The Dirt About Wireworm Management in Sunflowers

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Wireworms

- **Family Elateridae (click beetles)**
- **885 wireworm species in N.A.**
  - Prairie grain wireworm (*Selatosumus aeripennis destructor*)
  - Sugarbeet wireworm (*Limonius californicus)*
- **3 to 5 year life cycle**
- **Larvae feed on roots and tunnel in roots/stems**

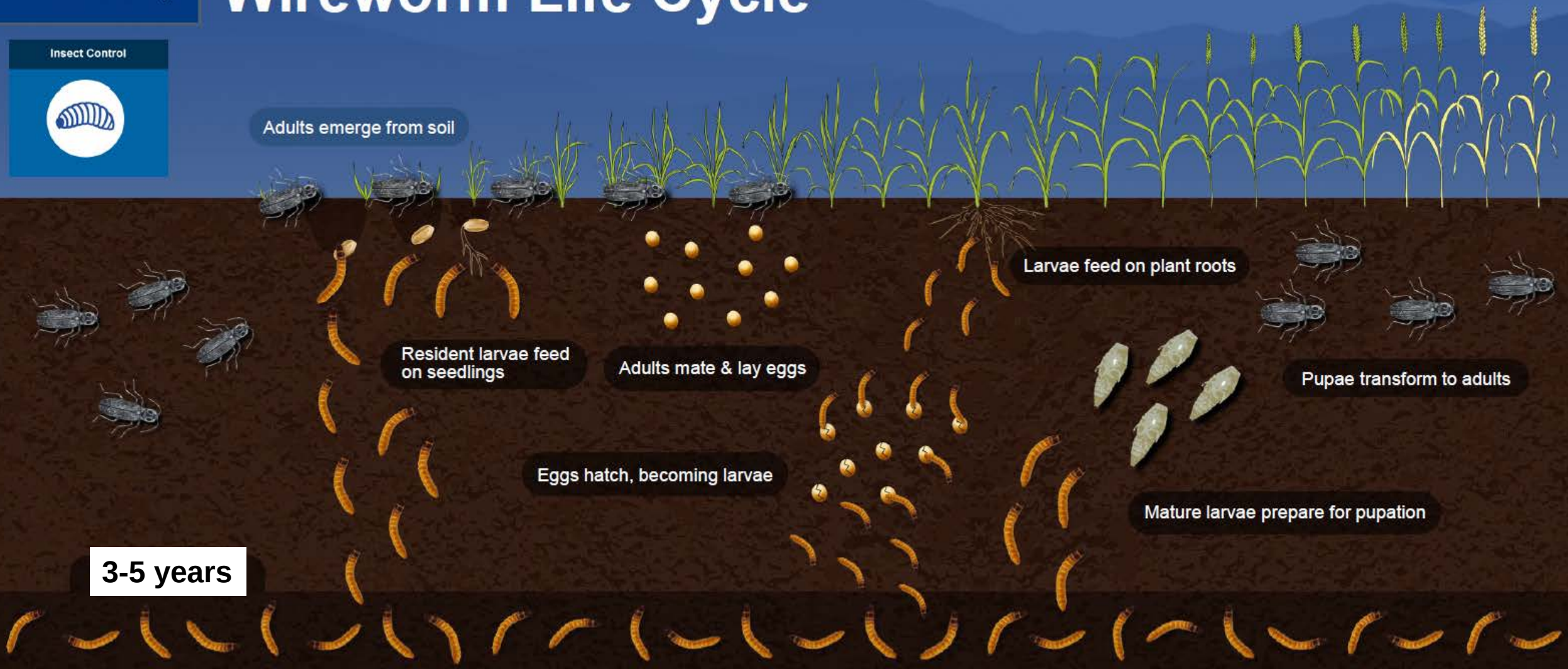
S. Brown, Univ. GA, bugwood.org

M. Boetel, NDSU

BASF
We create chemistry

Multiyear Wireworm Life Cycle

Insect Control



Winter
Adults overwinter in soil. Larvae move deeper into the soil profile to overwinter.

