OSWEGO ONION GROWER TWILIGHT MEETING- Ashley Leach, Erica Moretti, and Brian Nault
Cornell University August 22nd, 2018

Project 1: Interaction of thrips control and Stemphylium leaf blight disease

Objective: Determine if insecticide use reduces severity of Stemphylium leaf blight in the field

Stemphylium leaf blight symptoms were recorded in **four treatments:**

1) Untreated control (no fungicide or insecticide)
2) Fungicide only (Luna Tranquility at 27 fl oz/acre for 5 weeks)
3) Insecticide only (Radiant SC at 10 fl oz for 5 weeks)
4) Both fungicide and insecticide (Luna Tranquility at 27 fl oz/acre and Radiant SC at 10 fl oz/acre for 5 weeks)

Results

» Insecticide usage reduced thrips densities, and numbers of SLB lesions on leaves (Fig. 1a and b).

» The combination of fungicide and insecticide had the lowest levels of leaf dieback (62%), however was not significantly different from the insecticide only treatment (62%) (Fig. 1c). Dieback was mostly caused by thrips.

» Most onions in the untreated control died without successfully lodging (Fig. 2)

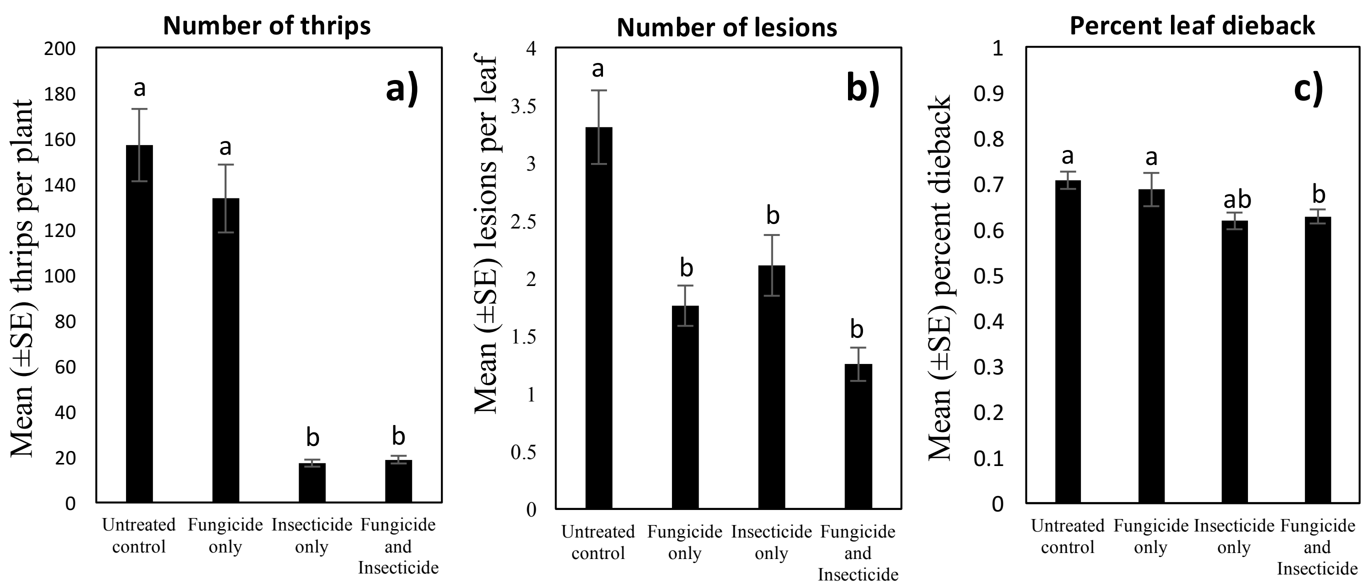


Figure 1: a) mean number of thrips per leaf, b) mean number of lesions per leaf by a visual estimate, c) mean percent of onion tissue dead. All graphs show the means from the entire 5-week data collection period.

Untreated control **Fungicide only** **Insecticide only** **Fungicide and Insecticide**

