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

Rob Wilson
UC IREC Director/Farm Advisor
Co-authors

Darrin Culp, IREC Superintendent
Kevin Nicholson, IREC Staff Research Assoc.
Skyler Peterson, IREC Staff Research Assoc.
Alan Taylor, Cornell University

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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

- Thiram Film Coat: 91,820 seed per pound
- Cornell Encrustment: 60,000 seed per pound
- Skagit Encrustment: 47,053 seed per pound
- Skagit Mini-Pellet: 23,650 seed per pound
- Full Size Pellet: 15,090 seed per pound
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

- F1500 mini-pellet + Lorsban 32 fl. oz/A in-furrow
- Thiram Check
- FI500 mini-pellet
- Lorsban 32 fl. oz/A in-furrow
- FI500 full-sized pellet seed trt
- OI100 encrustment + Lorsban 32 fl. oz/A in-furrow
- OI100 mini-pellet seed trt
- Sepresto mini-pellet + Lorsban 32 fl. oz/A in-furrow
- FI500 encrustment seed trt
- OI100 encrustment
- Sepresto mini-pellet seed trt

ONIONS PER BED FT

0.0  2.0  4.0  6.0  8.0  10.0  12.0  14.0  16.0  18.0
Onion Plant Population at Harvest for Seed Treatment Options

- Thiram Check
- FI500 mini-pellet
- FI500 full-sized pellet seed trt
- O1100 mini-pellet seed trt
- Cornell O1100 encrustment seed trt
- Cornell Sepresto encrustment seed trt
- FI500 encrustment seed trt
- O1100 encrustment
- Sepresto mini-pellet seed trt
- Cornell FI500 encrustment seed trt

ONIONS PER BED FT

Legend:
- a
- b
- c
- abc
- ab
Onion Plant Population at Harvest for Seed Treatments with and without Lorsban (chlorpyrifos) applied In-furrow

- F1500 mini-pellet + Lorsban 32 fl. oz/A in-furrow: c
- FI500 mini-pellet: bc
- OI100 encrustment + Lorsban 32 fl. oz/A in-furrow: abc
- Sepresto mini-pellet + Lorsban 32 fl. oz/A in-furrow
- OI100 encrustment: ab
- Sepresto mini-pellet seed trt: ab
Onion Plant Population at Harvest for Registered and Experimental In-furrow Insecticides

- Verimark 13.5 fl. oz/A in-furrow
- Thiram Check
- Radiant 20 fl. oz/A in-furrow
- Radiant 10 fl. oz/A in-furrow
- Verimark 13.5 fl. oz/A & Exirel 20 oz/A in-furrow
- Agri-Mek 3.5 fl. oz/A in-furrow
- Lorsban 32 fl. oz/A in-furrow
- Capture LFR 8.5 fl. oz/A in-furrow

ONIONS PER BED FT

0.0 2.0 4.0 6.0 8.0 10.0 12.0 14.0 16.0 18.0
The Influence of Onion Plant Population on Onion Bulb Yield

ONIONS PER BED FT

ONION BULB YIELD (TONS/A)

R² = 0.6477
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

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