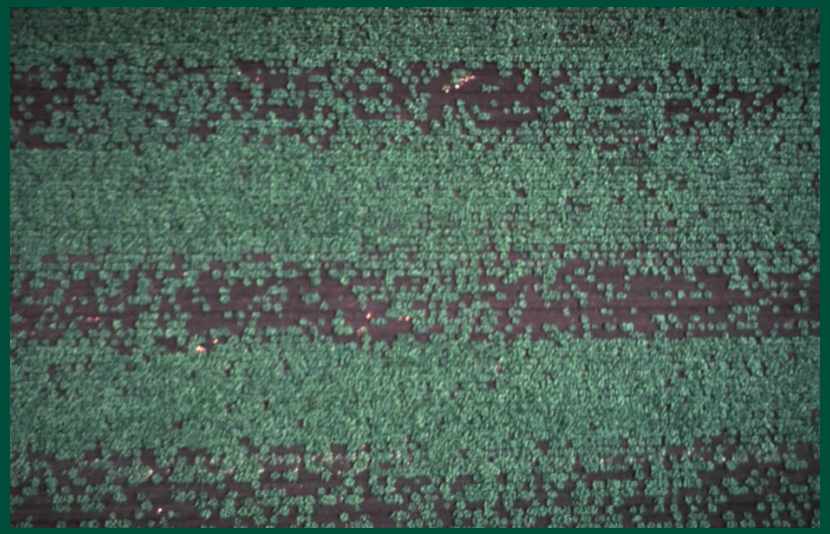
Spring
Adults and resident larvae migrate up the soil profile once environmental conditions become favorable.

Summer
All life stages present. Resident and neonate larvae feed on cereal crop until soil conditions become unfavorable. Move down the soil profile.

Fall
Adults and larvae from current and previous seasons prepare to overwinter in the soil.

Wireworms

- Plant losses due to wireworm feeding are increasing!
- Stand loss – blank spots or ‘skips’ in the rows
- Make sure the problem is actually caused by wireworms



Wireworm Field Sampling

- Difficult to survey and to predict whether wireworms will be a problem
- Wide host range, but grasses are preferred
- Crops most at risk following small grains, corn or CRP/non-crop
- Threshold of more than one wireworm per trap

Photo credit: Dr. Wanner, Montana State University

Wireworm Bait Trap

1. Fill ½ full with vermiculite
2. Add wheat to bait trap
3. Top with vermiculite
4. Soak with water!

Wireworm Bait Trap

- Core holes for bait trap about 6 inches deep and 4 inches wide

Wireworm Bait Trapping

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Insecticide - Application Technology for Wireworm Management

- Insecticide seed treatments
- In-furrow treatment at plant
- FMC - 3RIVE 3D system
  - Planter attachment and delivers a foam formulation of insecticide to the furrow around the seed.
  - Eliminates the need for frequent refilling of water on the planter

