Comparison of Insecticides and Insecticide Application Methods to Protect Spring-seeded Processing Onions from Seedcorn Maggot and Onion Maggot Damage

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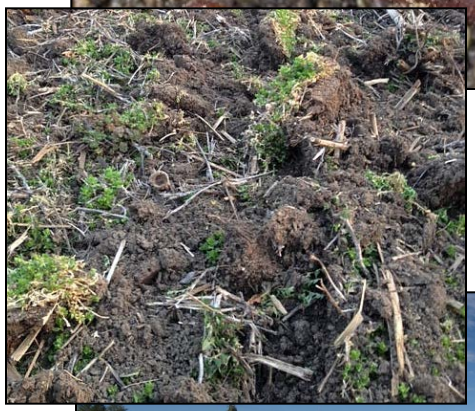
Background

- Early season stand loss from maggots is a regular problem for Tulelake onion growers
- Seedcorn maggot flies are captured in most onion fields during the normal onion planting window between mid-April to mid-May

- Onion maggot flies are often captured starting in mid-May
- Previous research by Wilson and Taylor showed maggots can reduce a onion stand by 65% to 95% of the initial seeding rate without insecticide treatment at planting

Background

- Cool wet weather, early planting dates, and decaying organic matter & plant material help facilitate maggot damage
- Insecticides are the cheapest and most effective treatment to prevent maggot damage
- Proposed regulations to limit chlorpyrifos use due to environmental concerns
- Many growers experienced greater than 15% stand loss regardless of insecticide choice or field location in recent years



2016 Maggot Management Study Objectives

- Evaluate insecticides and insecticide application methods to identify the most efficacious treatment for minimizing onion mortality from maggot feeding
- Test the efficacy of commercially available treatments and several experimental insecticides
- Evaluate different seed treatment methods used alone and in combination with chlorpyrifos to determine their efficacy for maggot control and their compatibility with different onion planter setups

2016 Study Methods

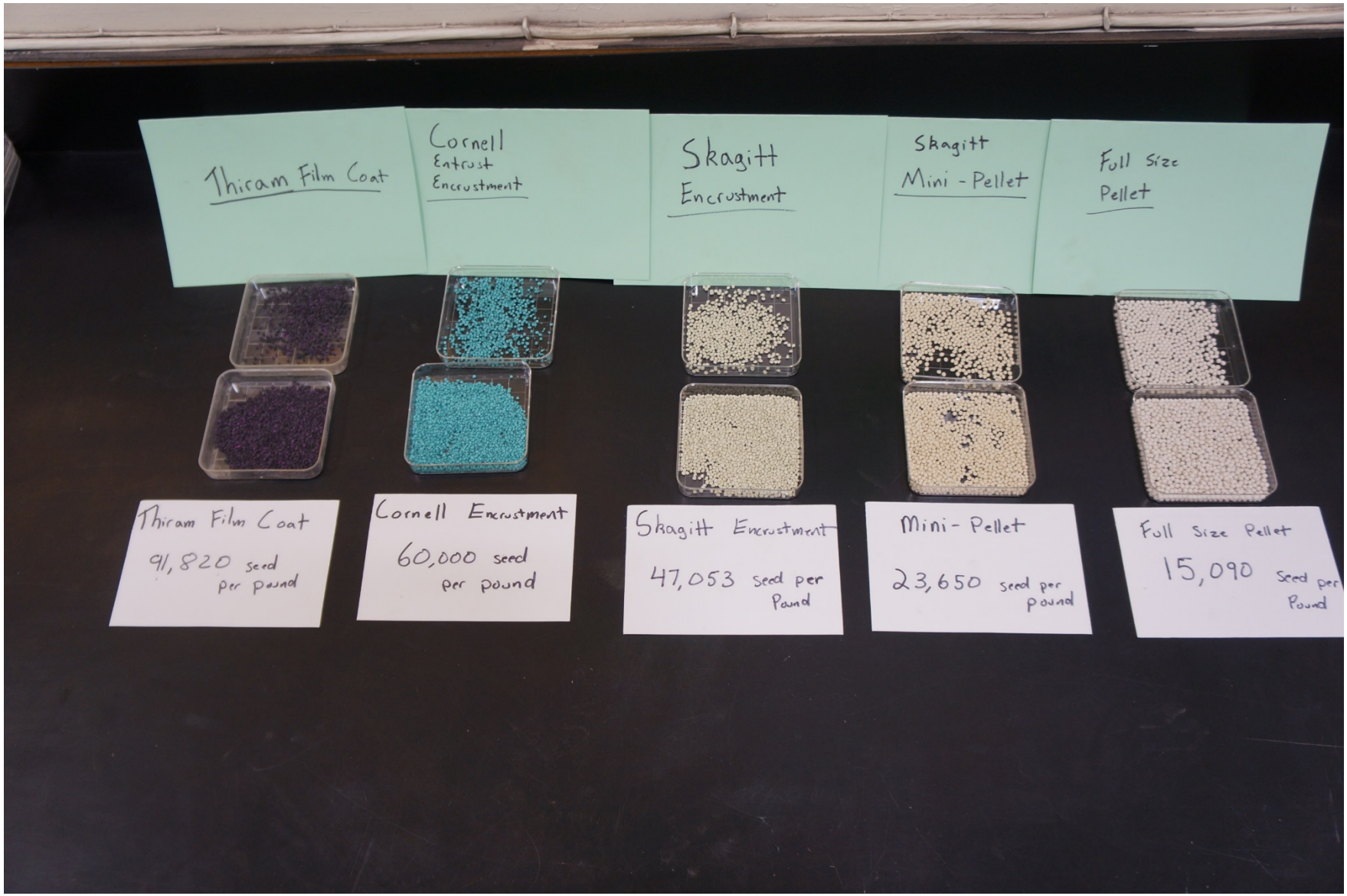
- **Soil type-** mucky silty clay loam- 4.2% OM
- **Growing season-** early May to late September
- **Irrigation –**solid-set sprinklers
- **Onions**- 36 inch beds with 4 seed-lines spaced 6 inches apart; 2 inch seed spacing
- **Design**- RCB with 6 blocks (reps)

