

Canola: Best Pest Management of Flea Beetles

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NDSU

EXTENSION

Minnesota Canola Council
Canola Symposium 2023
November 30, 2023



Striped flea beetle
Phyllotreta striolata

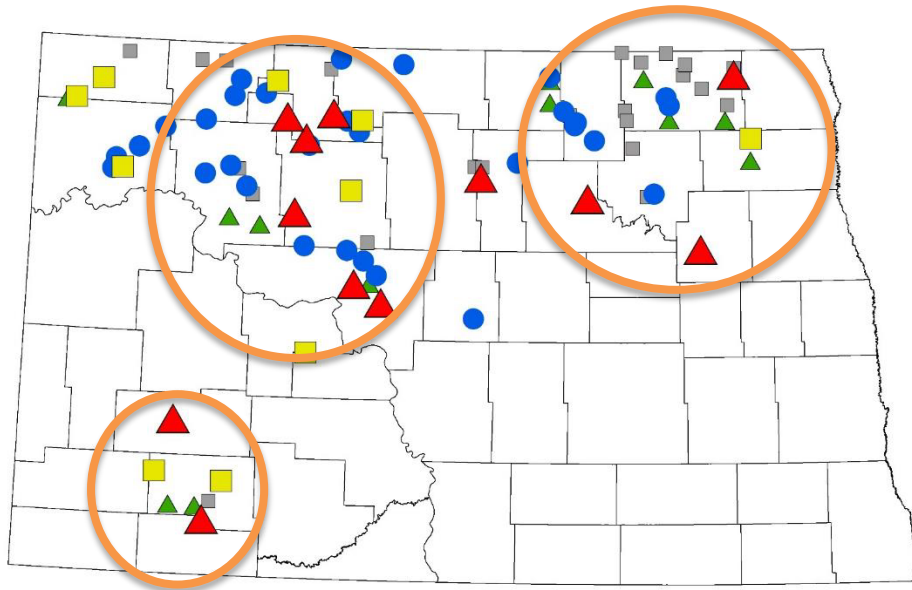


Crucifer flea beetle
Phyllotreta cruciferae





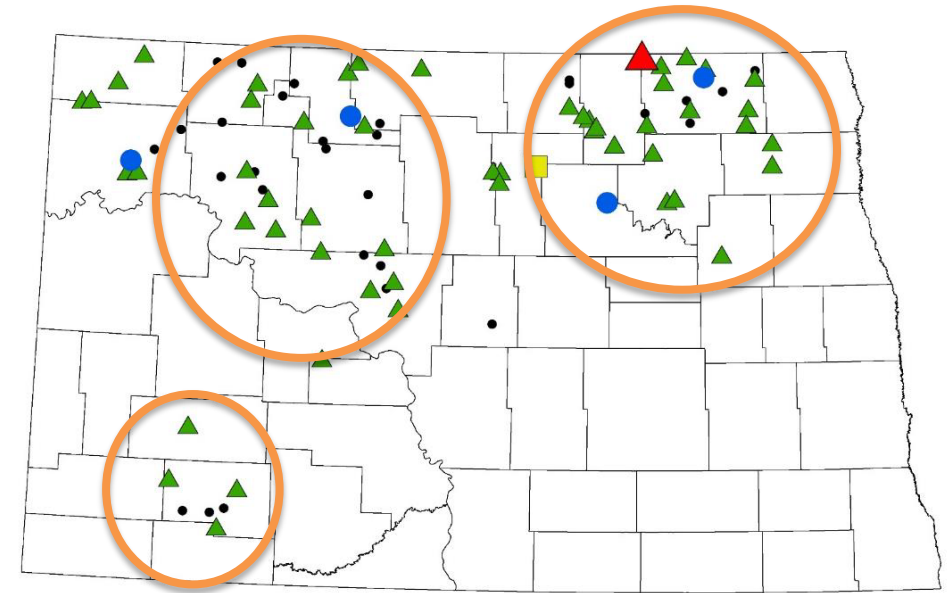
2018 Canola Flea Beetle Survey Crucifer Flea Beetle (*Phyllotreta cruciferae*)