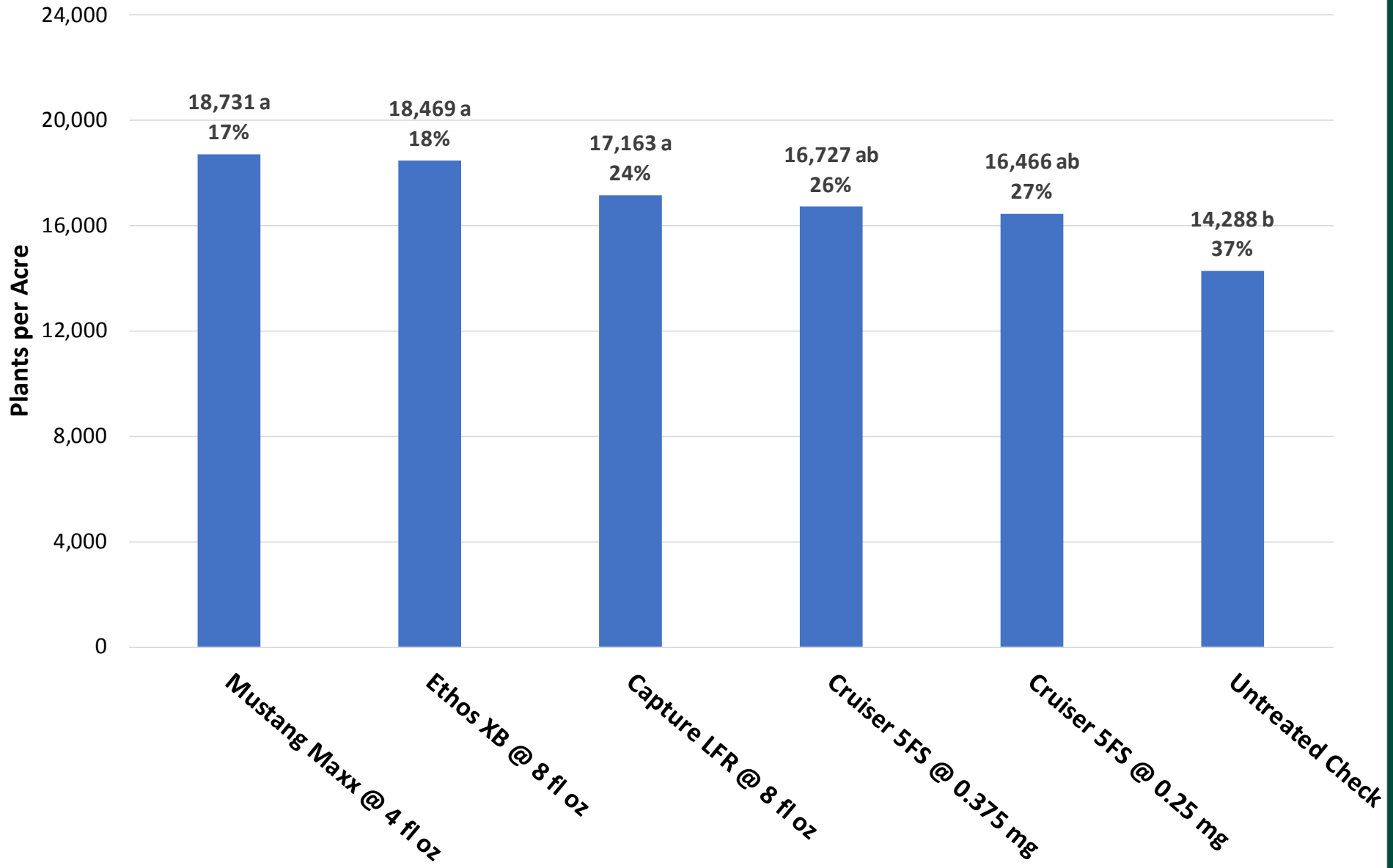
Current Sunflower Insecticides Registered for Wireworm

IRAC Group	Class	Active Ingredient	Products
3A	Synthetic Pyrethroid	Zeta-cypermethrin	Mustang Maxx (At plant)
3A	Synthetic Pyrethroid	Bifenthrin	Pending 2020 EPA label
4A	Neonicotinoid	Imidacloprid	Dyna-Shield, Gaucho 600, Senator 600FS
4A	Neonicotinoid	Thiamethoxam	Cruiser 5FS

In-furrow Pyrethroid and Neonic Seed Treatment Efficacy Trials in Sunflowers 2016-2019

Insecticide Class	Active Ingredient	Trade name	Rate
Neonicotinoid	Thiamethoxam	Cruiser 5FS	0.25 mg ai/seed
Neonicotinoid	Thiamethoxam	Cruiser 5FS	0.375 mg ai/seed
Pyrethroid	Zeta-cypermethrin	Mustang Maxx	4 fl oz/acre
Pyrethroid	Bifenthrin	Capture LFR	4-8 fl oz/acre
Pyrethroid	Bifenthrin	Ethos XB	4-8 fl oz/acre

Treatment Means for Plant Population
Mohall, 2016



No yield data due to birds!

