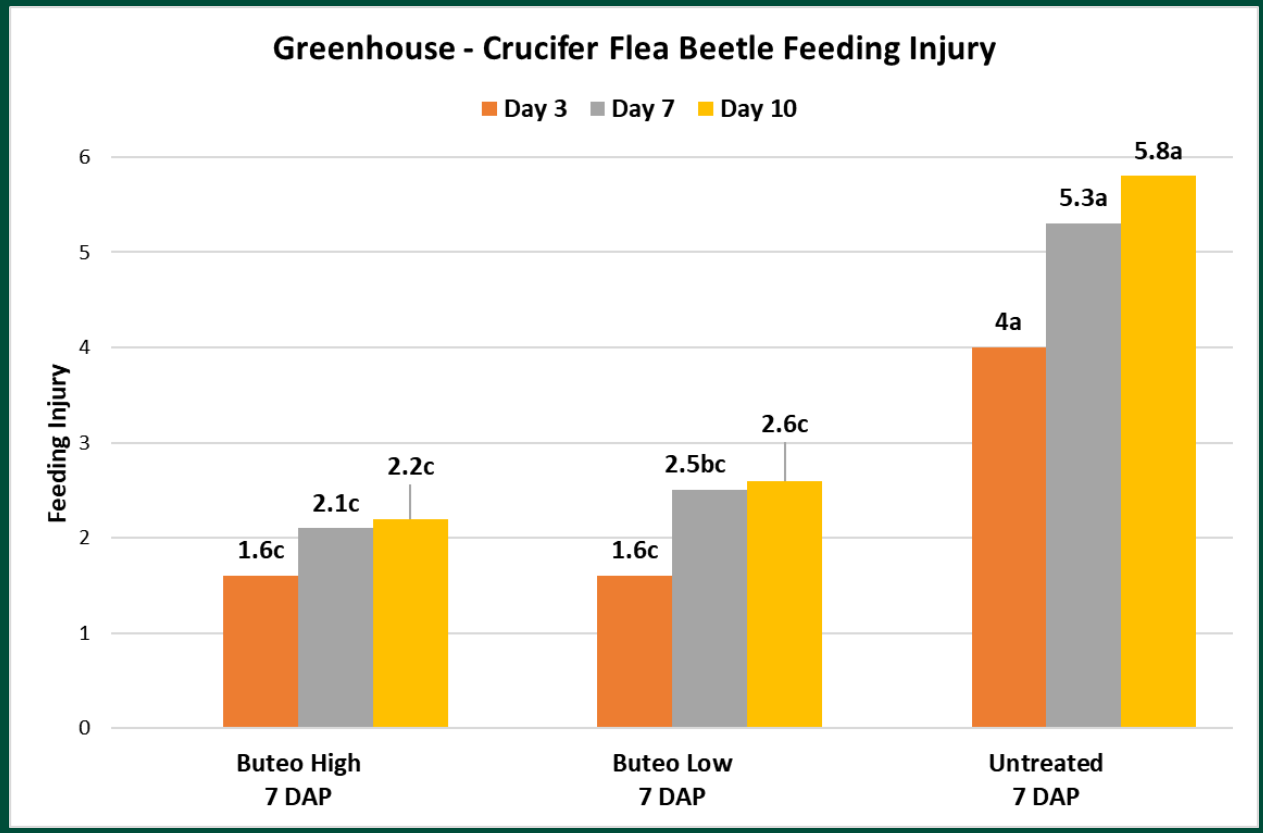
Buteo Start Field Plots - Canada



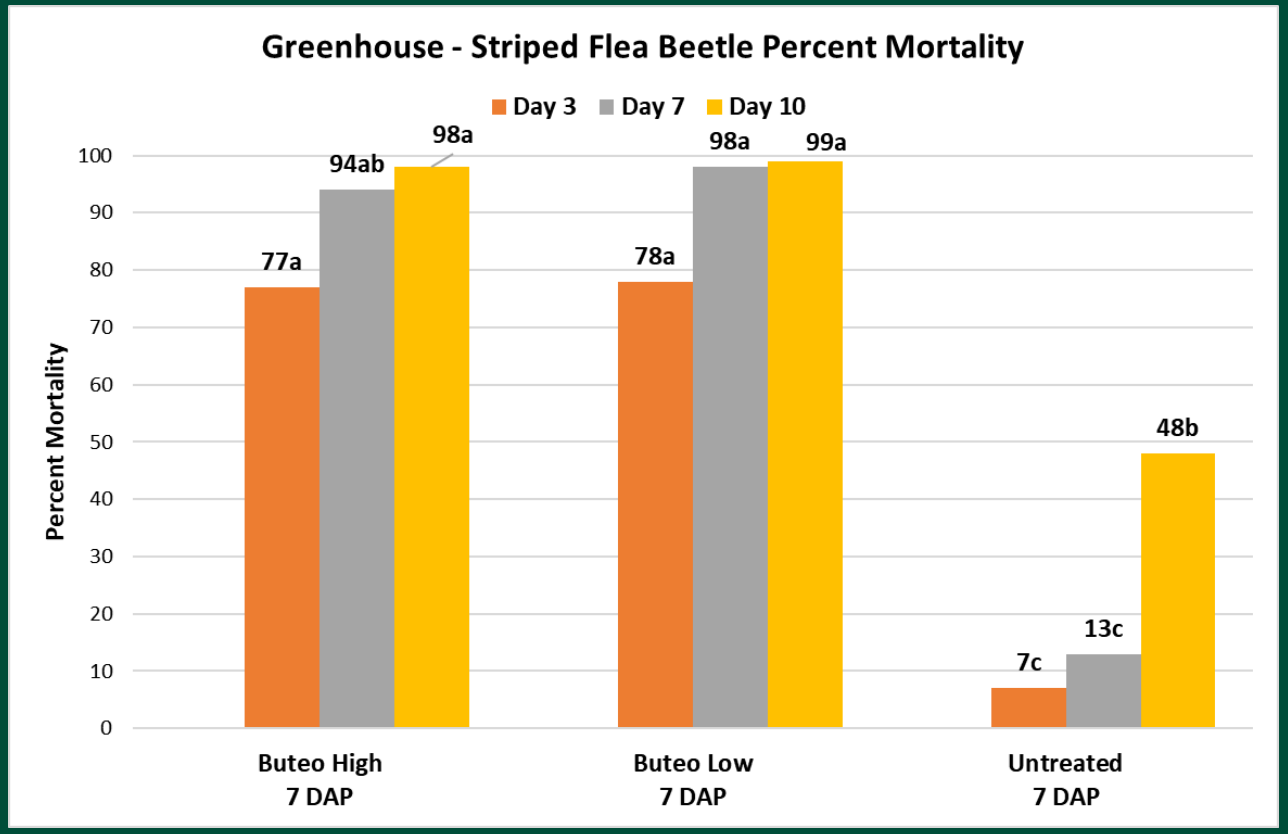
Greenhouse - Buteo Start Seed Treatment 2021