Total number of Flea Beetles Collected per 100 Sweeps



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

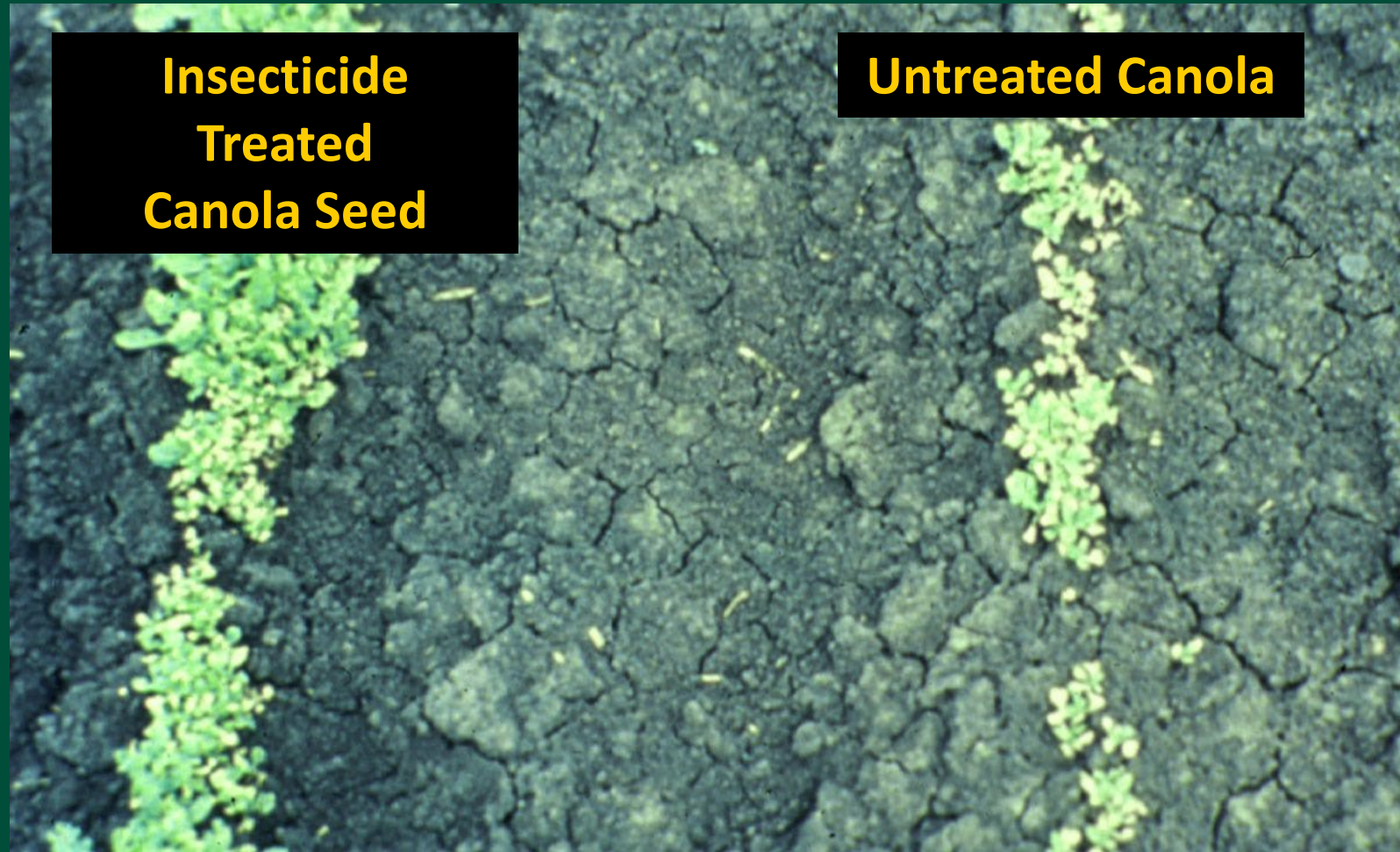


Total number of Flea Beetles Collected per 100 Sweeps



Crop Damage

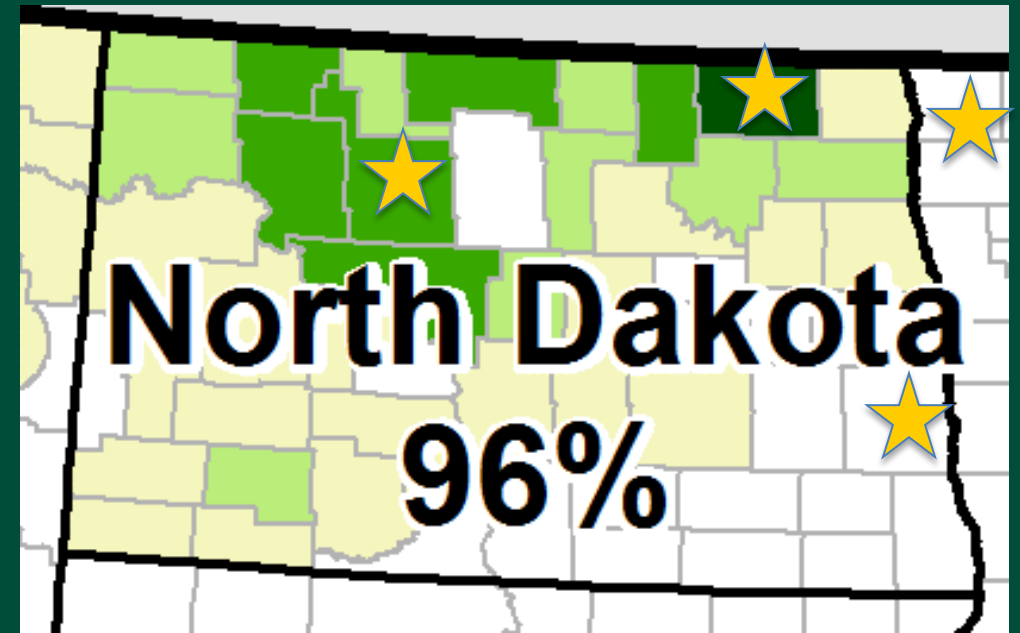
- Reduced crop stand
- Reduced plant growth
- Delayed maturity
- Yield loss



Putnam 1977, Lamb and Turnock 1982, Lamb 1984

Objectives

✓ Determine field efficacy of current insecticide seed treatments and foliar insecticides for control of spring populations of *Phyllotreta spp.* in different canola producing areas.



Canola growing regions (USDA NASS)



Canola

Insecticide Recommendations

Registered Insecticides – 2023-2024

Seed Treatment Insecticides

Neonicotinoid (Group 4A):

thiamethoxam - Helix Vibrance

clothianidin - NipsIt INSIDE, Prosper EverGol

imidacloprid - Attendant 480FS, Dyna-Shield

Imidacloprid 5, Gaucho 600, Senator 600 FS

Diamides (Group 28):

cyantraniliprole - Fortenza, Lumiderm

Butenolides (Group 4D):

Flupyradifurone – Buteo Start

*Always Read and
Follow Labels.*

2023 Treatments – Seed Treatments

1. Fungicide Check (Vibrance)
2. Helix Vibrance at 23 fl oz/cwt*
3. Helix Vibrance at 23 fl oz/cwt + Fortenza at 10.2 fl oz/cwt*
4. Helix Vibrance at 23 fl oz/cwt + Fortenza at 10.2 fl oz/cwt + **Brigade at 2.6 fl oz/acre***
5. Prosper Evergol at 21.5 fl oz/cwt*
6. Prosper Evergol at 21.5 fl oz/cwt + Lumiderm at 9.8 fl oz/cwt*
7. Prosper Evergol at 21.5 fl oz/cwt + Lumiderm at 9.8 fl oz/cwt + **Brigade at 2.6 fl oz/acre***
8. Prosper Evergol at 21.5 fl oz/cwt + Buteo Start at 9.6 fl oz/cwt*
9. Prosper Evergol at 21.5 fl oz/cwt + Buteo Start at 9.6 fl oz/cwt + **Brigade at 2.6 fl oz/acre***

Insecticide Active Ingredients

Product	Chemical Class (IRAC)	Active Ingredient	Commercial Rate	AI Rate (metric)
Helix Vibrance	Neonicotinoid (4A)	Thiamethoxam	23 fl oz per cwt	404 g ai per 100 kg
Prosper Evergol	Neonicotinoid (4A)	Clothianidin	21.5 fl oz per cwt	406 g ai per 100 kg

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Lumiderm	Diamide (28)	Cyantraniliprole	9.8 fl oz per cwt	400 g ai per 100 kg
Fortenza	Diamide (28)	Cyantraniliprole	10.2 fl oz per cwt*	400 g ai per 100 kg
Buteo Start	Butenolide (4D)	Flupyradifurone	9.6 fl oz per cwt	300 g ai per 100 kg