Insecticide Application Methods

- Seed treatment
  - Encrustment, mini-pellet, and full-size bb-sized pellet

- In-furrow treatments
  - 3-inch band of insecticide applied directly over the seed after seed placement but before furrow closure using Teejet even fan nozzles mounted on the onion planter

Seed Treatment Options

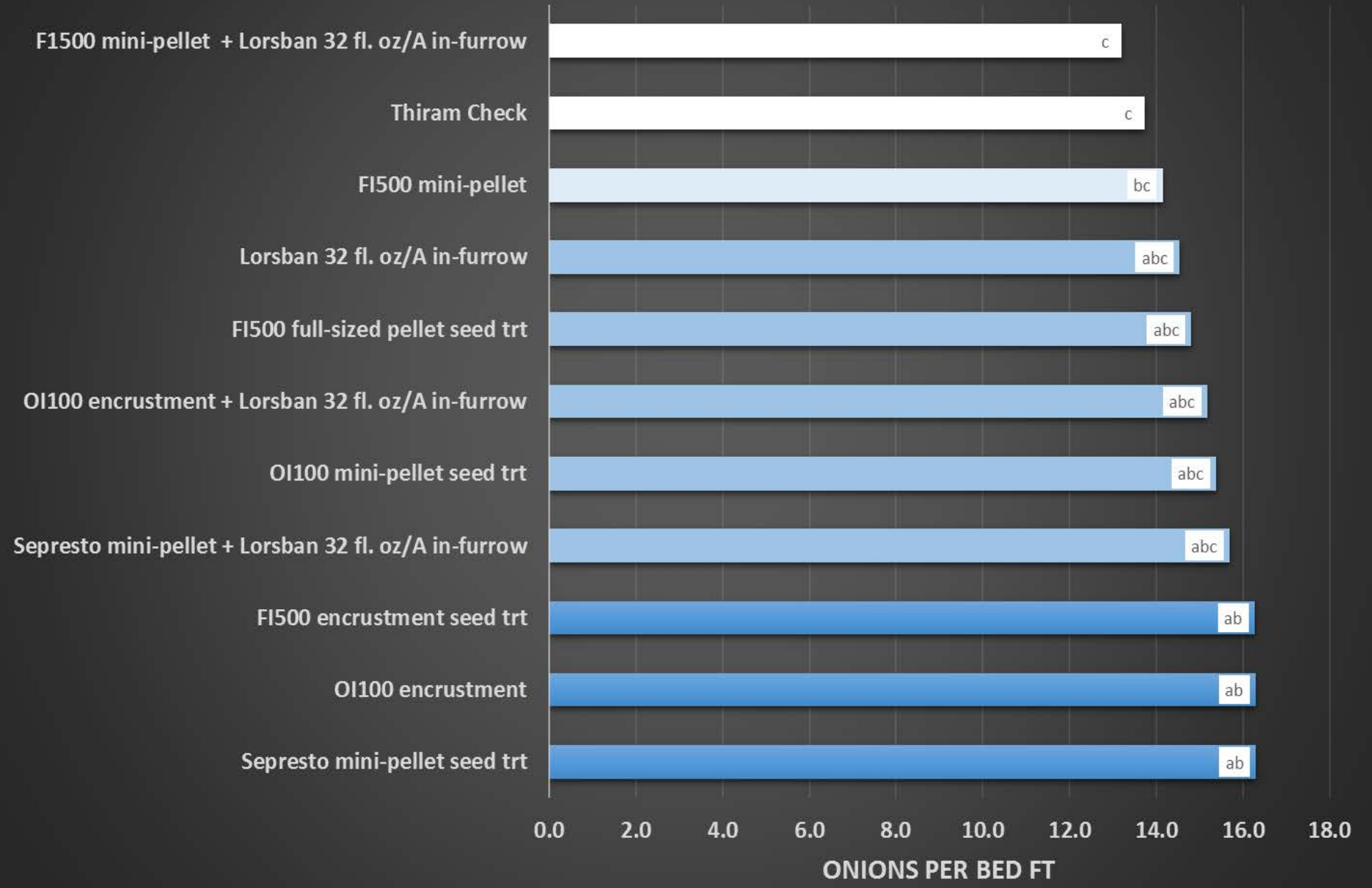


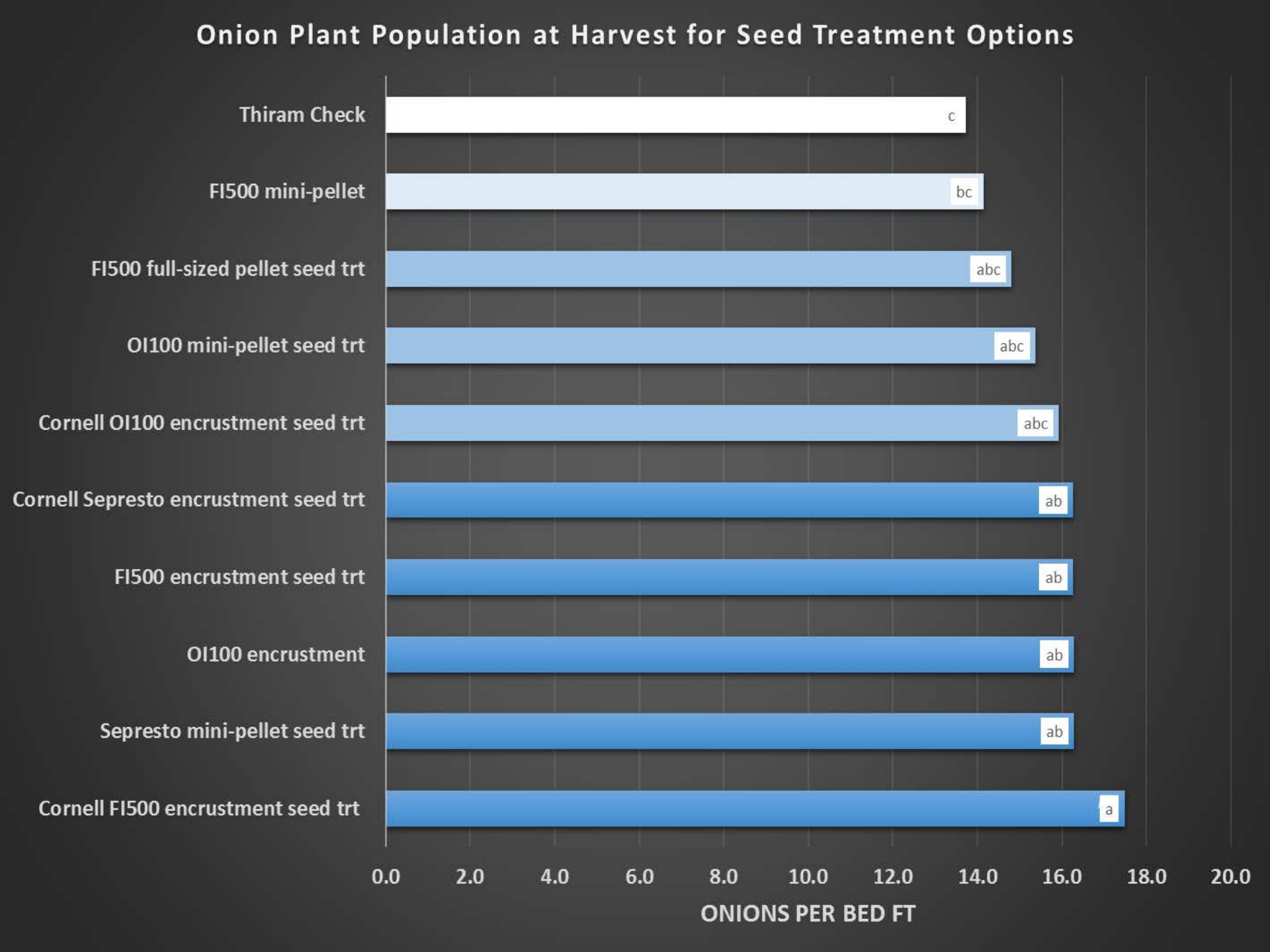
2016 Results