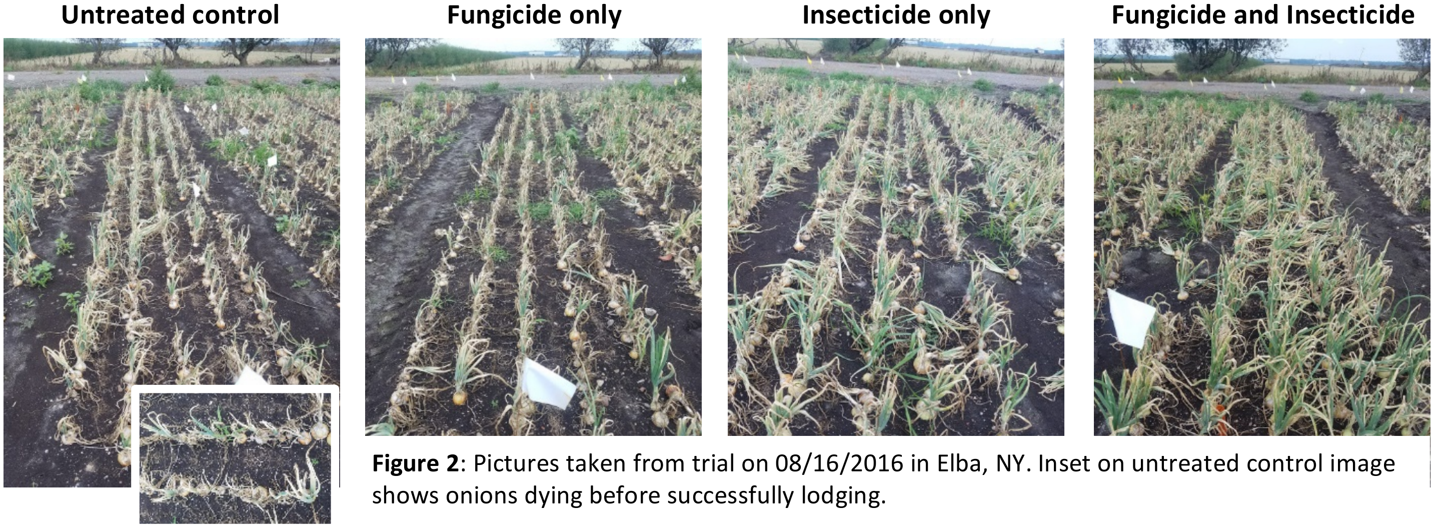


Figure 2: Pictures taken from trial on 08/16/2016 in Elba, NY. Inset on untreated control image shows onions dying before successfully lodging.

Project 2: Evaluating cultivar x nitrogen rates to reduce onion thrips densities and bacterial bulb rot

Objective: Determine the cultivar x nitrogen treatment that best reduces onion thrips densities and bacterial bulb rot without compromising marketable yield.

Onion thrips densities, bacterial bulb rot, and marketable yield were recorded in **ten treatments:**

1) **AVALON** x 0 lbs. N/A = **0 lbs. N total**
2) **AVALON** x 60 lbs. N/A at planting = **60 lbs. N total**
3) **AVALON** x 60 lbs. N/A at planting + 15 lbs. N/A = **75 lbs. N total**
4) **AVALON** x 60 lbs. N/A at planting + 45 lbs. N/A = **105 lbs. N total**
5) **AVALON** x 60 lbs. N/A at planting + 75 lbs. N/A = **135 lbs. N total**
6) **BRADLEY** x 0 lbs. N/A = **0 lbs. N total**
7) **BRADLEY** x 60 lbs. N/A at planting = **60 lbs. N total**
8) **BRADLEY** x 60 lbs. N/A at planting + 15 lbs. N/A = **75 lbs. N total**
9) **BRADLEY** x 60 lbs. N/A at planting + 45 lbs. N/A = **105 lbs. N total**
10) **BRADLEY** x 60 lbs. N/A at planting + 75 lbs. N/A = **135 lbs. N total**

Results

» Seasonal numbers of onion thrips densities were not impacted by nitrogen rate in 2017 (Fig. 3a). Densities were only significantly reduced by cultivar (Fig. 3b).

» In 2017, incidence of bacterial bulb rot was significantly higher in plots fertilized with nitrogen as compared to unfertilized onions (Fig. 4a- graph on page 3). Data collected from 2018 appears to be consistent with 2017 results, and onions fertilized with nitrogen have more rotten bulbs as compared to unfertilized treatments (data not shown).

» Marketable yields were significantly impacted by nitrogen rate. Onions that received fertilizer had statistically similar yields; however, onions that were not fertilized had 60% lower yields (Fig. 5- graph on page 3).