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Buteo Start	Butenolide (4D)	Flupyradifurone	9.6 fl oz per cwt	300 g ai per 100 kg
Brigade 2EC Foliar insecticide	Pyrethroid (3A)	Bifenthrin	2.6 fl oz per acre	18.4 g ai per acre

Flea Beetle Population & Injury Rating

- Mix of striped flea beetles and crucifer flea beetles*
- Feeding injury rating assessed at 3, 7, 10 and **14 DAE**
- 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

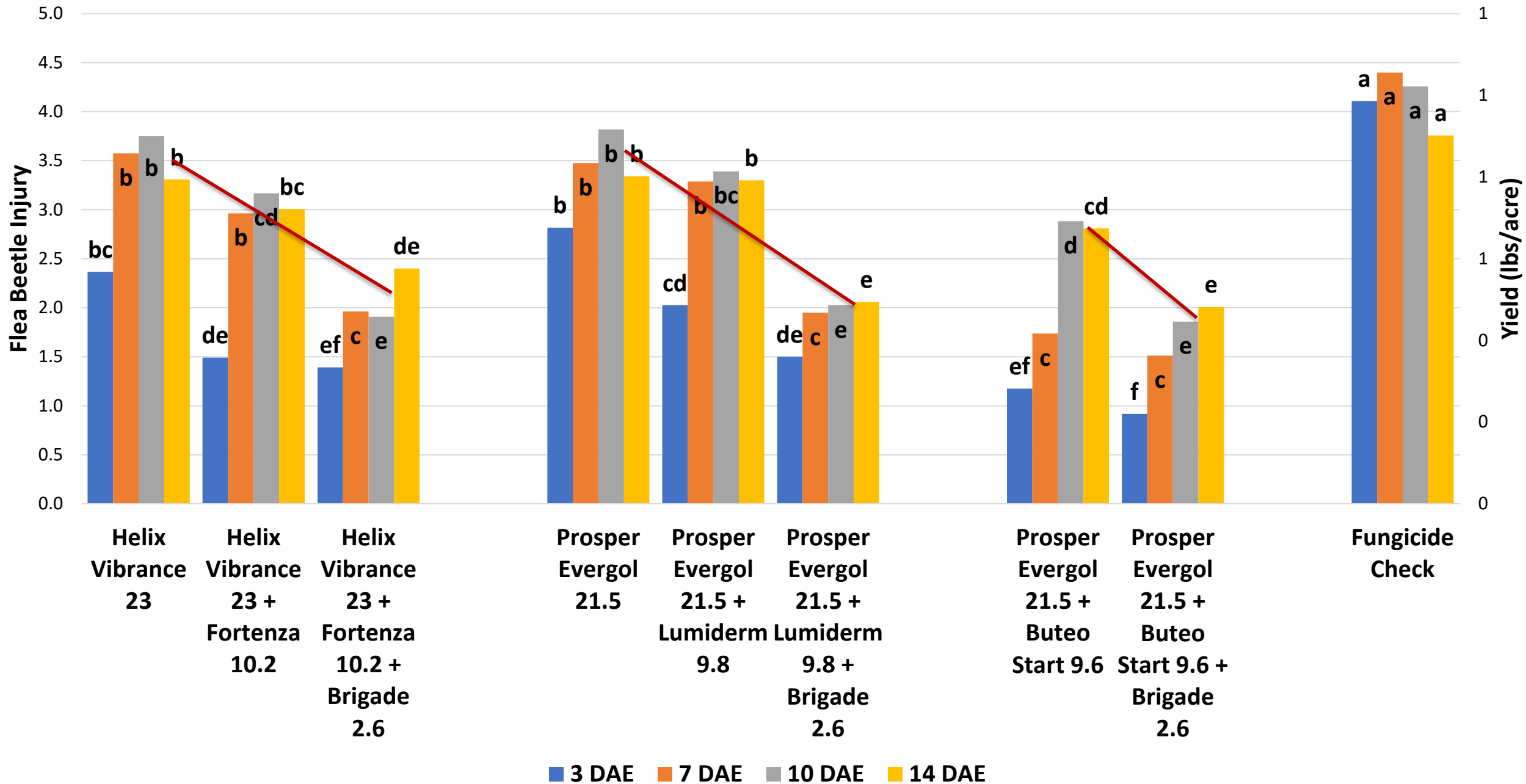
5 = >25 pits

6 = Plant death

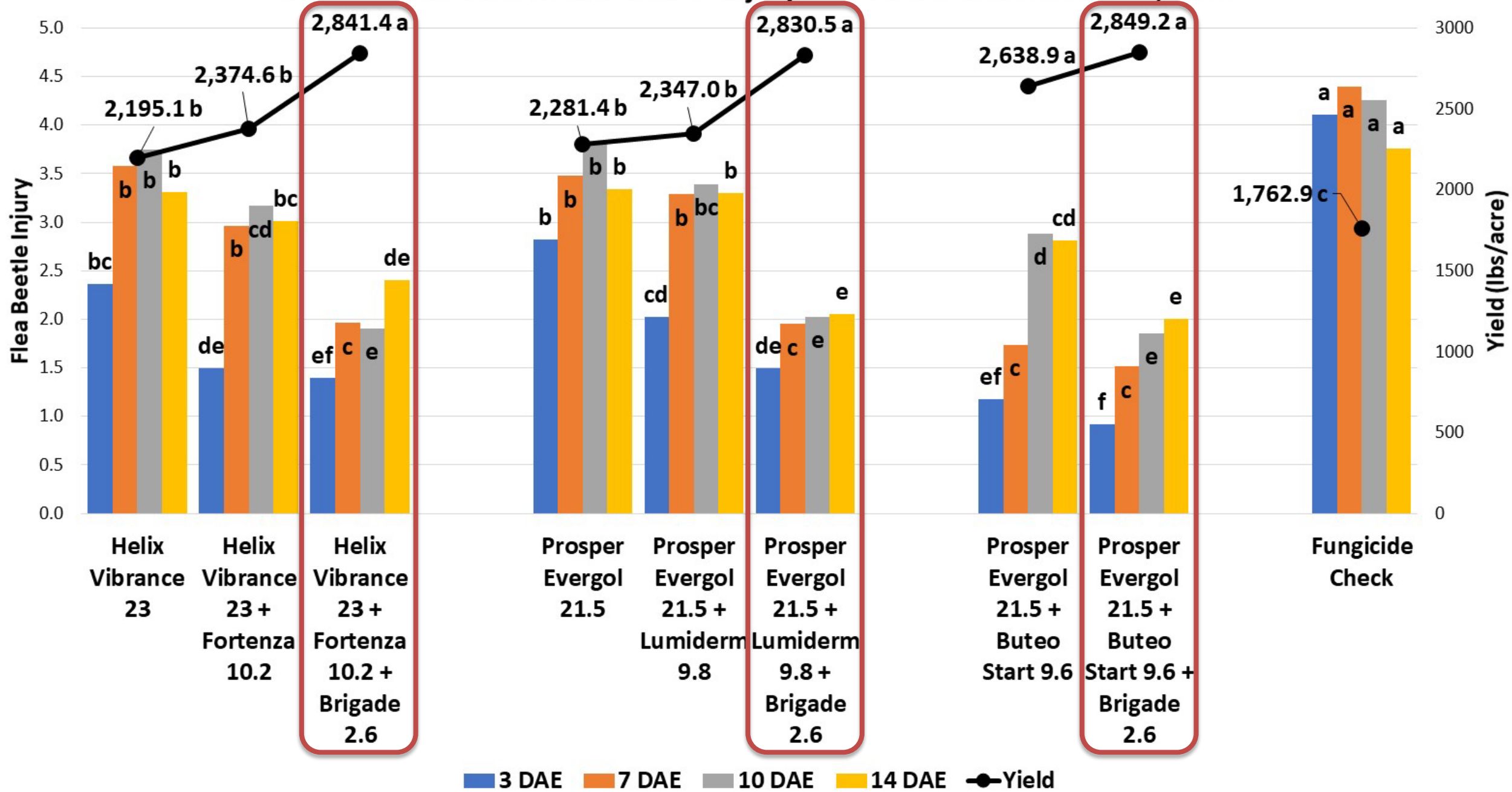


RESULTS

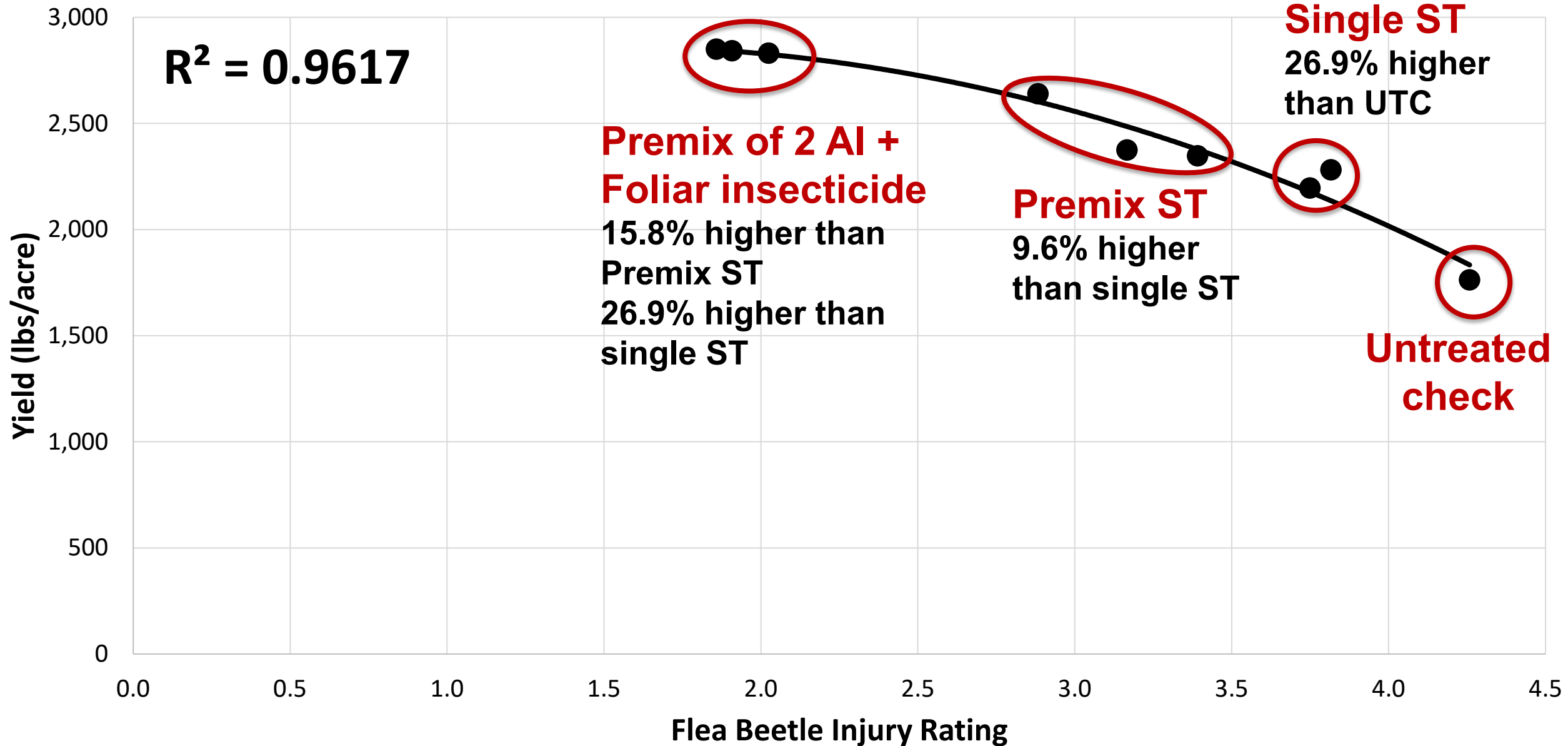
Treatment Means for Flea Beetle Injury and Yield Across Locations, 2023



Treatment Means for Flea Beetle Injury and Yield Across Locations, 2023



Correlation Between Flea Beetle Injury and Yield at 10 Days After Emergence



14 DAE