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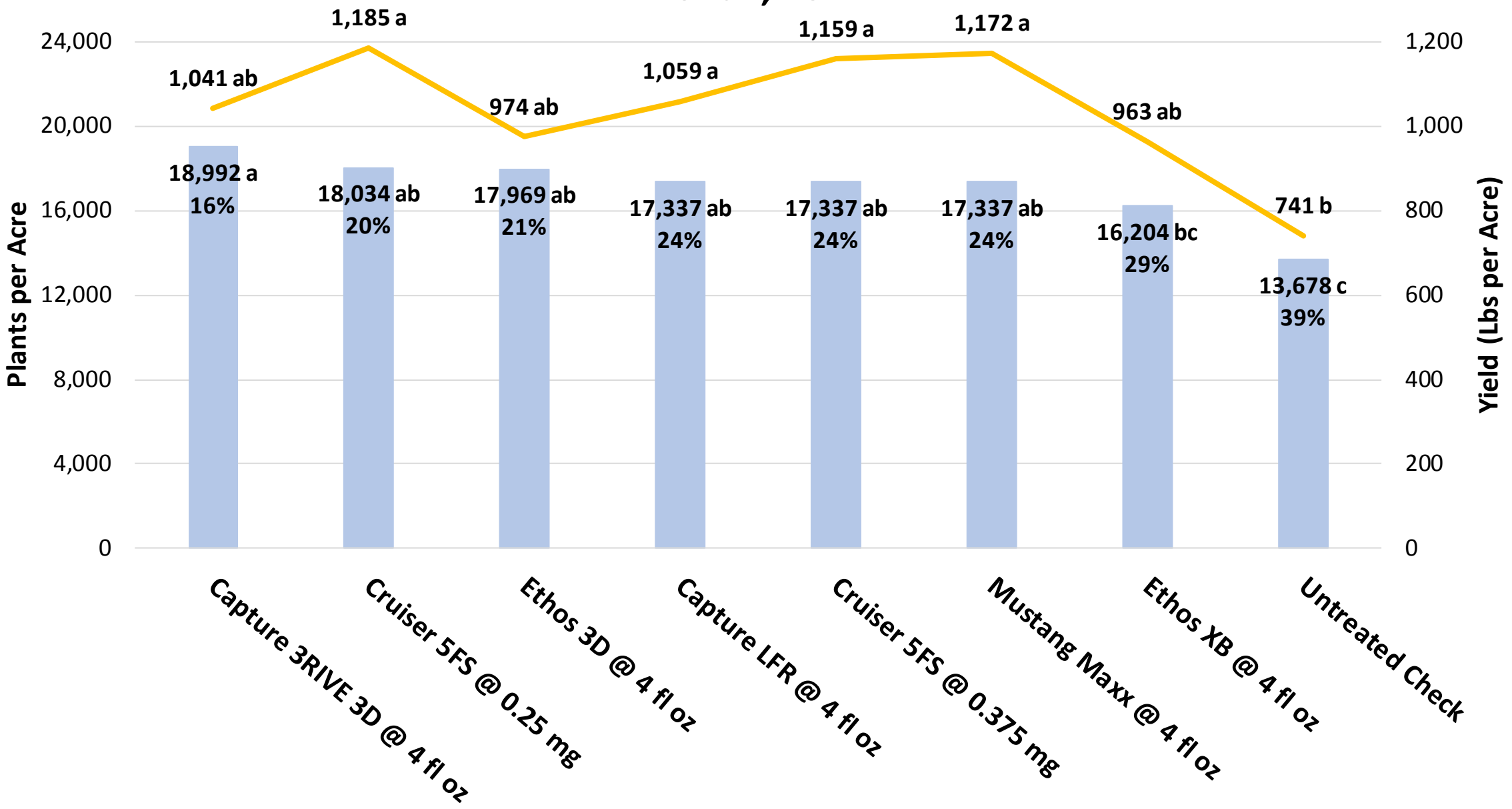
