Best Pest Management for Flea Beetle in Canola

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NDSU | EXTENSION

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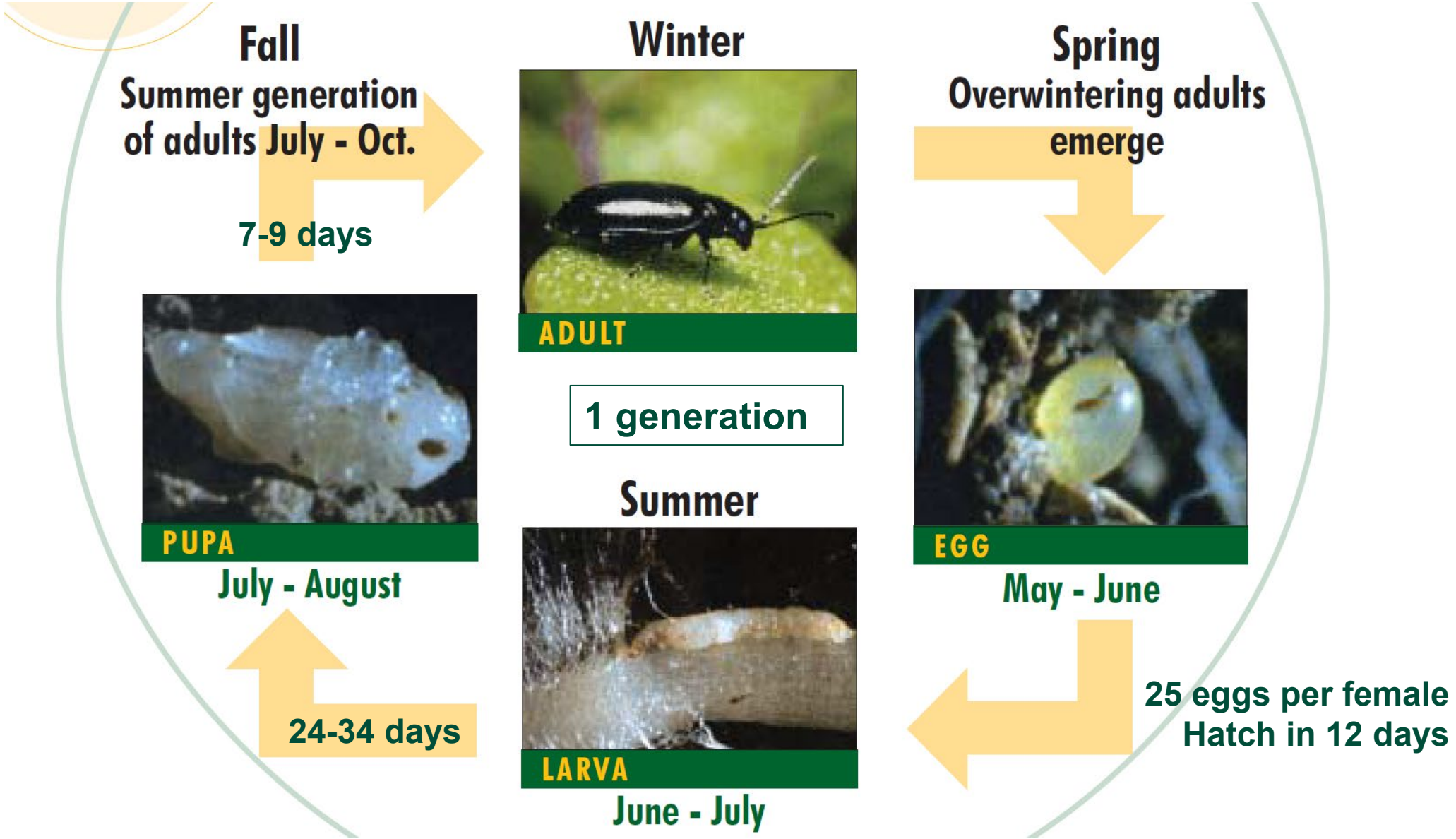
Striped flea beetle
Phyllotreta striolata

Crucifer flea beetle
Phyllotreta cruciferae

Life Cycle of the Crucifer Flea Beetle



Source: Crucifer Flea Beetle: Biology and IPM in Canola, E1234, NDSU Ext.; Westdal & Romanow 1972