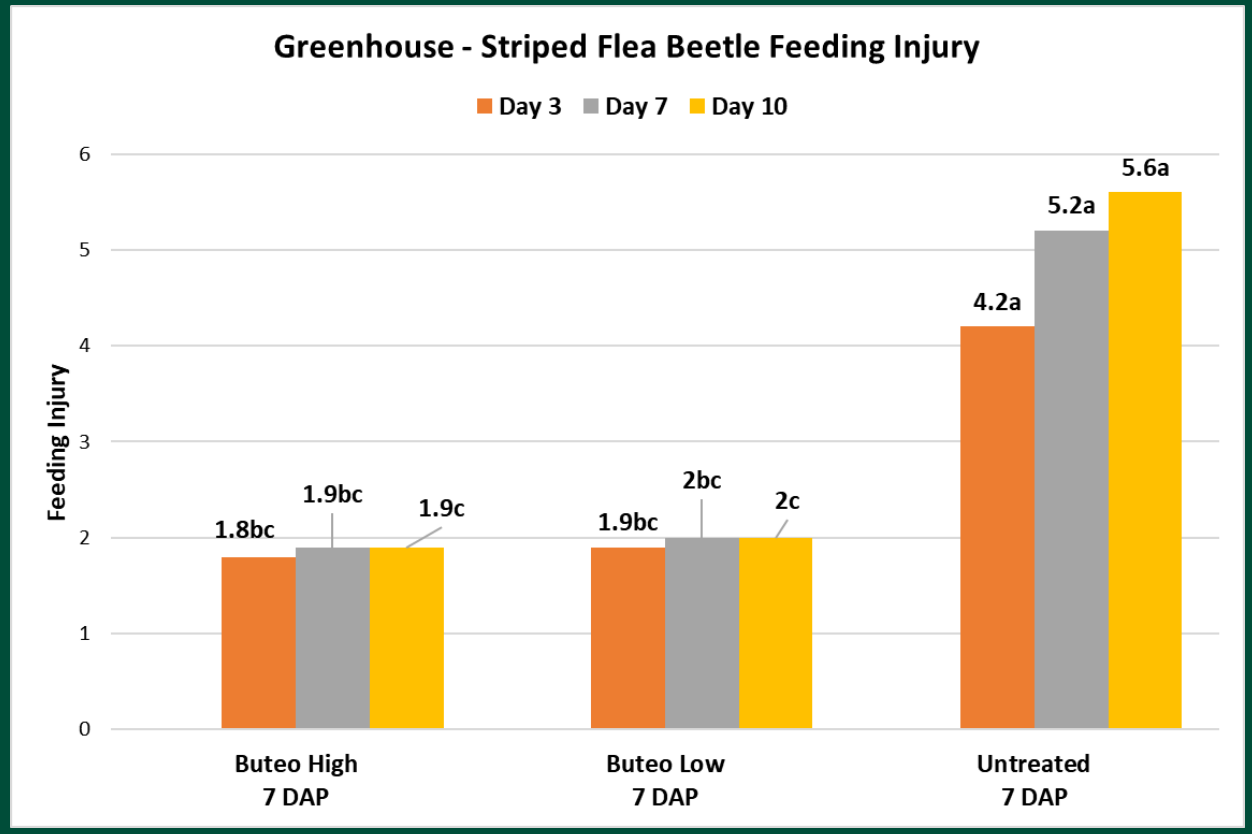




Treatment	Rate
Buteo Start (low rate)	9.6 fl oz/acre
Buteo Start (high rate)	16 fl oz/acre