Difference in early season onion plant population for various insecticide treatments

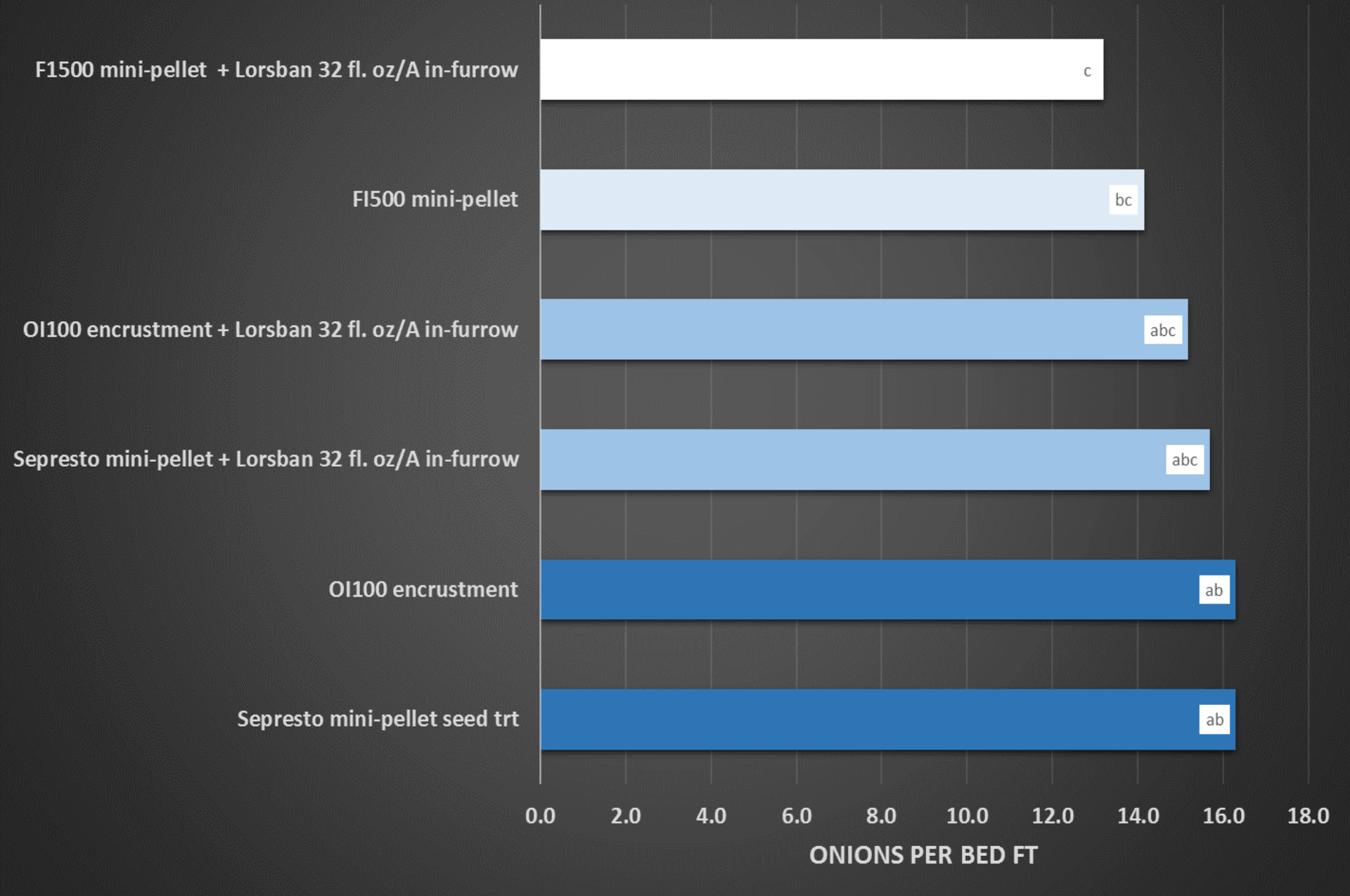
Early season differences in onion plant population are evident through the entire onion growing season to harvest