Populations of *Phyllotreta cruciferae*

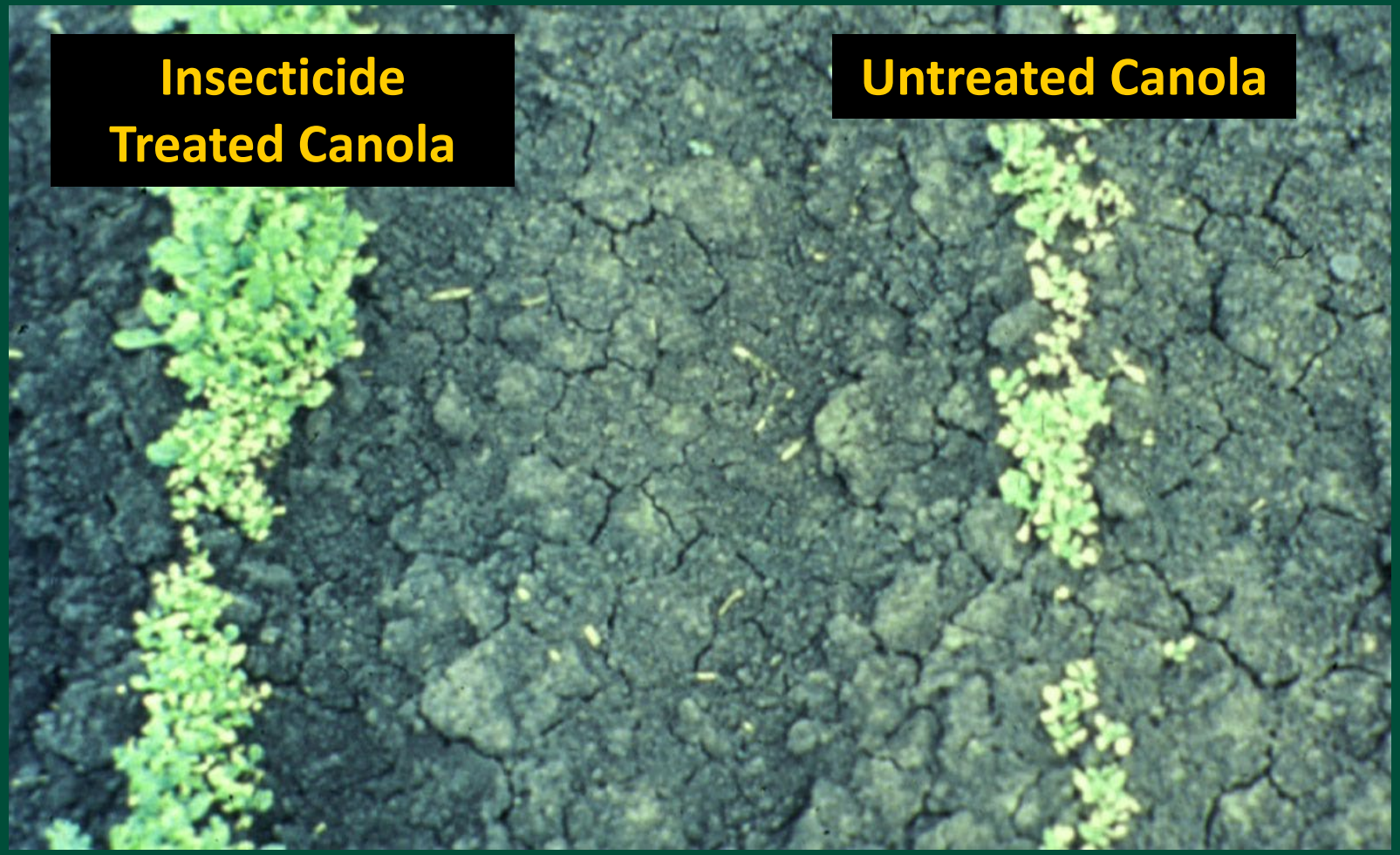
- Spring = overwintered adults, feed on seedling canola

- Summer = new generation, feeds on epidermis of leaves, stems and pods
  - E.T. = 100-300 beetles per plant depending on hybrid

Turnock and Lamb 1982, Lamb 1984, Bracken and Bucher 1986

Crop Damage

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



Putnam 1977, Lamb and Turnock 1982, Lamb 1984

Canola

Insecticide Recommendations

Registered Insecticides – 2022-2023

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):

cyantraniliprole - Fortenza, Lumiderm

Butenolides (Group 4D):

Flupyradifurone – Buteo Start

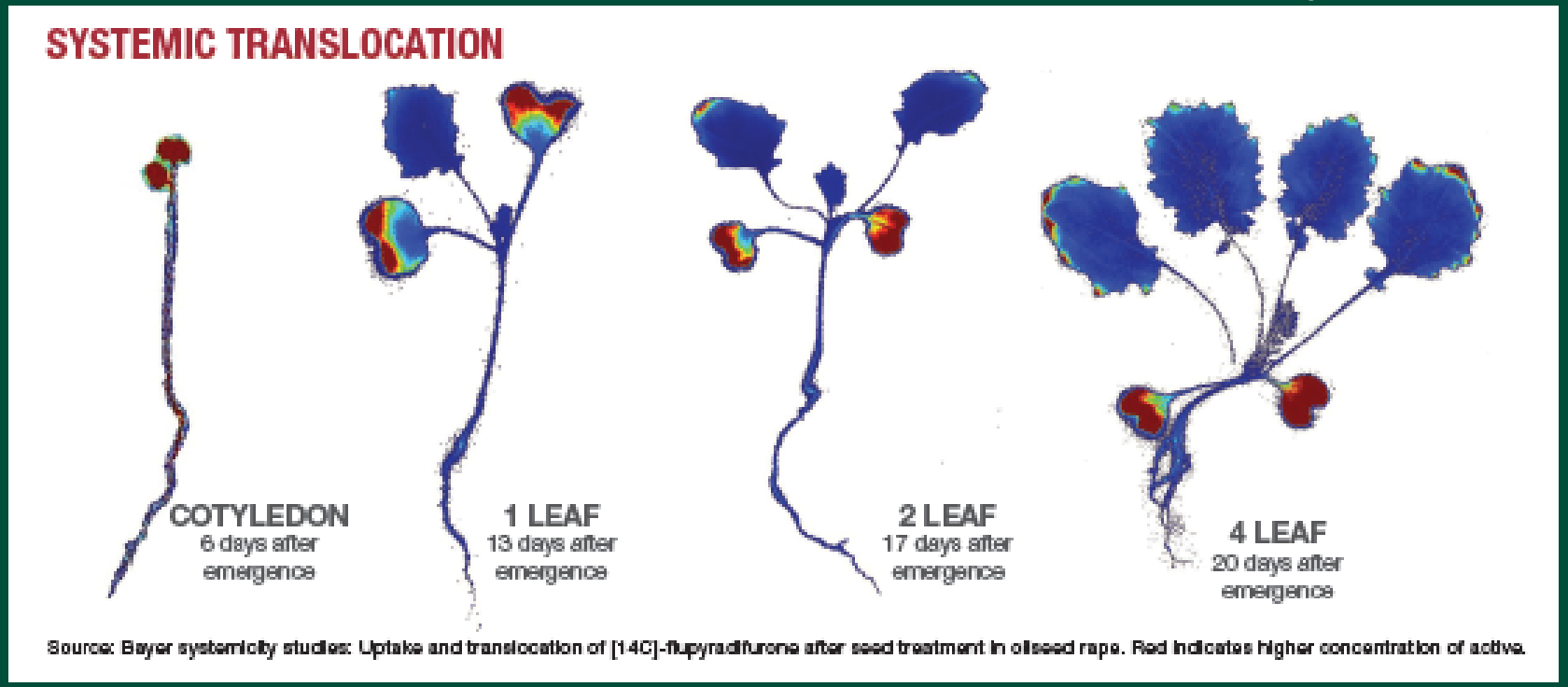
Always Read and Follow Labels.