Untreated check (fungicide only)



Prosper Evergol

14 DAE



Prosper Evergol + Lumiderm



Prosper Evergol + Buteo Start

14 DAE



**Prosper Evergol +
Lumiderm + Brigade**



**Prosper Evergol + Buteo
Start + Brigade**

\$ Economics \$

Treatment	Market Value (USD/cwt)	Yield (lbs/acre)	Crop Value (USD/acre)
Check	\$ 28.10	1762.9	\$ 495.37
Helix Vibrance	\$ 28.10	2195.1	\$ 616.82
Helix Vibrance + Fortenza	\$ 28.10	2374.6	\$ 667.26
Helix Vibrance + Fortenza + Bifenthrin	\$ 28.10	2841.4	\$ 798.43
Prosper Evergol	\$ 28.10	2281.4	\$ 641.07
Prosper Evergol + Lumiderm	\$ 28.10	2347	\$ 659.51
Prosper Evergol + Lumiderm + Bifenthrin	\$ 28.10	2830.5	\$ 795.37
Prosper Evergol + Buteo Start	\$ 28.10	2638.9	\$ 741.53
Prosper Evergol + Buteo Start + Bifenthrin	\$ 28.10	2849.2	\$ 800.63
Bifenthrin Only	\$ 28.10	2461.1	\$ 691.57
Bifenthrin Only x 2	\$ 28.10	2636.5	\$ 740.86

