Management of Maggots in Processing Onions

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Early season stand loss from maggot is a regular problem for Tulelake onion growers.

In recent years growers reported significant stand loss in Lorsban-treated fields.

The Tulelake NWR is prohibiting the use of chlorpyrifos on lease lands due to environmental concerns.
In 2011 and 2012, a maggot control study was conducted in Tulelake with funding support from the California Garlic and Onion Research Board.

Study objectives were to compare insecticides and insecticide application methods (in-furrow at planting versus seed treatment) to the current in-furrow standard (Lorsban).
Insecticide Application Methods

- **Seed treatment**
  - Sepresto, Entrust, and Cruiser applied via encrustment by Alan Taylor at Cornell University
  - FarMore applied as a pellet coating (BB size)

- **In-furrow treatments**
  - Teejet AI nozzles mounted on the onion planter applied a 4-inch band directly over the seed after seed placement but before furrow closure

- **Rototill incorporated before planting**
  - Broadcast applied over the top of the bed and then immediately incorporated in the top 4 inches of soil with a 2-row tiller/bed shaper
Our technique for assuring a high maggot population
Total Maggot Fly Counts in 2011
Both Seed Corn Maggot and Onion Maggot were captured
Total Onion and Seed Corn Maggot Fly Counts in 2012

6% to 30% seed corn maggot
Influence of Insecticide Seed Treatments on Onion Stand Density at the 3-leaf Stage Averaged Across 2011 and 2012 Trials at IREC

- Sepresto (clothianidin+imidacloprid) seed trt
- Entrust (spinosad) seed trt
- FarMoreF1500 (thiamethoxam + spinosad) pelleted seed trt
- Cruiser (thiamethoxam) seed trt
- Untreated Control with Thiram
- Untreated seed-raw seed

Error Bar = 95% Confidence Interval
Influence of Insecticide Seed Treatments on Onion Yield Averaged Across 2011 and 2012 Trials at IREC

- Sepresto (clothianidin+imidacloprid) seed trt
- Entrust (spinosad) seed trt
- FarMoreFI500 (thiamethoxam + spinosad) pelleted seed trt
- Cruiser (thiamethoxam) seed trt
- Untreated Control with Thiram
- Untreated seed-raw seed

Error Bar = 95% Confidence Interval

Onion Yield (tons/acre)
In-furrow at Planting
Influence of Insecticides Applied In-furrow at Planting on Onion Stand at the 3-Leaf Stage Averaged Across 2011 and 2012 Trials at IREC

(Sepresto Seed Treatment included for comparison)

- Sepresto (clothianidin+imidacloprid) seed trt
- Lorsban 4E (chlorpyrifos) 32 fl oz/A in-furrow at planting
- Lorsban 15-G (chlorpyrifos) 6.6 lbs/A in-furrow at planting
- Untreated Control with Thiram
- Entrust (spinosad) 6 oz/A in-furrow at planting
- Admire Pro (imidacloprid) 7 fl oz/A in-furrow at planting
- Admire Pro (imidacloprid) 14 fl oz/A in-furrow at planting

Error Bar = 95% Confidence Interval

Onion Plants per Plot
Influence of Insecticides Applied In-furrow at Planting on Onion Yield
Averaged Across 2011 and 2012 Trials at IREC
(Sepresto Seed Treatment included for comparison)

- Sepresto (clothianidin+imidacloprid) seed trt
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Error Bar = 95% Confidence Interval

Onion Yield (tons/acre)
Rototill-incorporated Before Planting
Influence of Spinosad and Imidacloprid Application Method on Onion Stand at the 3-leaf Stage in 2012 at IREC

- Entrust (spinosad) seed trt
- Entrust (spinosad) 6 oz/A in-furrow at planting
- Entrust (spinosad) 6 oz/A rototill before planting
- Entrust (spinosad) 3 oz/A + 3 oz/A split applied rototill and in-furrow

- Admire Pro (imidacloprid) 14 fl oz/A in-furrow at planting
- Admire Pro (imidacloprid) 14 fl oz/A rototill before planting
- Amire Pro (imidacloprid) 7 fl oz/A + 7 fl oz/A split applied rototill and in-furrow

Error Bar = 95% Confidence Interval

Onion Plants per Plot [0-800]
Oxamyl and Imidacloprid
Influence of Oxamyl and Imidacloprid on Onion Stand at the 3-leaf Stage in 2012 at IREC

- Untreated Control with Thiram
- Vydate (oxamyl) 32 fl oz/A in-furrow at planting
- Vydate 64 fl oz/A water-incorporated 1st irrigation after planting
- Admire Pro (imidacloprid) 14 fl oz/A in-furrow at planting
- Admire Pro (imidacloprid) 14 fl oz/A rototill before planting
- Amire Pro (imidacloprid) 7 fl oz/A + 7 fl oz/A split applied rototill and in-furrow

Error Bar = 95% Confidence Interval
Influence of Oxamyl and Imidacloprid on Onion Yield in 2012 at IREC

Sepresto Seed Treatment included for comparison

- Sepresto (clothianidin+imidacloprid) seed trt
- Untreated Control with Thiram
- Vydate (oxamyl) 32 fl oz/A in-furrow at planting
- Vydate 64 fl oz/A water-incorporated 1st irrigation after planting
- Admire Pro (imidacloprid) 14 fl oz/A in-furrow at planting
- Admire Pro (imidacloprid) 14 fl oz/A rototill before planting
- Amire Pro (imidacloprid) 7 fl oz/A + 7 fl oz/A split applied rototill and in-furrow

Error Bar = 95% Confidence Interval

Onion Yield
Products with clothianidin (Sepresto) and spinosad (Entrust, Regard, or FarMore) applied as a seed treatment provided superior protection from maggot damage compared to the current standard Lorsban.