Insecticide Seed Treatment - Canola

- Corteva Agriscience
- Lumiderm, AI – cyantraniliprole, Group 28 (Diamides)
  - Works on muscle system of insects, abit slower acting
  - Crucifer and striped flea beetles, cutworms
  - 35 days of protection
  - Excellent stand establishment, vigor and biomass
- Pre-mix: Prosper EverGol + Lumiderm (21.5 + 9.8 fl oz/cwt)
- Pre-mix: Helix Vibrance + Lumiderm (23 + 9.8 fl oz/cwt)
- Alone – Flea beetles 14.8-24.6 fl oz/cwt (Canada only)

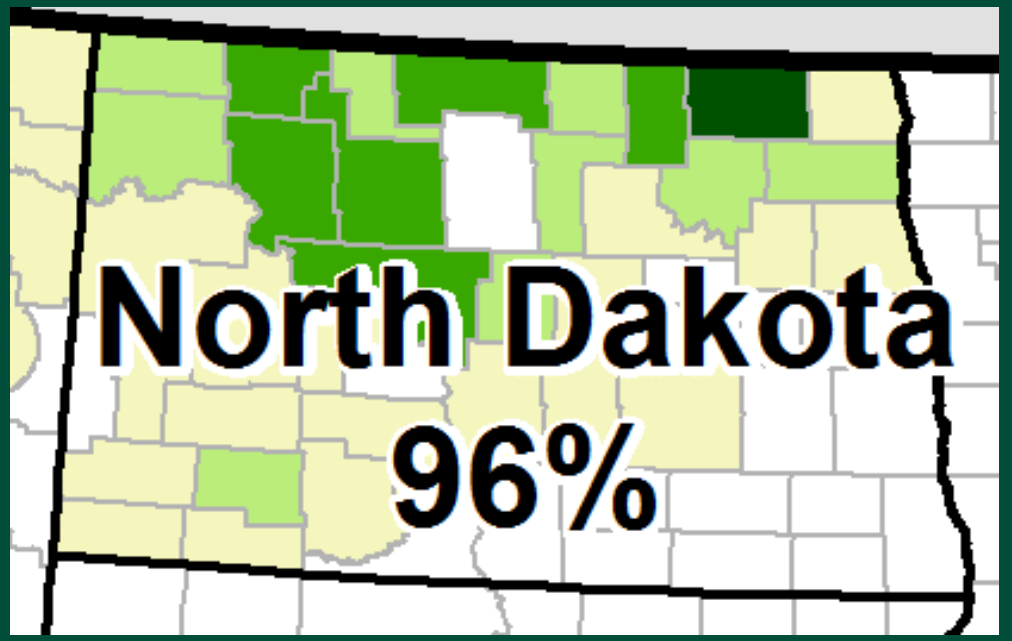
New Insecticide Seed Treatment - Canola

- Bayer Crop Sciences
- Buteo Start, AI – flupyradiforuone, Group 4D (Butenolides)
  - Pre-mix: Prosper EverGol + Buteo Start (21.5 + 9.6 fl oz/cwt)
  - Crucifer and striped flea beetles, effective to 4 leaf, even dry conditions



Objectives

✓ Determine field efficacy of current insecticide seed treatments for control of spring populations of *Phyllotreta spp.* in canola.



Canola growing regions (USDA NASS)

Canola Seed Treatments Tested in Field, Fargo 2022

- Untreated check
- Single A.I.:
  - Clothianidin (Prosper Evergol), 21.5 fl oz / cwt
  - Thiamethoxam (Helix Vibrance), 23 fl oz / cwt
- Pre-mixes with 2 A.I.:
  - Helix Vibrance + Cyantraniliprole (Lumiderm), 23 + 9.8 fl oz / cwt (commercial standard)
  - Helix Vibrance + Lumiderm, 23 + 14.8 fl oz / cwt
  - Prosper Evergol + Lumiderm, 21.5 + 9.8 fl oz / cwt (commercial standard)
  - Prosper Evergol + Lumiderm, 21.5 + 14.8 fl oz / cwt
  - Prosper Evergol + Buteo Start, 21.5 + 9.6 fl oz / cwt (commercial standard)
  - Prosper Evergol + Buteo Start, 21.5 + 16 fl oz / cwt

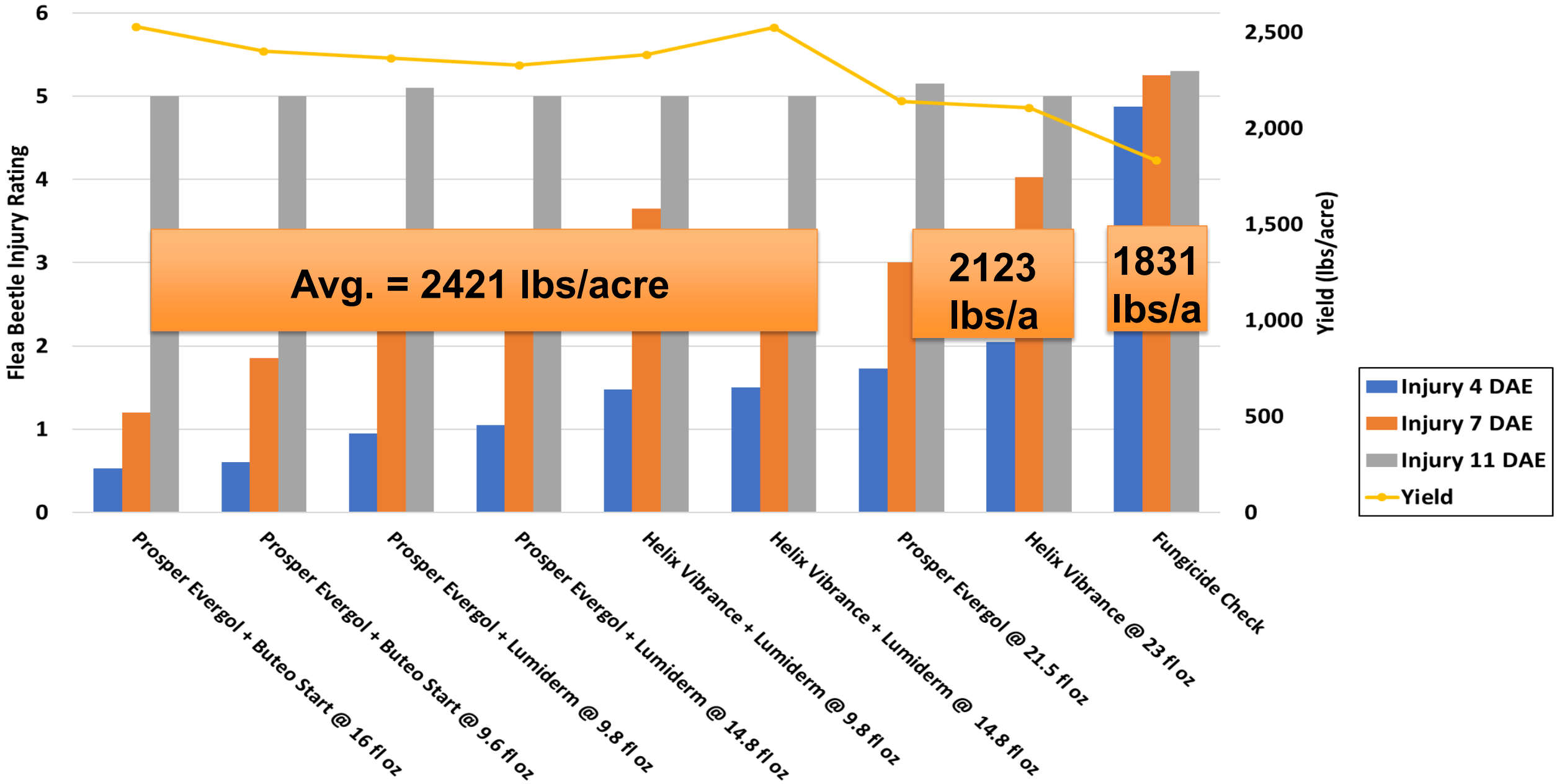
After 12 DAE: Sprayed with bifenthrin at high rate (2.6 fl oz/acre)