\$ Economics \$

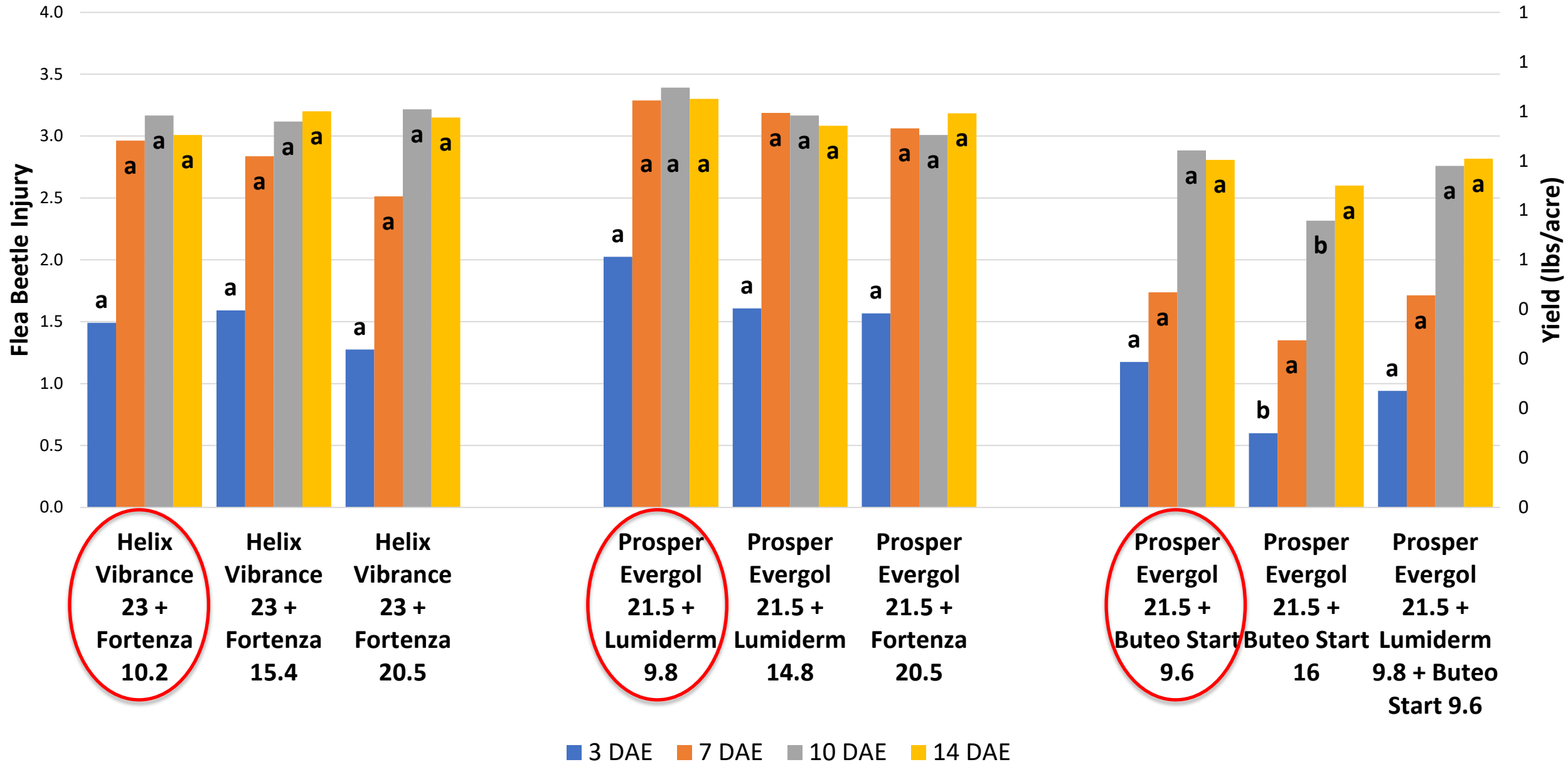
Treatment	Market Value (USD/cwt)	Yield (lbs/acre)	Crop Value (USD/acre)	ST Cost (USD/acre)	Foliar Cost (USD/acre)	Total Cost (USD/acre)
Check	\$ 28.10	1762.9	\$ 495.37	\$ -	\$ -	\$ -
Helix Vibrance	\$ 28.10	2195.1	\$ 616.82	\$ 8.00	\$ -	\$ 8.00
Helix Vibrance + Fortenza	\$ 28.10	2374.6	\$ 667.26	\$ 16.00	\$ -	\$ 16.00
Helix Vibrance + Fortenza + Bifenthrin	\$ 28.10	2841.4	\$ 798.43	\$ 16.00	\$ 11.12	\$ 27.12
Prosper Evergol	\$ 28.10	2281.4	\$ 641.07	\$ 8.00	\$ -	\$ 8.00
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Bifenthrin Only	\$ 28.10	2461.1	\$ 691.57	\$ -	\$ 11.12	\$ 11.12
Bifenthrin Only x 2	\$ 28.10	2636.5	\$ 740.86	\$ -	\$ 22.24	\$ 22.24