Greenhouse - Buteo Start Seed Treatment 2021





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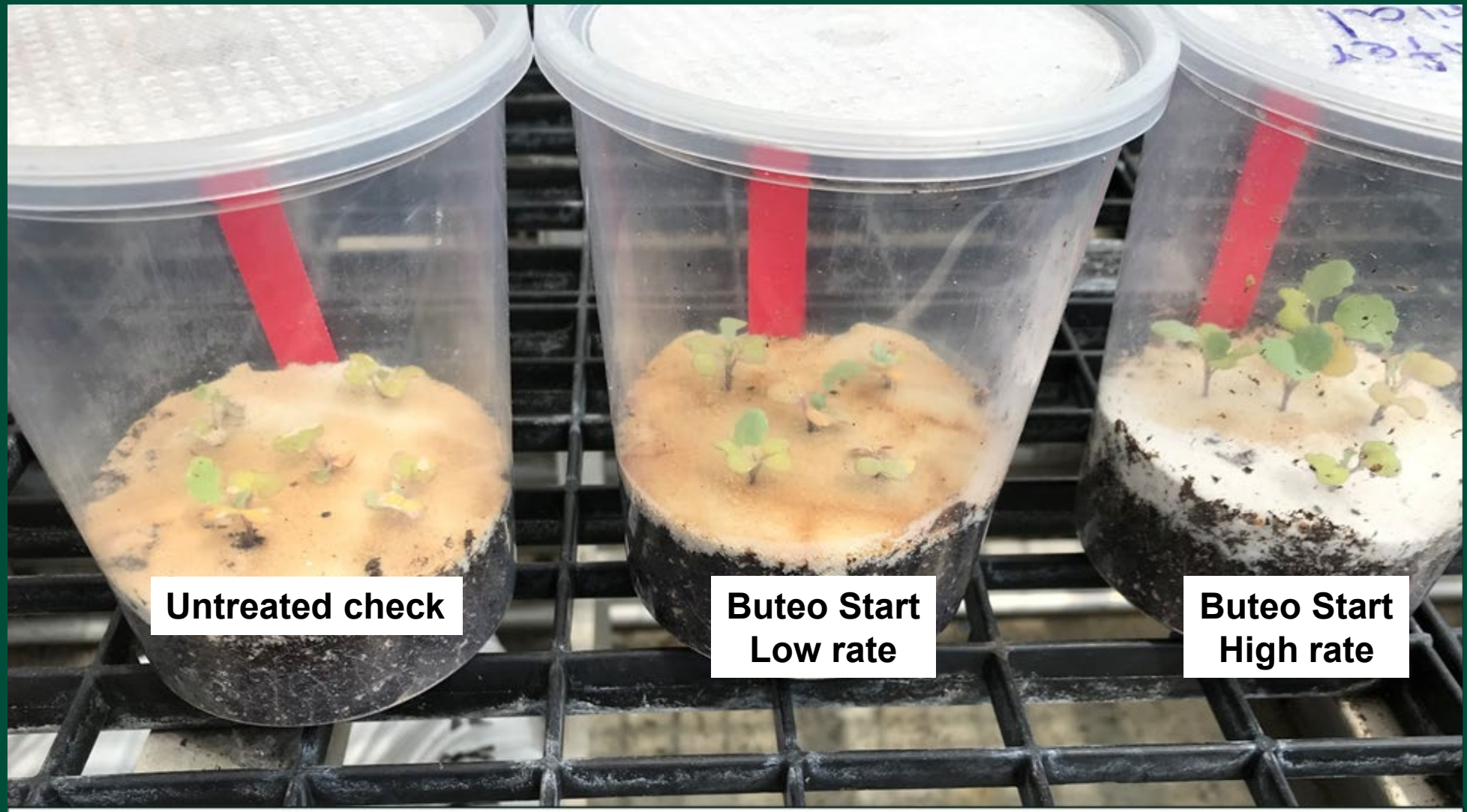