Syngenta labeled FarMore FI-500 and OI-100 for seed treatment in CA.
- FarMore FI-500 (fludioxonil-Maxim, azoxystrobin-Dynasty, mefenoxam- Apron, spinosad-Regard, and thiamethoxam-Cruiser) applied as pellet form
- OI-500 (spinosad- Regard or Entrust) applied as film coat or encrustment
- Cost probably around $100 to $140 per acre depending on seeding rate
2012 Weed Control Study

- Improve control of problem weeds (kochia, common lambsquarters, & pigweed)
- Large field-size studies using grower application equipment (solid-set sprinkler chemigation)
- Investigate herbicide tank-mixes and sequential herbicide application strategies
Kochia Control Results

- Dacthal applied at post-plant and Prowl H20 applied at loop provided the best pre-emergence control
  - Preemergence herbicides alone did not provide acceptable control of kochia.
- GoalTender at 1.5 leaf stage and Goal + Buctril at 2.5 leaf stage was the best postemergence program!
- Starane (fluroxypyr) applied between 4-5 leaf stage controlled kochia up to 6 inches tall, but it’s not labeled in CA
Does Starane have a fit in CA?

- Weeds Starane controls: kochia, clover, ragweed, potatoes, chickweed, purslane, and morningglory

- Weeds Starane suppresses: field bindweed, horseweed, and Russian thistle

- Starane caused significant crop injury (laid onions flat) but it did not reduce yields in IREC trials. Works best split-applied at high GPA.
Lambsquarter and Pigweed Control Results
Lambsquarter Density at 4-leaf stage at the Grower Site with Sandy Loam Soil in 2012

- **GoalTender at 1.5 leaf & Goal + Outlook at 2.5 leaf**
  - No Herbicide at planting or loop
  - Nortron 16 fl oz/A at planting & Prowl H20 at loop
  - Dacral at 2.5 pt/A at planting & Prowl H20 at loop
  - Nortron 16 fl oz/A at planting
  - Dacral at 5 pt/A at planting
  - Prowl H20 at loop

- **GoalTender at 1.5 leaf & Goal+ Buctril 2.5 leaf**

Y-axis: lambsquarter plants per 180 ft²
Pigweed Density at 4-leaf stage at the Grower Site with Sandy Loam Soil in 2012

- No Herbicide at planting or loop
- Nortron 16 fl oz/A at planting & Prowl H2O at loop
- Dacthal 2.5 pt/A at planting & Prowl H2O at loop
- Nortron 16 fl oz/A at planting
- Dacthal 5 pt/A at planting
- Prowl H2O at loop

pigweed plants per 180 ft²
5 leaf stage
No herbicide at planting or loop
Yield Results
Yield Results

- Dacthal at 5 pts/A applied at planting and Prowl H20 at loop stage did not reduce yield in any of the trials
- Nortron caused onion injury and a slight yield reduction when applied on sandy loam soil
- Crop safety was excellent when Nortron was applied to onions on clay loam soil
- Goal + Buctril + Outlook reduced onion yield in multiple trials
Onion Yield at the Grower Site with *Sandy Loam Soil* in 2012

- **No Herbicide at planting or loop**
- **Nortron 16 fl oz/A at planting & Prowl H20 at loop**
- **Dacthal at 2.5 pt/A at planting & Prowl H20 at loop**
- **Nortron 16 fl oz/A at planting**
- **Dacthal at 5 pt/A at planting**
- **Prowl H20 at loop**

![Bar chart showing onion yield for different treatments with sandy loam soil in 2012.](chart)

**Onion Yield (tons/acre)**
Summary

- Dacthal at planting or Prowl H2O applied at loop improved weed control with excellent crop safety.
- Weeds that escaped Prowl H2O treatment grew slower and were more susceptible to postemergence herbicides.
- Reduced Dacthal rates (below 5 pt/A) were possible when combined with Prowl H2O applied at loop.
- Nortron was most effective when combined with Prowl H2O at loop.
Goal Tender at 1.5 –leaf is an important treatment to control weed seedlings and slow growth of larger weeds

- Avoid Goal applications after 4-5 leaf stage
- Make sure sprinkler coverage is uniform when chemigating herbicides!
Thank You

- IREC Staff
- California Garlic and Onion Research Advisory Board
- Sensient and Olam International
- DuPont, Dow AgroScience, Syngenta, Bayer CropScience, Amvac, BASF
- McKoen Farms, Macy’s Flying Service, and Basin Fertilizer
- Alan Taylor, Cornell University