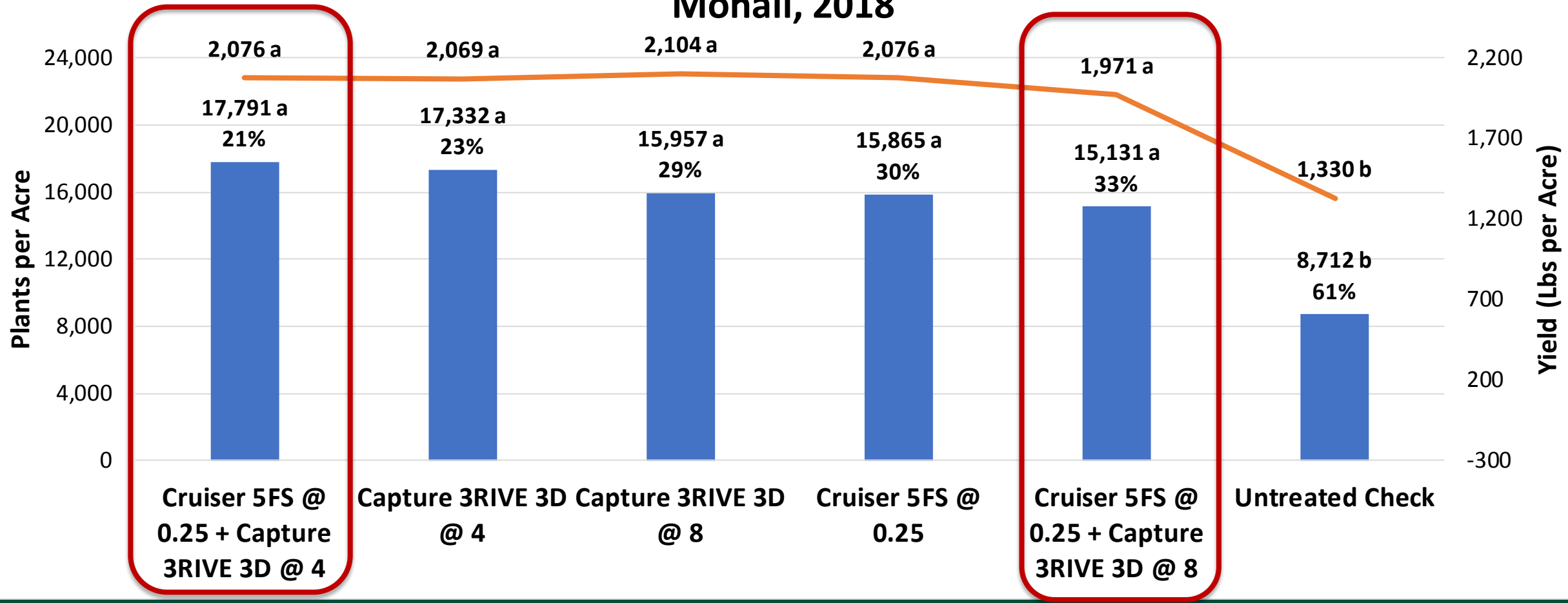
Treatment Means for Plant Population and Yield
Mohall, 2017