\$ Economics \$

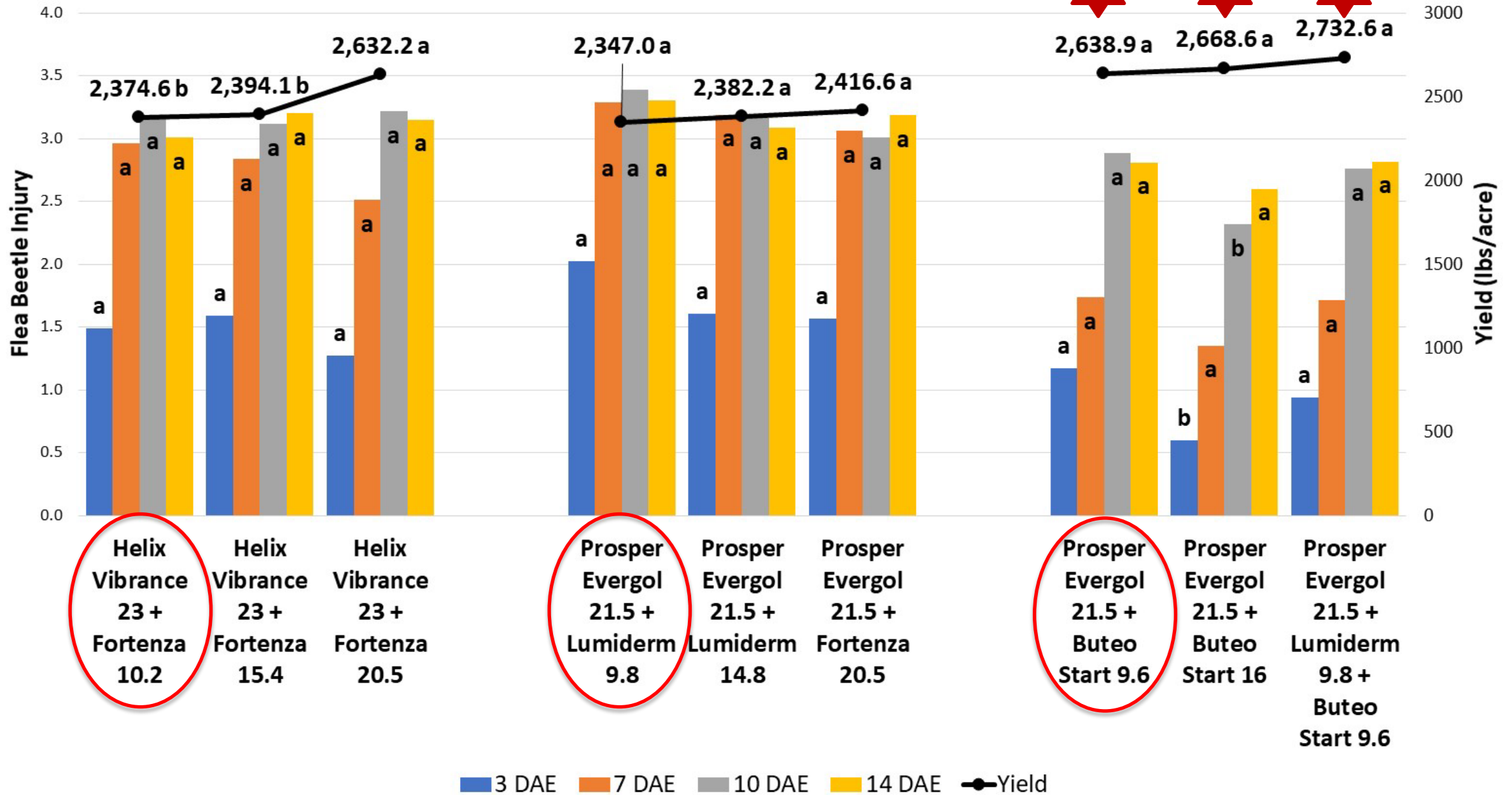
Treatment	Net (USD/acre)	Net Increase
Check	\$ 495.37	
Helix Vibrance	\$ 608.82	\$ 113.45
Helix Vibrance + Fortenza	\$ 651.26	\$ 155.89
Helix Vibrance + Fortenza + Bifenthrin	\$ 771.31	\$ 275.94
Prosper Evergol	\$ 633.07	\$ 137.70
Prosper Evergol + Lumiderm	\$ 643.51	\$ 148.14
Prosper Evergol + Lumiderm + Bifenthrin	\$ 768.25	\$ 272.88
Prosper Evergol + Buteo Start	\$ 725.53	\$ 230.16
Prosper Evergol + Buteo Start + Bifenthrin	\$ 773.51	\$ 278.14
Bifenthrin Only	\$ 680.45	\$ 185.08
Bifenthrin Only x 2	\$ 718.62	\$ 223.25



Comparison of Commercially Available and Experimental Rates of Cyantraniliprole Added to Neonicotinoid Seed Treatments



Comparison of Commercially Available and Experimental Rates of Cyantraniliprole Added to Neonicotinoid Seed Treatments



Conclusions



- **Neonic Alone (single A.I.)**
 - Lower feeding injury ratings compared to the untreated check
 - Lower yield compared to the pre-mixes, foliar insecticide on top of pre-mixes
 - Higher yield untreated check
 - Yield Gain 26.9% over untreated check

Conclusions



- Pre-mixes (2 A.I., Neonic + Fortenza, Lumiderm OR Buteo Start)
 - **Lower feeding injury ratings** compared to the Neonic alone and untreated check
 - **Higher yield** compared to the Neonic alone and untreated check
 - Yield Gain 9.6% higher than Neonic alone
 - Higher Rates of Fortenza / Lumiderm or Buteo Start did **not lower flea beetle injury and did not increase yield**

Conclusions



- Pre-mixes (two A.I., Neonic + Fortenza / Lumiderm OR Buteo Start) plus foliar insecticide (Brigade)
 - **Lowest feeding injury ratings** compared to the Neonic alone, premixes and untreated check
 - **Highest yield** compared to the Neonic alone, premixes and untreated check
 - Yield Gain 15.8% higher than premixes and 26.9% higher than Neonic alone

Take Home Message for Canola Growers



- Most efficacious and economic risk-efficient strategies for control of both species of *Phyllotreta* flea beetles:
 - Pre-mixes of neonics with newer Modes of Action (Diamides, Group 28 OR Butenolides, Group 4D)



Take Home Message for Canola Growers



- **Additional foliar spray on top of ST** may be necessary to protect canola crop
 - Economic populations of mixed species of flea beetles
 - Repeated field infestations due to extended feeding period

Canola Council of Canada

Flea Beetle Damage on Canola

Scout for flea beetle damage in several places throughout the field, including field edges, hedgerows, and bluffs, ideally at five points, in a "W" pattern, checking 10 plants at each point (to get a representative sample).