Flea Beetle Population & Injury Rating System

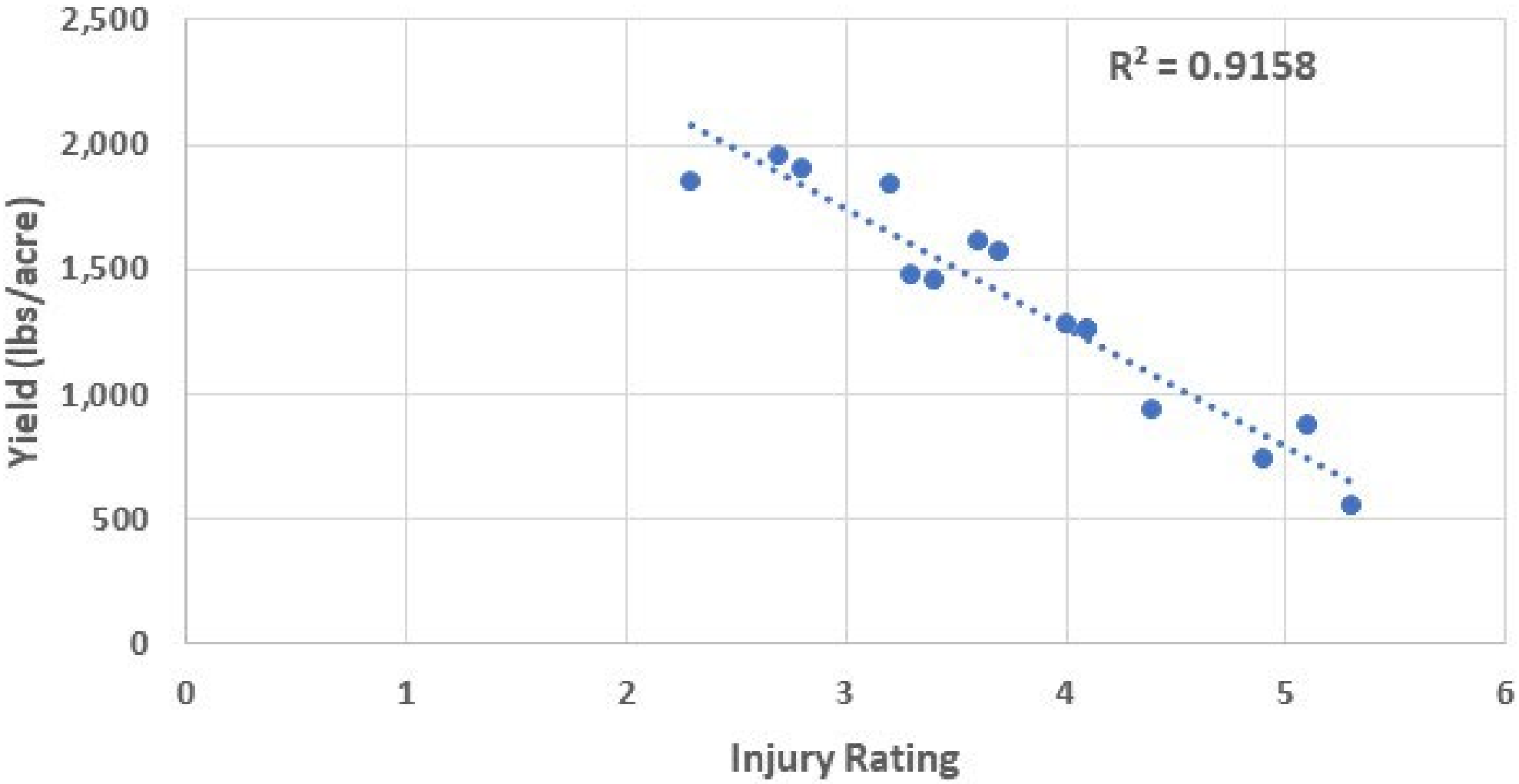
- 60% Striped flea beetles : 40% crucifer flea beetles
- Feeding injury rating assessed at 3, 7 and 11 DAE
- 0-6 scale based on cotyledon pitting feeding injury (Knodel et al. 2008).