22,500 target plant population



Treatment Means for Plant Population and Yield
Mohall, 2018



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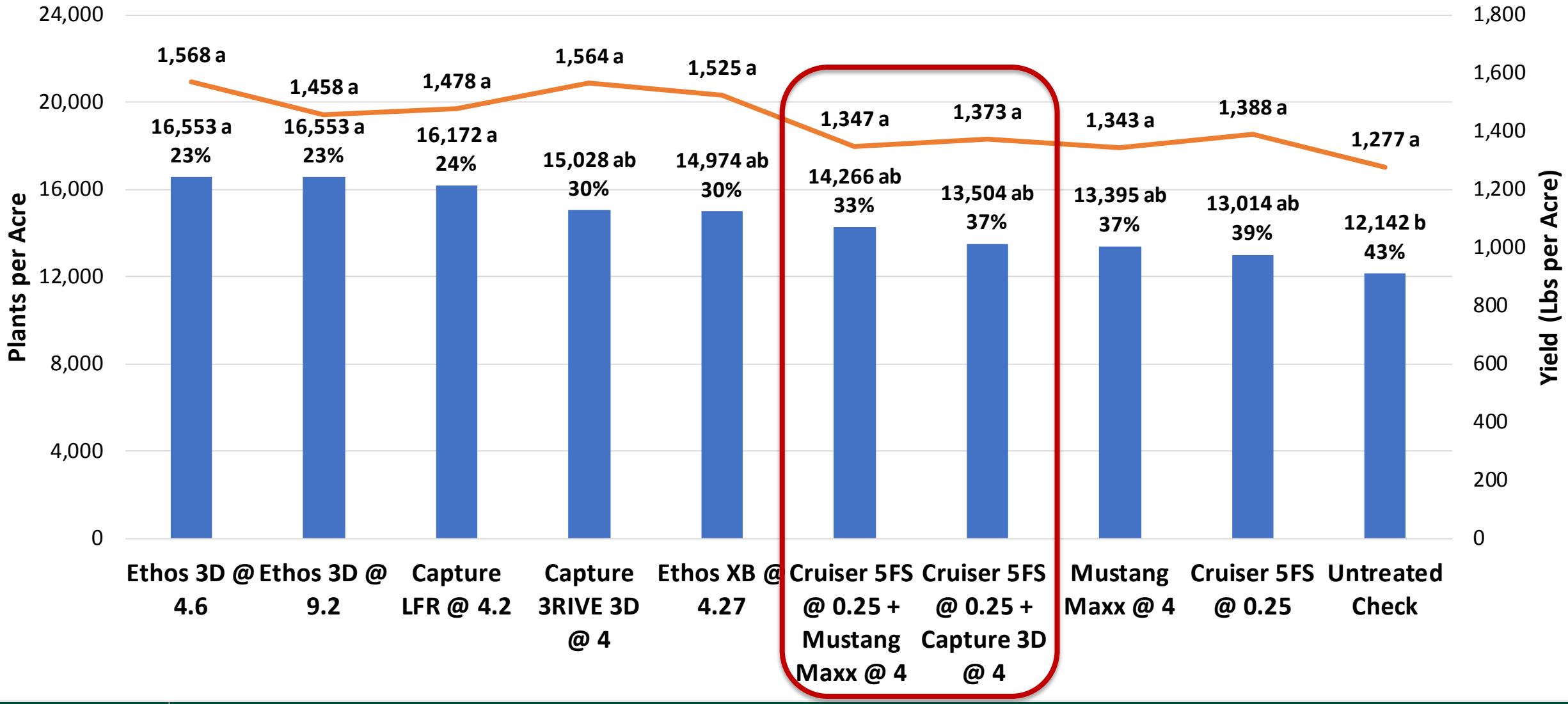
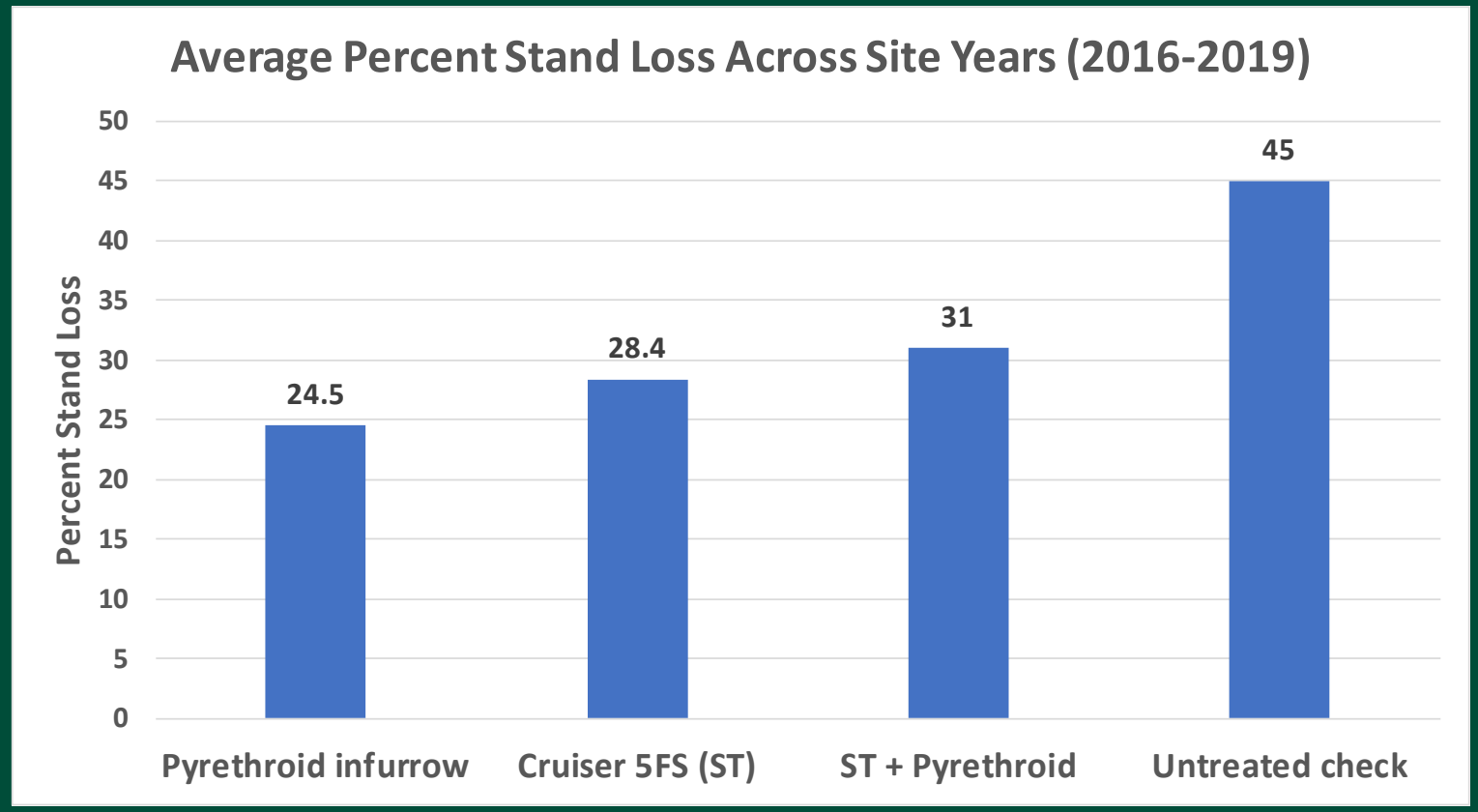