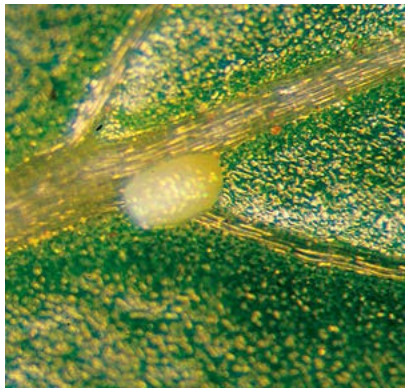
From left to right: Untreated check, Buteo Start low rate and Buteo Start high rate assessed at day 10 (7 DAP).

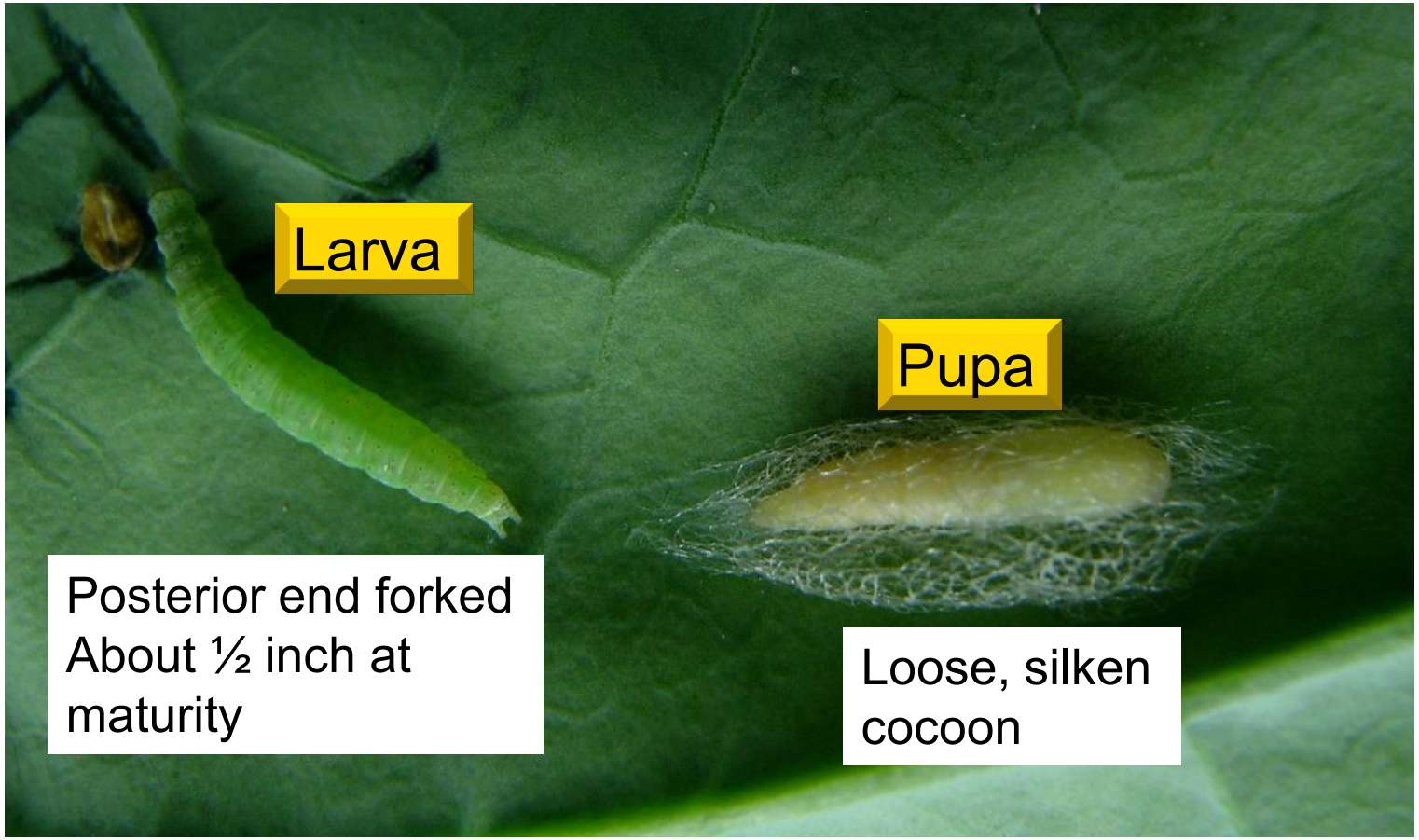
Diamondback Moth (*Plutella xylostella*)