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

Seed Treatment Means for Flea Beetle Injury Rating and Yield at Fargo, 2022



Relationship Between Flea Beetle Injury and Yield



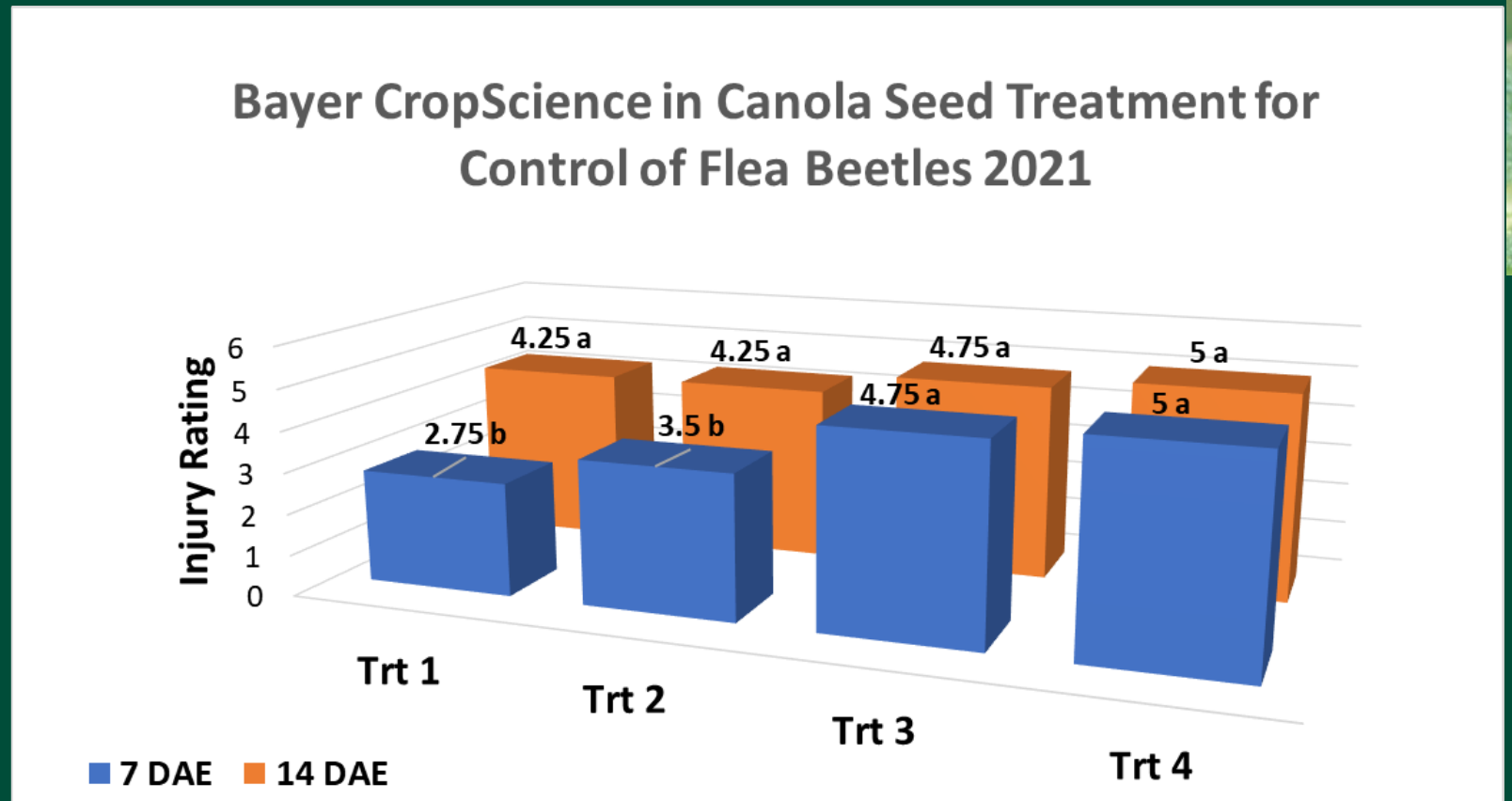
Economics of Insecticide Seed Treatments

Seed Treatment	Market Value (USD/cwt)	Yield (lbs/acre)	Yield Gain (lbs/acre)	Crop Value (USD/acre)	Gain (USD/acre)
Untreated	$ 30.00	1,832	0	$ 549.57	$ -
Neonic Alone	$ 30.00	2,123	291	$ 636.90	$ 87.33
Neonic + Lumiderm or Buteo Start	$ 30.00	2,421	589	$ 726.30	$ 176.73

Seed Treatment	Gain (USD/acre)	ST Cost (USD/acre)	Foliar App (USD/acre)	Net Gain (USD/acre)
Untreated	$ -	$ -	$ 10.00	$ (10.00)
Neonic Alone	$ 87.33	$ 8.00	$ 10.00	$ 69.33
Neonic + Lumiderm or Buteo Start	$ 176.73	$ 16.00	$ 10.00	$ 150.73*