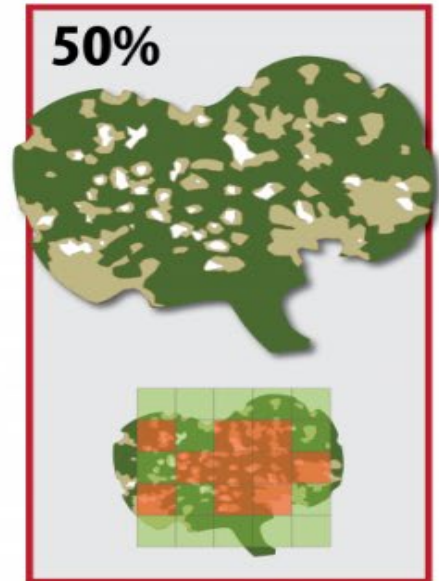
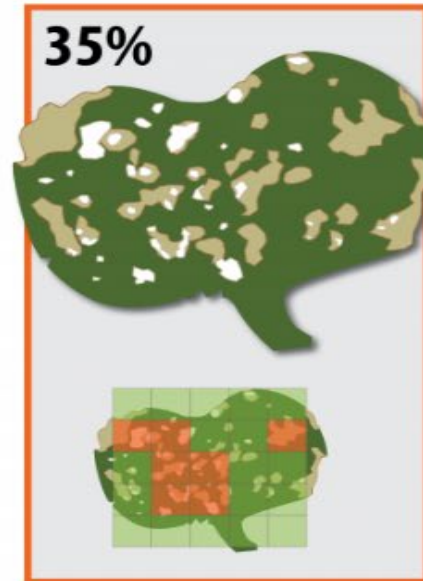
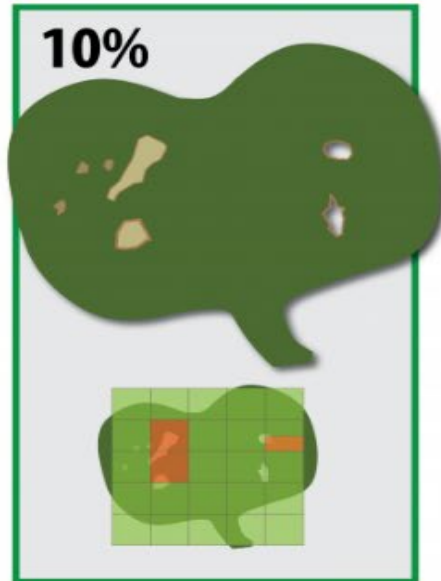


Crucifer
Flea Beetle



Striped
Flea Beetle

2.5 mm
0.1"