Adult

½ inch long

Egg





Larva

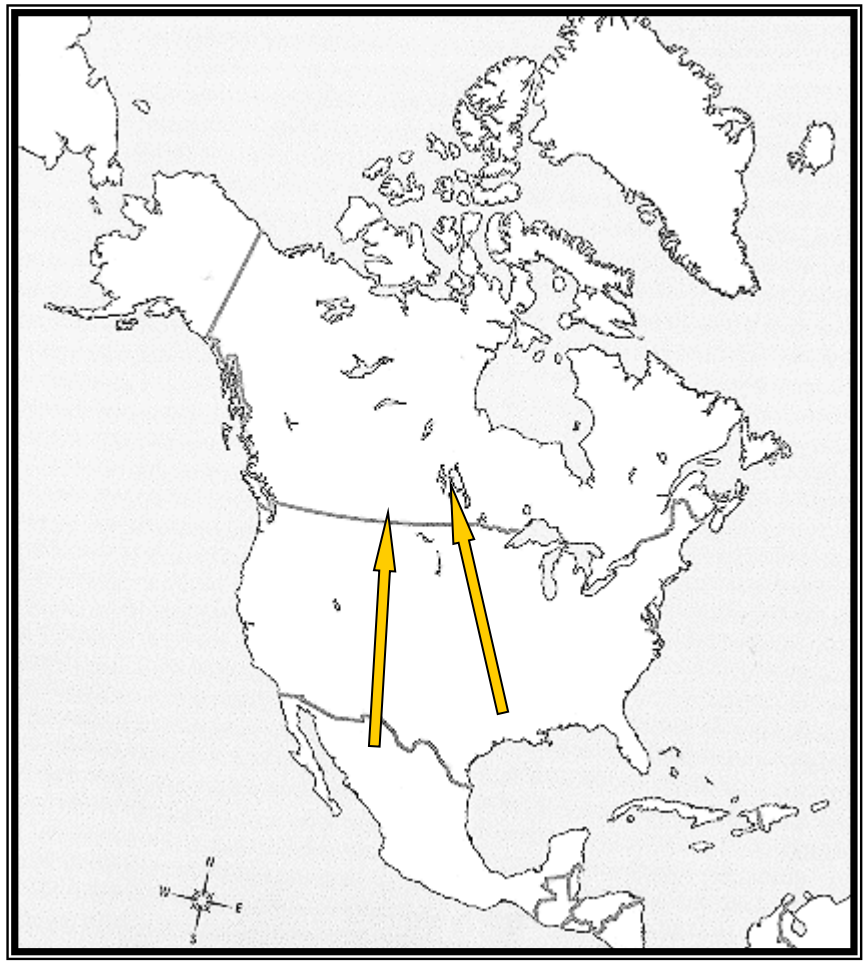
Pupa

Posterior end forked
About ½ inch at maturity

Loose, silken cocoon

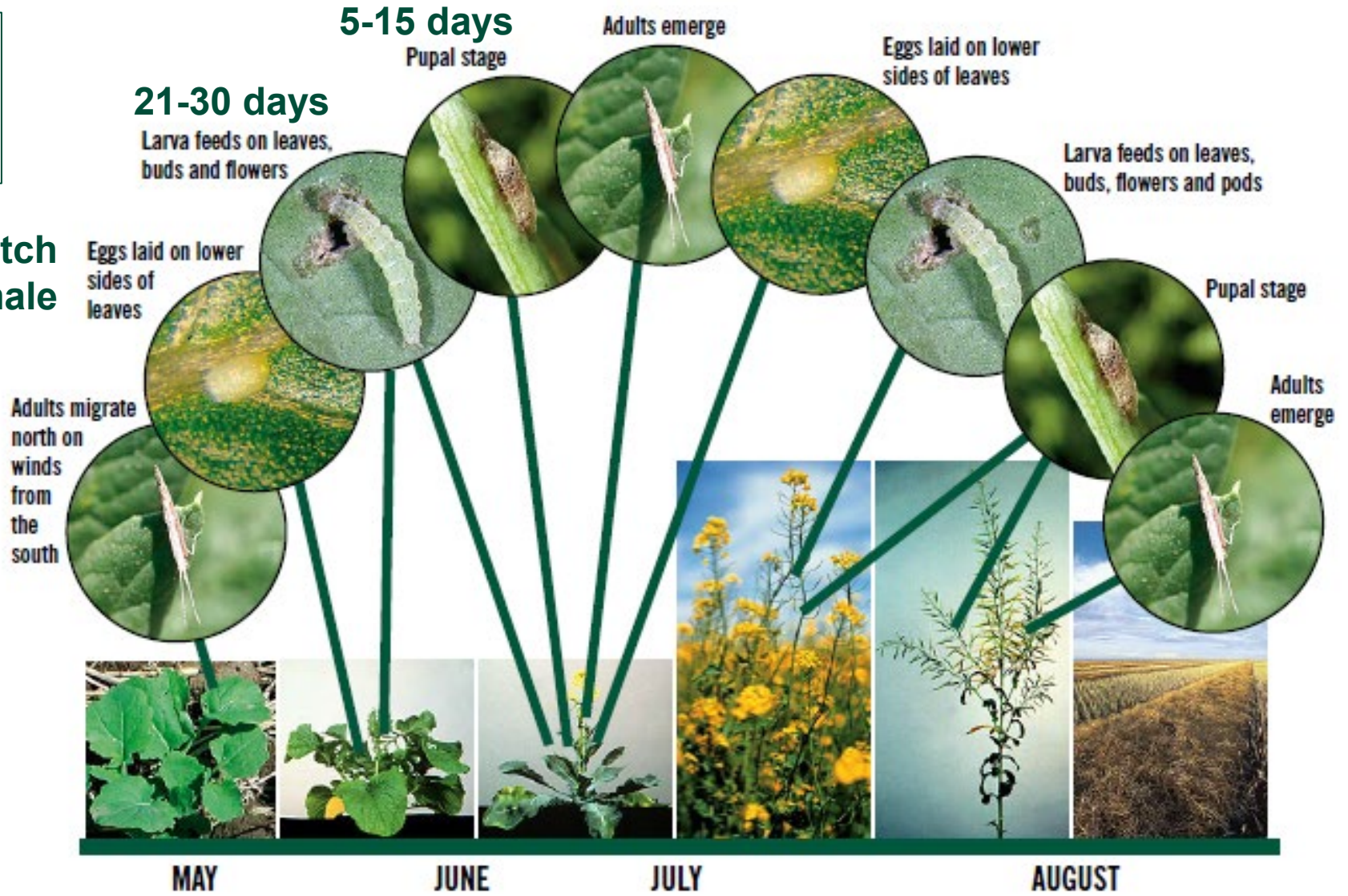
Using Air Flow Trajectories to Predict Infestations of Diamondback moth in Canola in Northern Great Plains

- **Migratory insect pest**
  - Do not overwinter in ND or MN or Canada
- Originate primarily from **southern U.S.A. or Mexico** when strong winds carry adults northward in spring
  - Dosdall et al. 2001



Diamondback Moth – Life Cycle

32 days for complete life cycle
2-3+ generations



Diamondback Moth – Crop Damage

- Larvae may feed on leaves, buds, flowers, seed pods and green outer layer of the stem
- Irregular shaped holes with membranes

Can Canola Compensate for Some Feeding?

- Canola can compensate well for feeding on **buds** and **flowers,** particularly if soil moisture is good.
- **Pod** feeding main concern, especially in dry weather (less leaf material), and larvae feed on pods earlier.

Trap Monitoring for Adult Diamondback Moths

Put traps in field in May - June

Appropriate Use of DBM Trap Data

- Appropriate use of the trap data.
  - Look for high numbers of adults >100 moths per trap per week, early in the season.
  - Advise farmers and agronomists to scout for DBM larvae