*** Net Gain of $81.40 over neonic alone**

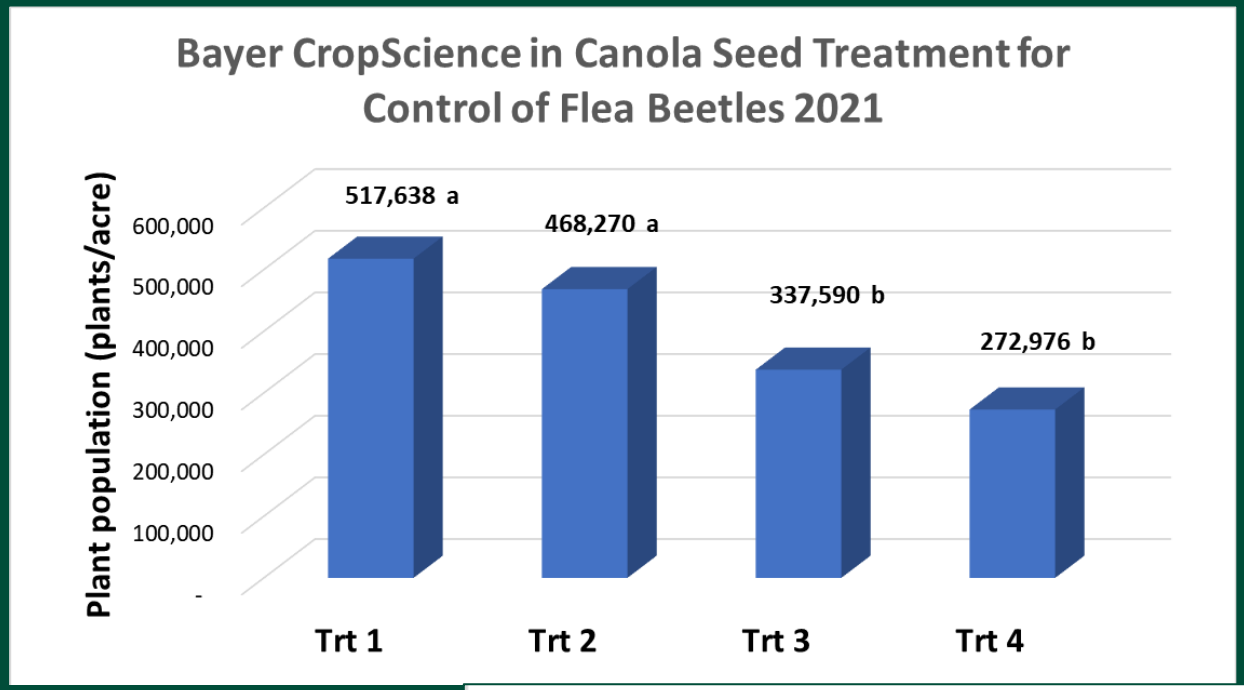
Buteo Start Seed Treatment – Fargo 2021

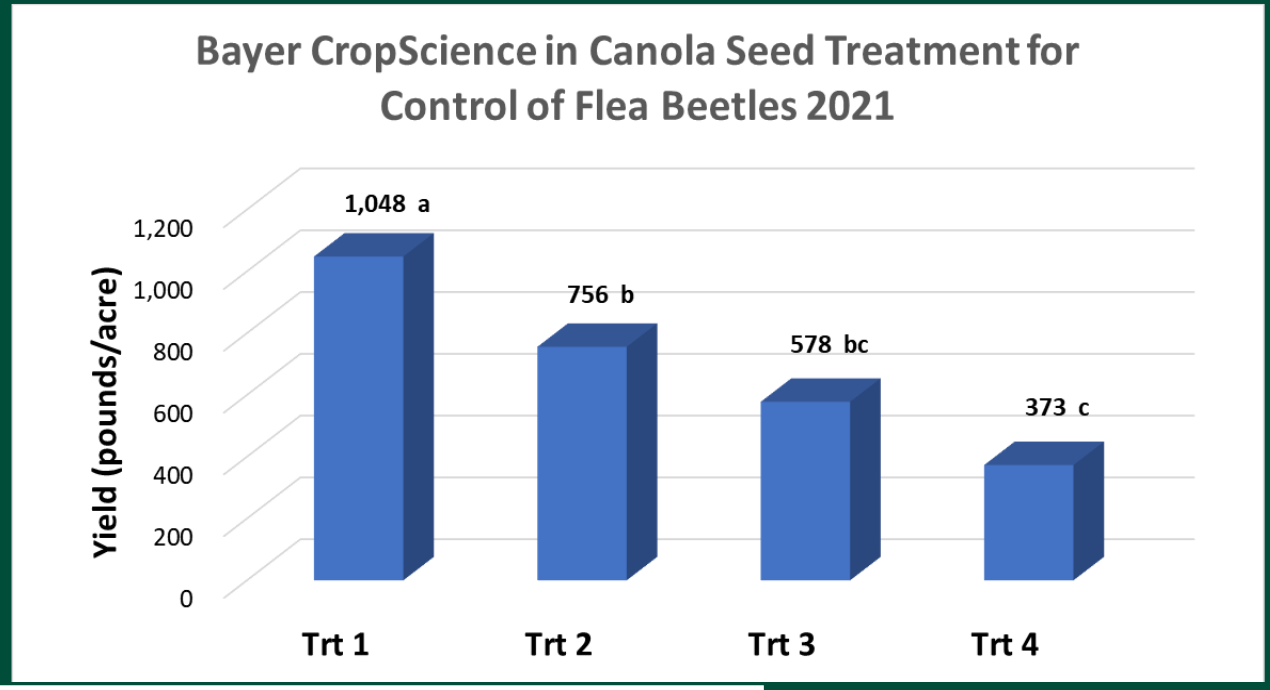


Trt 1 = Prosper Evergol @ 21.5 fl oz/cwt + Buteo Start @ 16 fl oz/cwt
Trt 2 = Prosper Evergol @ 21.5 fl oz/cwt + Buteo Start @ 9.6 fl oz/cwt
Trt 3 = Prosper Evergol @ 21.5 fl oz/cwt
Trt 4 = Untreated Check

- ✓ 90% striped FB : 10% crucifer FB
- ✓ After 14 DAE: Sprayed with bifenthrin at high rate (2.6 fl oz/acre)