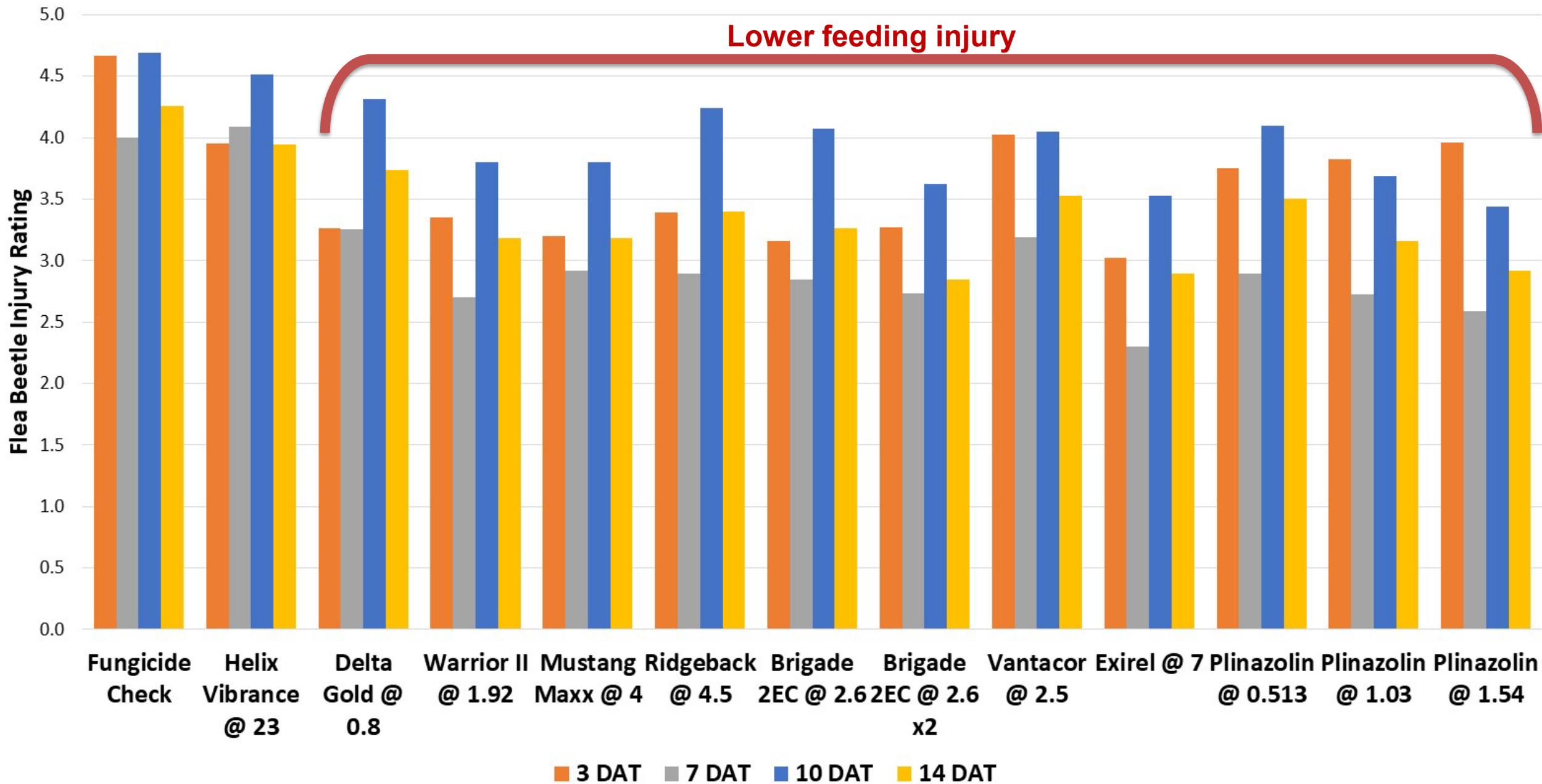


Economic Threshold

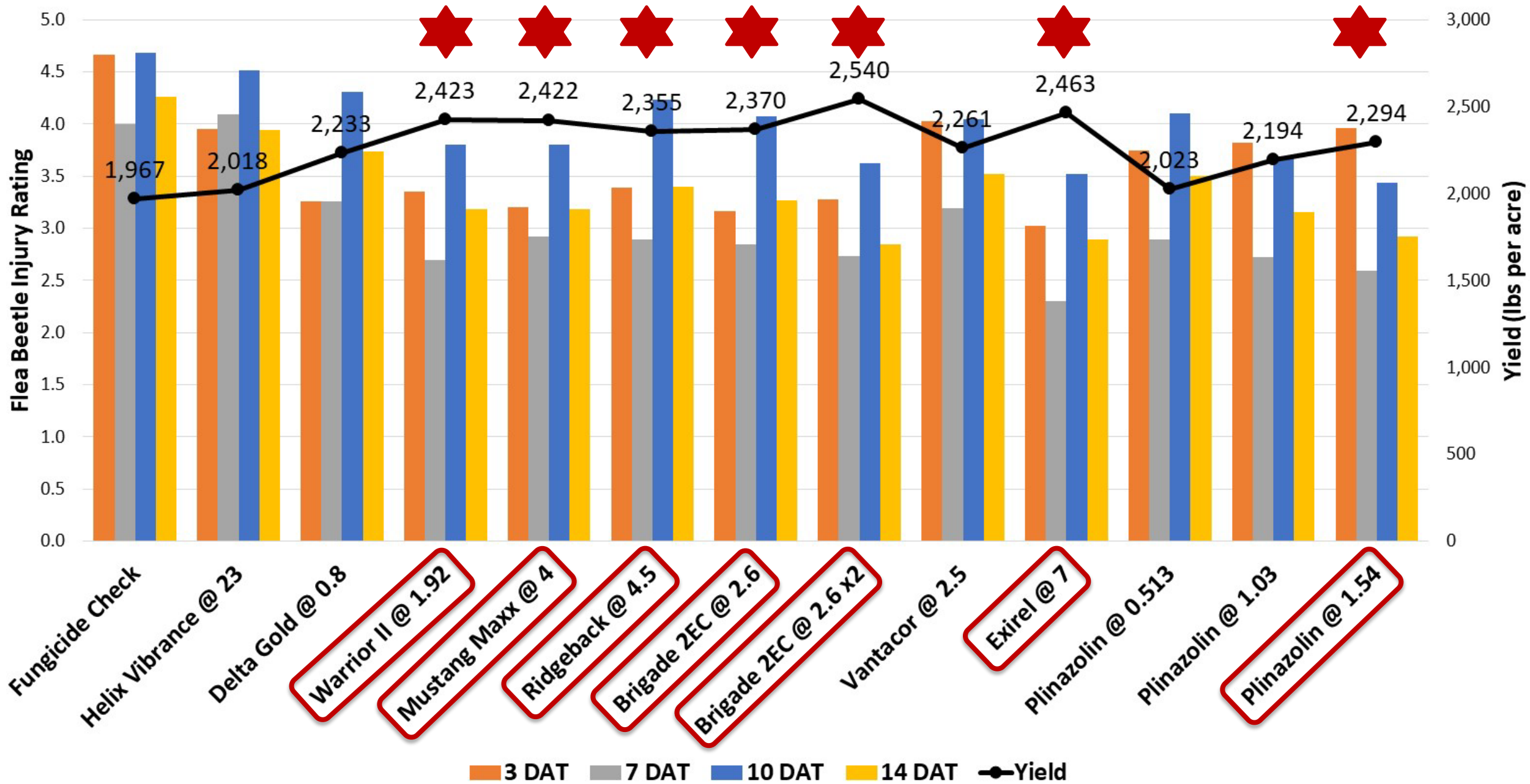
Foliar Insecticide Treatments

PRODUCT	RATE fl oz/A	CHEMICAL CLASS (IRAC)	ACTIVE INGREDIENT
Brigade 2EC	2.6 (1x, 2x)	Pyrethroid (3A)	Bifenthrin
Ridgeback	4.5	Pyrethroid (3A) + Sulfoximine (4C)	Bifenthrin + Sulfoxaflor
Warrior II	1.92	Pyrethroid (3A)	Lambda-cyhalothrin
Mustang Maxx	4	Pyrethroid (3A)	Zeta-cypermethrin
Delta Gold	0.8	Pyrethroid (3A)	Deltamethrin
Exirel	7	Diamide (28)	Cyantraniliprole
Vantacor	2.5	Diamide (28)	Chlorantraniliprole
Plinazolin	1.54	GABA receptor antagonists (30)	Isocycloseram

Treatment Means for Flea Beetle Injury and Yield Across Locations, 2023



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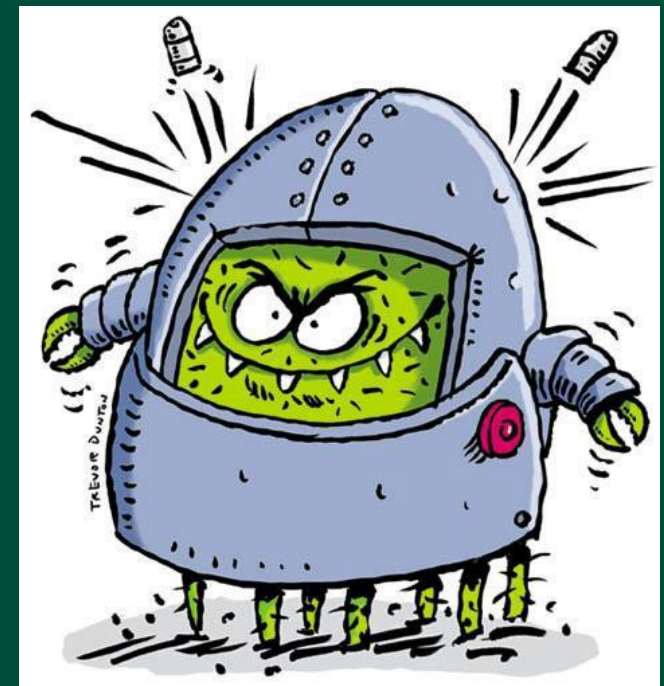
Take Home Message for Canola Growers



- All foliar insecticides tested had lower feeding injury and higher yield than the fungicide check and Helix Vibrance ST.
- Highest yield - most **pyrethroid insecticides, Exirel and high rate of Plinazolin**
- Lower yield - Delta Gold, Vantacor and low to mid- rates of Plinazolin
- **Brigade applied twice** had lowest feeding injury and highest yield compared to Delta Gold and Vantacor

Take Home Message for Canola Growers

- Watch for **field failures when spraying pyrethroid insecticides**
 - Repeated applications of foliar pyrethroid insecticides
 - Could lead to pyrethroid resistant flea beetles?



ACKNOWLEDGEMENTS

THANK YOU

- Jim Johnson, Star Specialty Seeds, Fargo, ND
- Northern Canola Growers Association



Send any questions to:
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