- Trap counts are not a substitute for regular field scouting, even if trap counts are low.

Field Scouting for Diamondback Moth Larvae

- Remove plants in an area measuring about 1 foot square
- Beat them on a clean surface
- Count the number of larvae that fall or dangle from the plants
- Repeat this procedure in at least five locations in the field
- Common to see all life stage in field

White bucket

Nominal Thresholds - Diamondback Moth on Canola

- **Seedling stage:**
  - >25% defoliation, larvae still present on plants
- **Immature to flowering plants**:
  - If larvae exceed 10-15 per ft^2 of plants
- **Plants with flowers and pods**:
  - If larvae exceed 20-30 per ft^2

Foliar Insecticide for DBM in Canola

- **Pyrethroids – Group 3A**
  - Bifenthrin (Helix XTra, Helix Vibrance)
  - Deltamethrin (Delta Gold)
  - Gamma-cyhalothrin (Declare)
  - Lambda-cyhalothrin (Warrior II, Silencer, Lambda-T, etc.)
  - Zeta-cypermethrin (Mustang Maxx)
- **Diamides – Group 28 (Lep pests)**
  - Chlorantraniliprole (Coragen, Prevathon)
  - Cyantraniliprole (Exirel) (Lep pest + flea beetle)
- **Bacteria**
  - *Bacillus thuringiensis* (DiPel DF, Xen Tari DF)
- **Premix** –Chlorantraniliprole 28 + lambda-cyhalothrin 3A (Besiege)
- **Premix** –Sulfoxaflor 4C + Bifenthrin 3A (Ridgeback) NEW!