Field - Buteo Start Seed Treatment 2021





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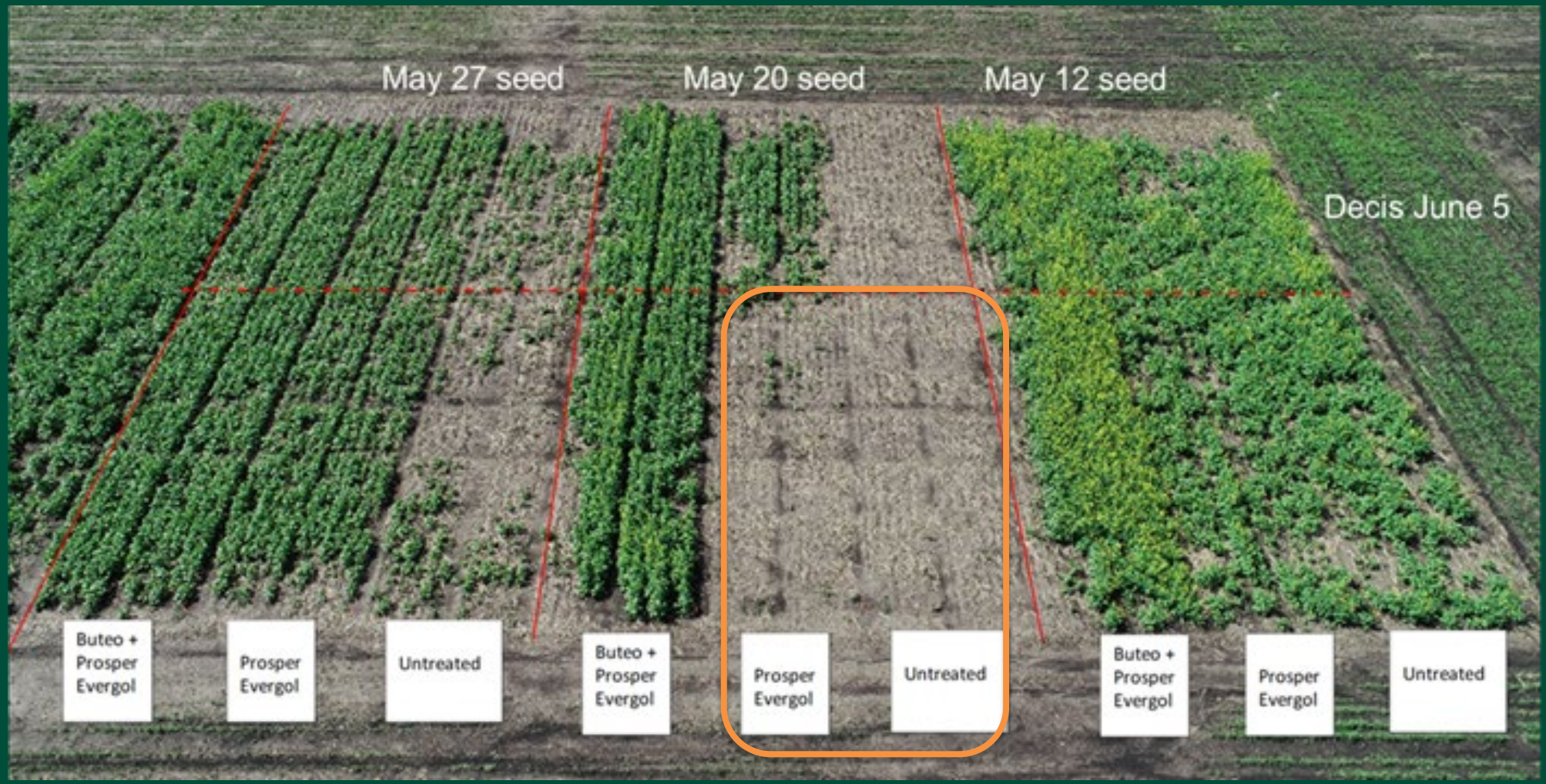
Buteo Start Field Plots - Canada



Conclusion

- Neonic Alone (single A.I.)
  - Lower feeding injury ratings and higher yield compared to the untreated check
  - Lower yield compared to the pre-mixes
  - Yield Net Gains were half that of pre-mixes
- Pre-mixes (two A.I., Neonic + Lumiderm OR Buteo Start)
  - Lowest feeding injury ratings compared to the untreated check
  - Highest yield compared to the Neonic alone and untreated check
  - Yield Net Gains were twice that of Neonic alone

Conclusion

- Newer MOA insecticides (Diamides, Group 28 OR Butenolides, Group 4D)
  - Effective against both crucifer and striped flea beetles in field
- Due to high populations and repeated infestations of flea beetles in canola fields, residual of all commercial insecticide seed treatments were not long enough to protect the young canola and required a foliar rescue insecticide application on top of ST for additional protection.