Onion Plant Population at Harvest for Commercially Available Insecticide Options

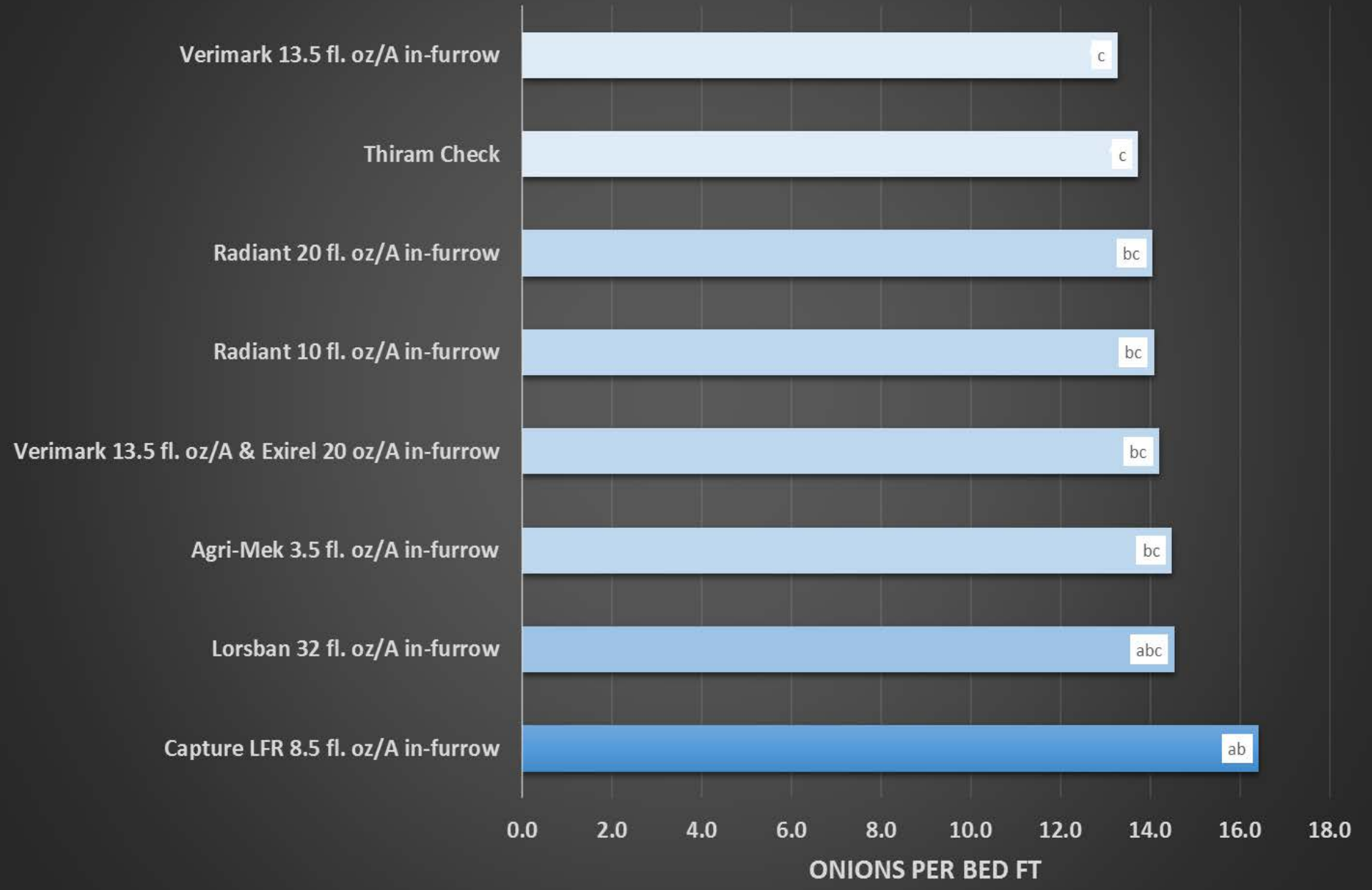


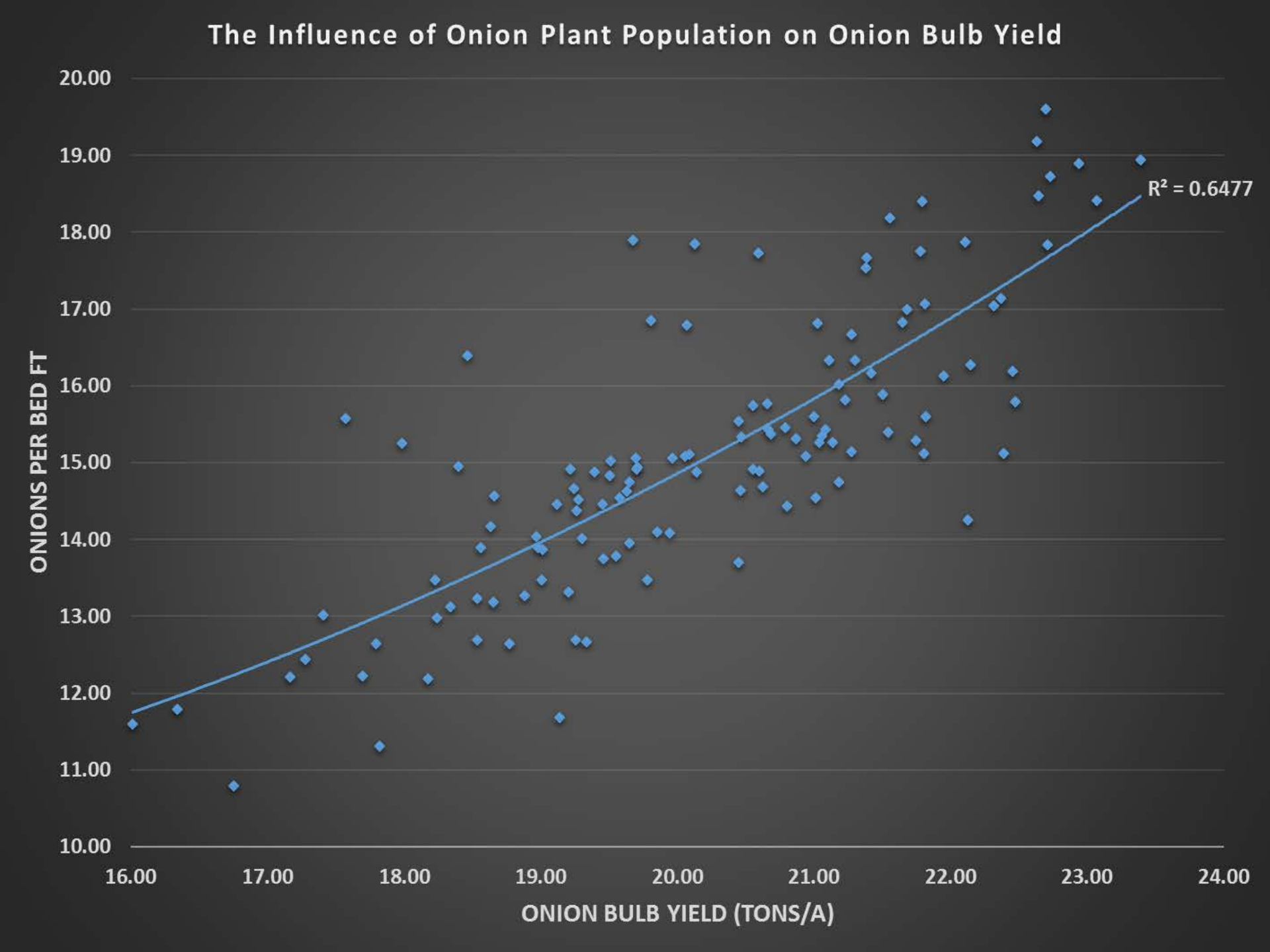

Onion Plant Population at Harvest for Seed Treatment Options
Thiram Check
FI500 mini-pellet
FI500 full-sized pellet seed trt
OI100 mini-pellet seed trt
Cornell OI100 encrustment seed trt
Cornell Sepresto encrustment seed trt
FI500 encrustment seed trt
OI100 encrustment
Sepresto mini-pellet seed trt
Cornell FI500 encrustment seed trt
c
bc
abc
abc
abc
ab
ab
ab
ab
a
0.0
2.0
4.0
6.0
8.0
10.0
12.0
14.0
16.0
18.0
20.0
ONIONS PER BED FT

Onion Plant Population at Harvest for Seed Treatments with and without Lorsban (chlorpyrifos) applied In-furrow



Onion Plant Population at Harvest for Registered and Experimental In-furrow Insecticides




The Influence of Onion Plant Population on Onion Bulb Yield