Field Reports of Pyrethroid Failures against DBM

- Spray 2-3 times with low kill
- NE ND

Notify your Extension agent

Mortality Factor of Diamondback Moth

- **Rainfall** can be a major mortality factor of eggs and early growth stages (instars) of larvae
  - Harcourt. 1963. Memoirs of the Ent. Soc. Canada. 55-66.
  - Kobori and Amano. 2003. Applied Entomology and Zoology. 249-253.

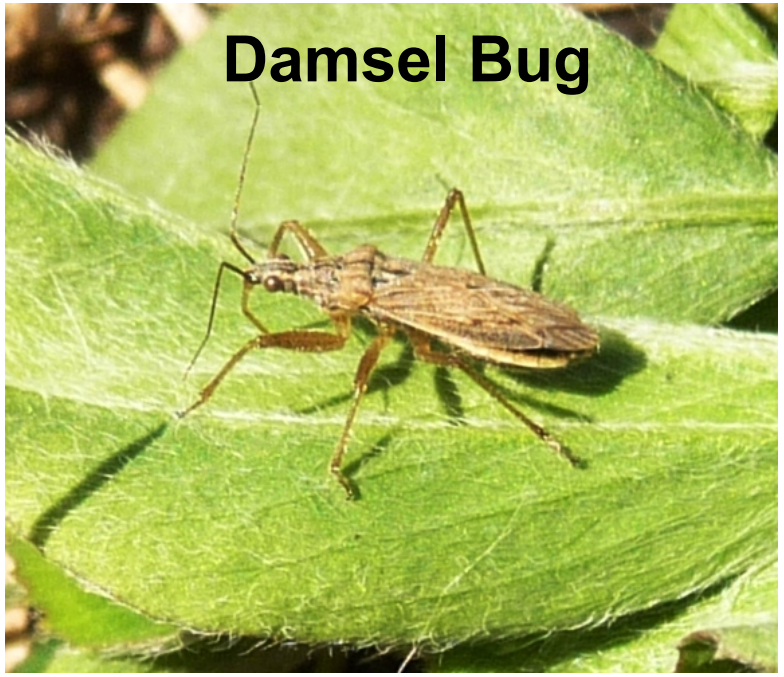
- **Predators, parasitoids and pathogens**

Natural Enemies of Diamondback Moth

Parasitoids

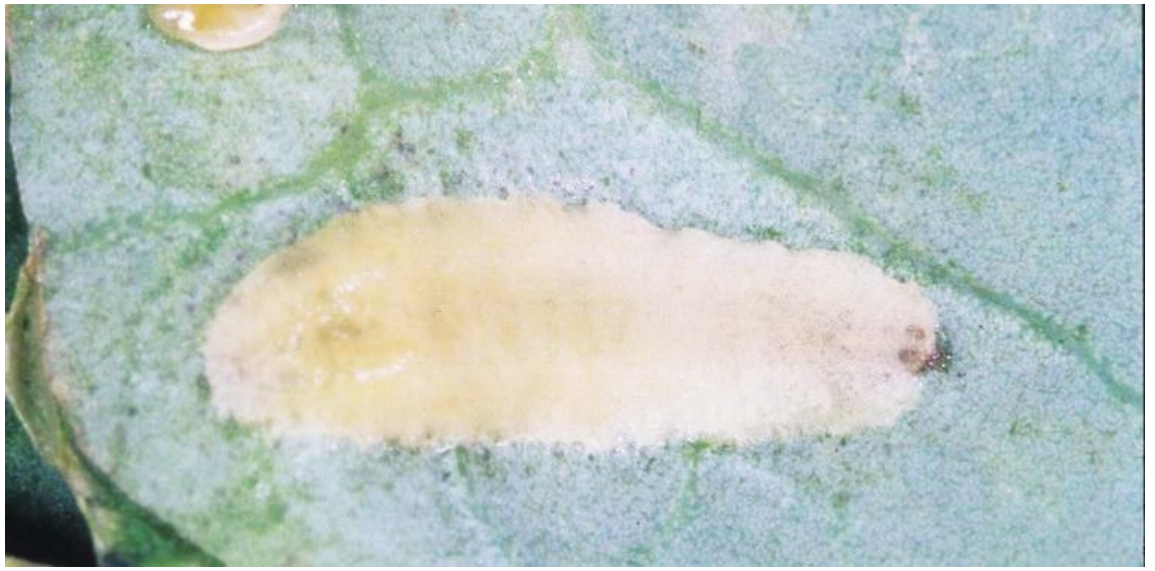
Photo courtesy of Lloyd Dosdall, University of Alberta