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

Flea Beetles

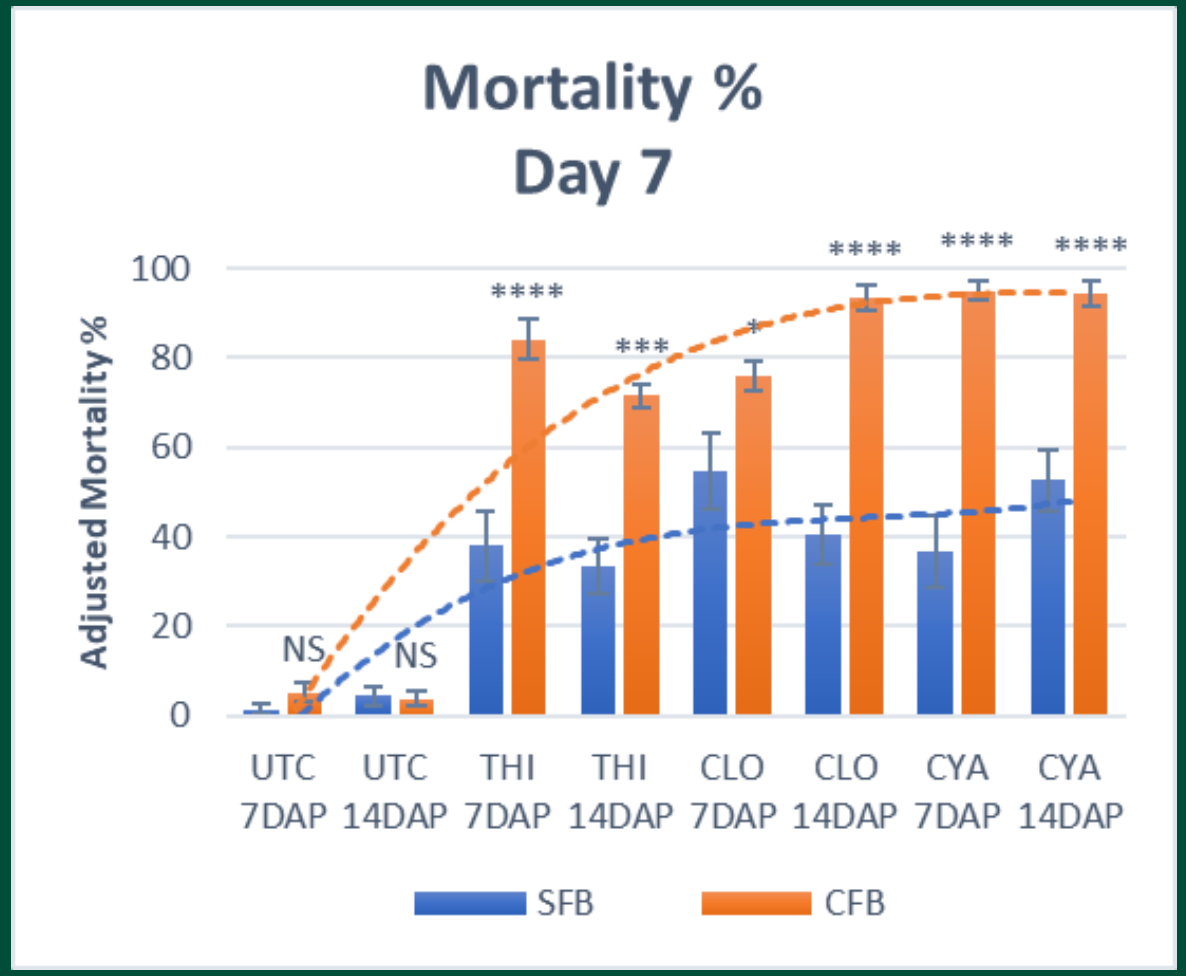
Lesley Lubenow's Ph.D. project

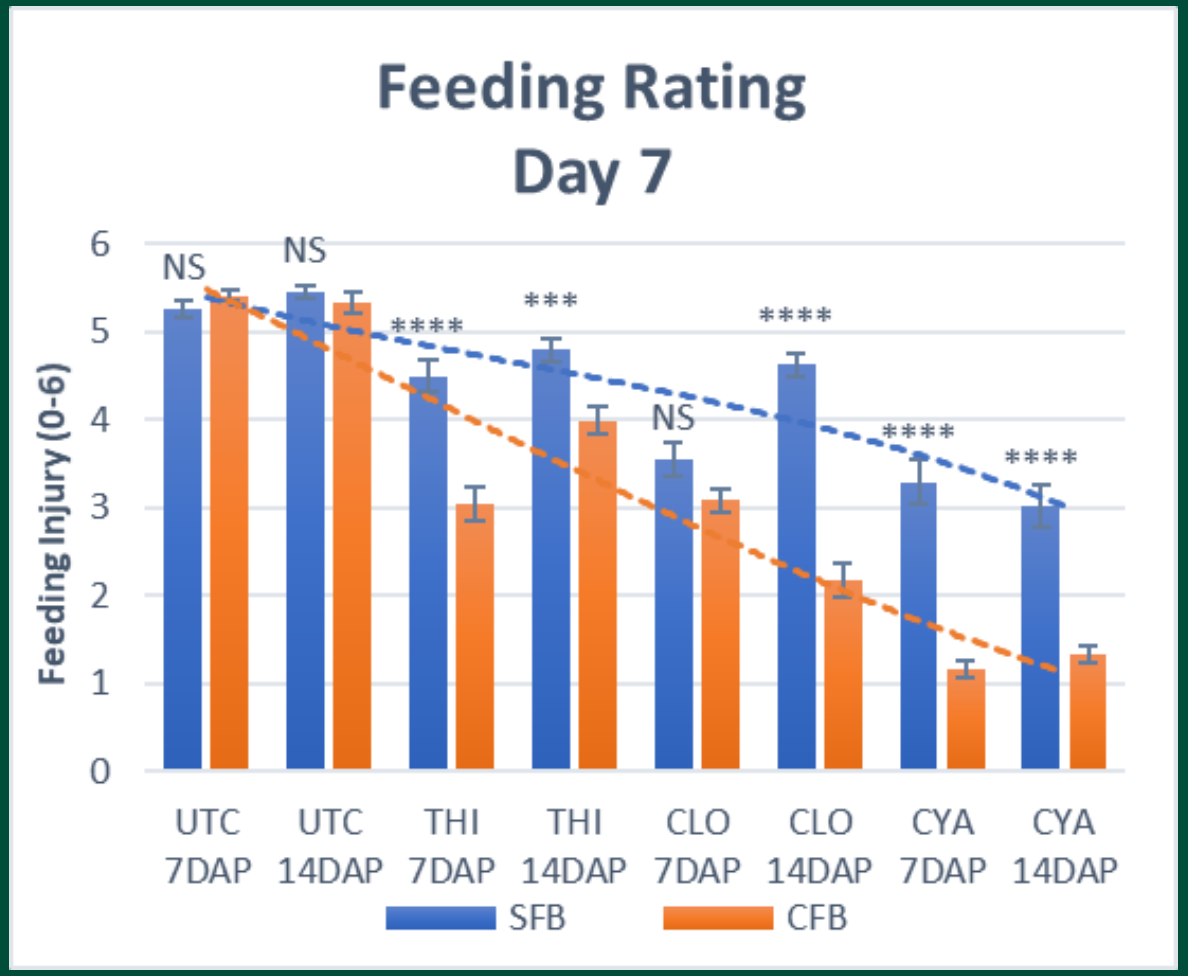
RCBD with factorial arrangement

- 6 reps, ran twice

Canola Insecticide 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


Mortality %
Day 7
Adjusted Mortality %
100
80
60
40
20
0
NS
NS
****
***
*
****
****
****
UTC 7DAP
UTC 14DAP
THI 7DAP
THI 14DAP
CLO 7DAP
CLO 14DAP
CYA 7DAP
CYA 14DAP
SFB
CFB


Feeding Rating
Day 7
Feeding Injury (0-6)
6
5
4
3
2
1
0
NS
NS
****
***
NS
****
****
****
UTC 7DAP
UTC 14DAP
THI 7DAP
THI 14DAP
CLO 7DAP
CLO 14DAP
CYA 7DAP
CYA 14DAP
SFB
CFB

Conclusion

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

Take Home Message for Canola Growers

- Be aware of the dominant species of flea beetles in canola field
- Management of both crucifer flea beetle and striped flea beetle is important for successful canola production
- Striped flea beetles are slowly increasing in ND due to tolerance/resistance of standard insecticide seed treatments (Neonicotinoids, Group 4A) used in canola (Knodel et al., unpublished)

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)
- When flea beetle populations are high or feeding injury extends beyond the time when seed treatments are effective, additional foliar sprays are necessary to protect canola crop.
- Watch for the development of **pyrethroid resistance** in flea beetles from repeated applications of foliar pyrethroid insecticides

ACKNOWLEDGEMENTS

- Northern Canola Growers Association
- Chemical Companies

Northern CANOLA GROWERS Association

Send any questions to:
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