20.00
19.00
18.00
17.00
16.00
15.00
14.00
13.00
12.00
11.00
10.00
ONIONS PER BED FT
R² = 0.6477
16.00
17.00
18.00
19.00
20.00
21.00
22.00
23.00
24.00
ONION BULB YIELD (TONS/A)

Summary

- Spinosad (OI100 & FI500) and clothianidin (Sepresto) applied as a encrustment seed coating were the most effective labeled insecticide options for minimizing a reduction in onion plant population
- The seed treatments consistently outperform chlorpyrifos (Lorsban) applied in-furrow for minimizing a reduction in onion plant population
- The type of seed coating may influence the efficacy of spinosad on **Tulelake soil** but the trend was not statistically different and more research is needed.

Summary

- Applying chlorpyrifos (Lorsban) in-furrow in combination with spinosad (OI100 & FI500) and clothianidin (Sepresto) seed treatment did not improve onion plant population compared to seed treatment alone
- Bifenthrin (Capture LFR) applied in-furrow appears to be a very promising experimental option for protecting onions from maggot (also supported by Mary Ruth McDonald's research)

Additional Thoughts

- The average onion stand in all insecticide treatments was 20%+ below the desired seeding rate
- Later planting & higher seeding rates
- Incorporate manure, weeds, cover crops, and crop residues in fall or as early in the spring as possible
- Olfactory cues and contact cues created by tillage trigger egg laying. Can we alter the timing of tillage and/or duration between tillage and onion planting to reduce maggot damage?

Thank You

- California Garlic and Onion Research Advisory Board
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- Tulelake Grower Cooperators
- IREC Staff