Wireworm ‘Control’

- Increasing rates or stacking ST + in furrow pyrethroids did not improve efficacy
- Insecticide ST, in-furrow pyrethroid or 3RIVE 3D applications provided **‘better’ stand establishment than the untreated check**



Wireworm Stand Loss

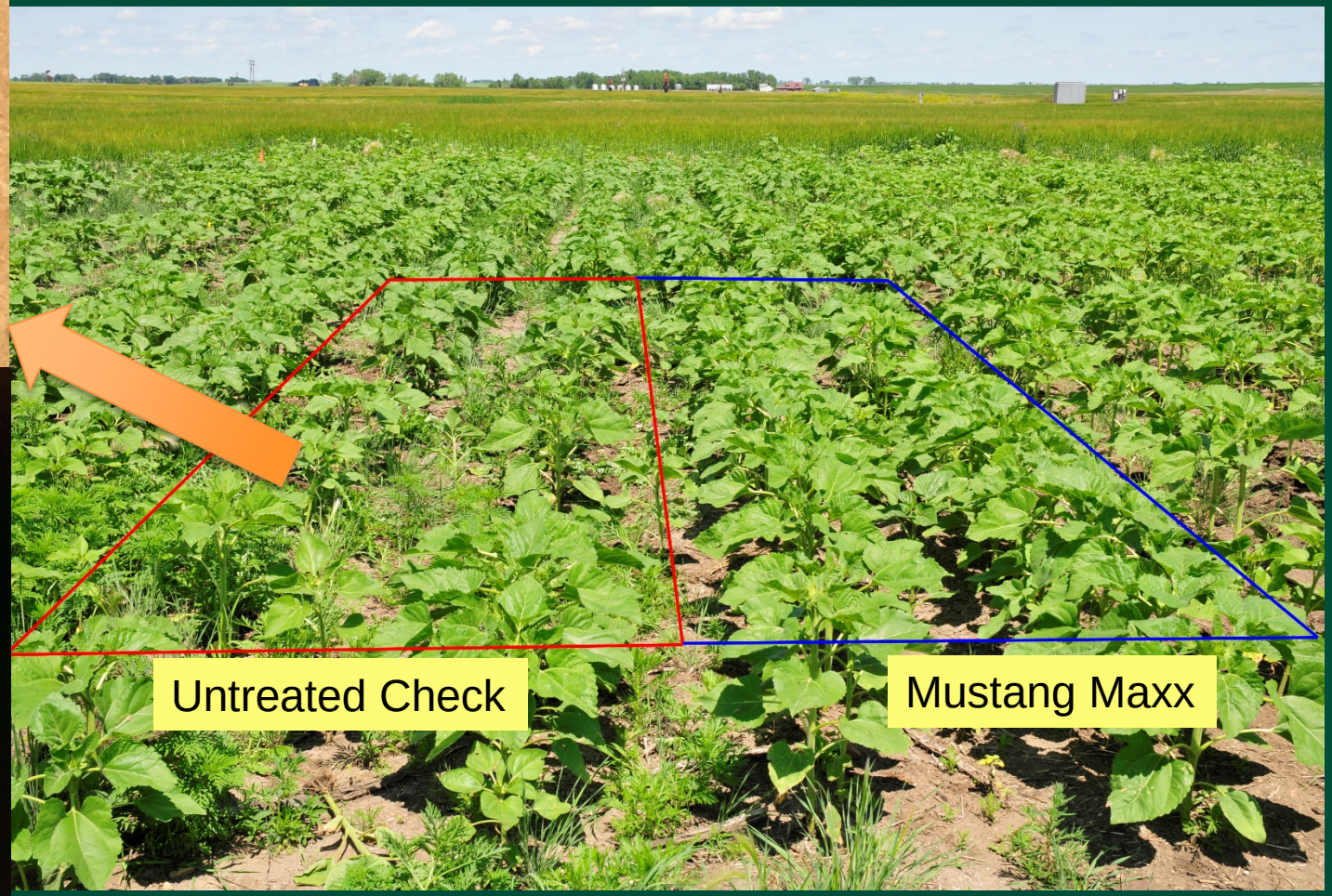


Photo by P. Beauzay

Wireworm ‘Control’

- Current insecticides **do not provide mortality or long-term management of wireworms**
  - Neonicotinoid seed treatments (such as thiamethoxam) cause ‘temporary’ morbidity
  - Pyrethroids are repellents and nonlethal

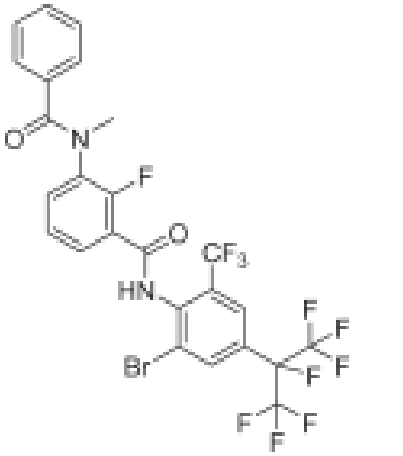
van Herk et al. 2015. Contact behavior and mortality of wireworms exposed to six classes of insecticide applied to wheat seed. J Pest Sci 88: 717-739.

Wireworm Pest Management

- Thiamethoxam seed treatment, in-furrow pyrethroid, and 3rive applications provided ‘improved’ protection over the untreated check
- Consider your crop rotation and know your field history with wireworm pressures
- Weed management
- Adjust seeding rate +10% to compensate for wireworm stand loss
- New Modes of Action – Syngenta and BASF

New Chemistry for Wireworm Control in Cereals from BASF

- Broflanilide, the new Group 30 insecticide
- Teraxxa Insecticide Seed Treatment
- Small grain cereals late this year
  - Crops: wheat, barley, rye, and triticale
- High activity against various pests, including Lepidopteran, Coleopteran, and Thysanopteran pests
- Not seeking registration for Teraxxa in sunflowers



Broflanilide (**1**)
Chemical Class; *Meta*-diamides

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