Predators

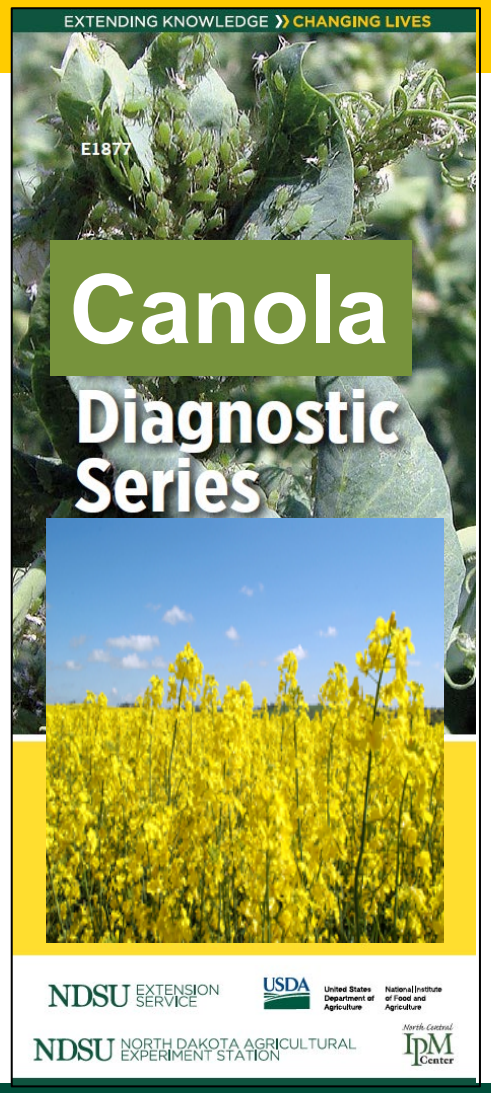


Natural Enemies of Diamondback Moth

- Disease pathogen, ***Zoopthora***, especially if environmental conditions are humid and moist.



Canola Insect & Disease Diagnostic Series



Introduction

General Scouting & Calendar

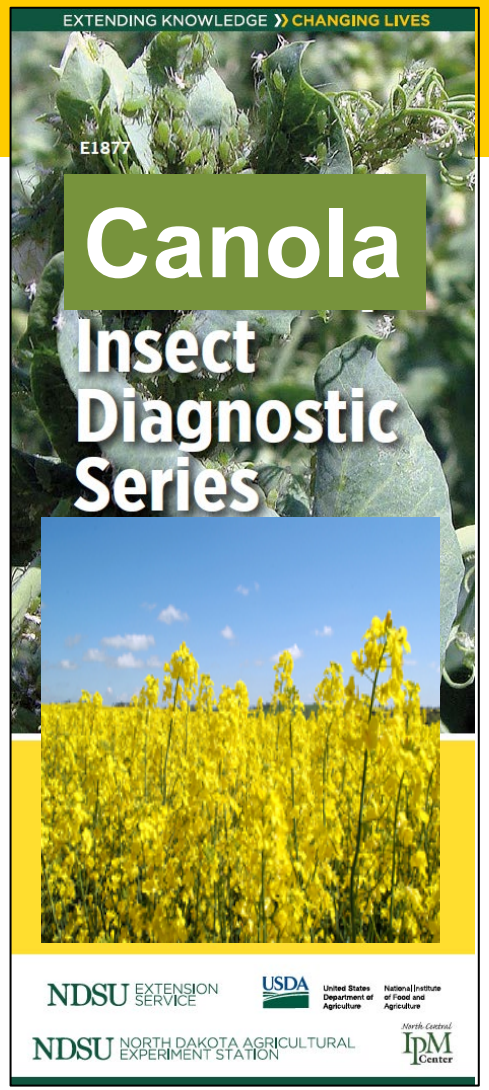
Root and Surface Feeders

- Wireworms
- Cabbage root maggots
- Cutworms

NEW!

Foliage and Seed feeders

- Flea beetles
- Grasshoppers
- Aster leafhoppers
- Bertha armyworms
- Lygus bugs
- Cabbage seed pod weevils



Sap Feeders

- Turnip aphids, cabbage aphids and other aphid species

New Insect Pests of Canola

- Canola flower midge
- Invasive Swede midge

Biological Control – Natural Enemies

- Predators
  - Lady beetles
  - Lacewings
  - Orius bug and other true bugs
  - Syrphid fly larva
  - Ground beetles (Carabidae)
- Parasitoids
  - Parasitic wasps
  - Tachinid flies
- Beneficial entomopathogens (fungi ,bacteria, viruses)

Pollinators

Dr. Janet Knodel
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THANK YOU

Any Questions

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EXTENDING KNOWLEDGE » CHANGING LIVES

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