Number of thrips

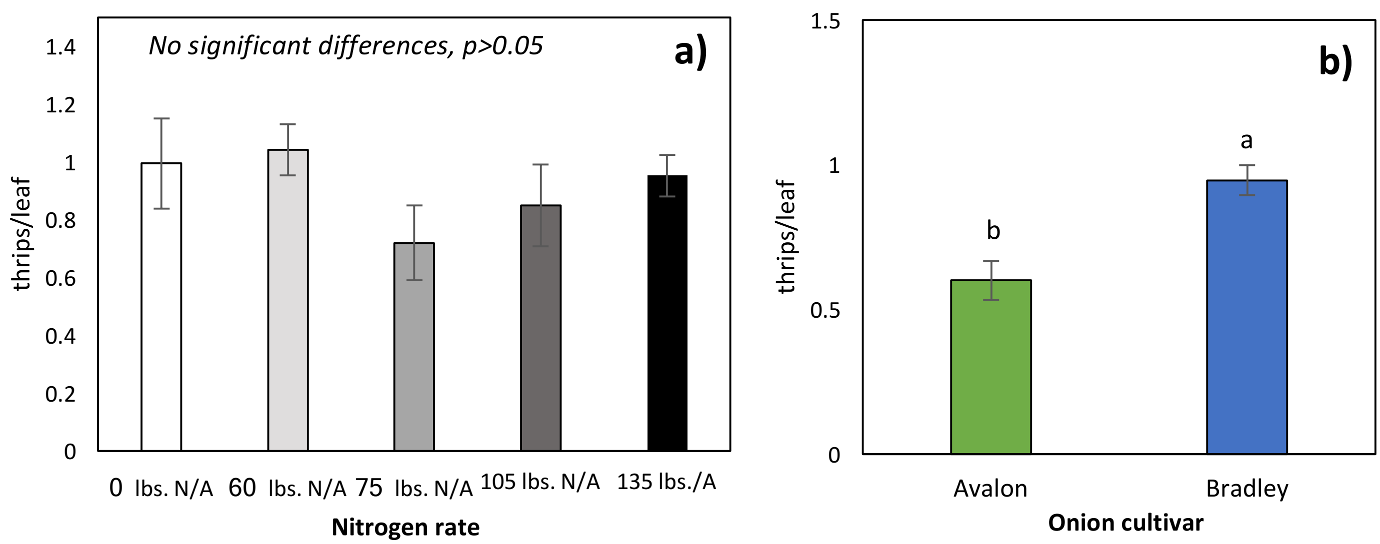


Figure 3: a) mean number of thrips per leaf within 5 different rates of nitrogen, and b) mean number of thrips per leaf within 2 onion cultivars.

Bacterial bulb rot

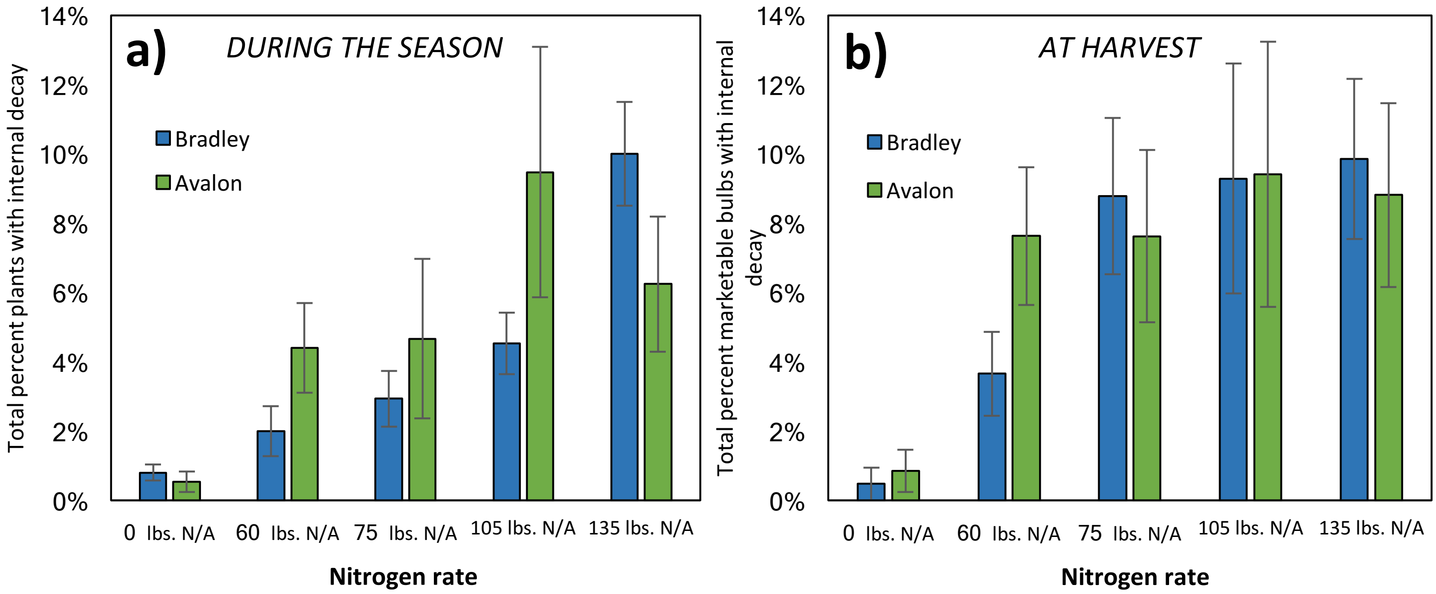


Figure 4: Total percent onions with bacterial rot symptoms during the 2017 growing season (a) and at harvest (b) within differing rates of nitrogen (0, 60, 75, 105, and 135 lbs. of N per acre) and two onion cultivars, 'Avalon' and 'Bradley'.

Marketable yield

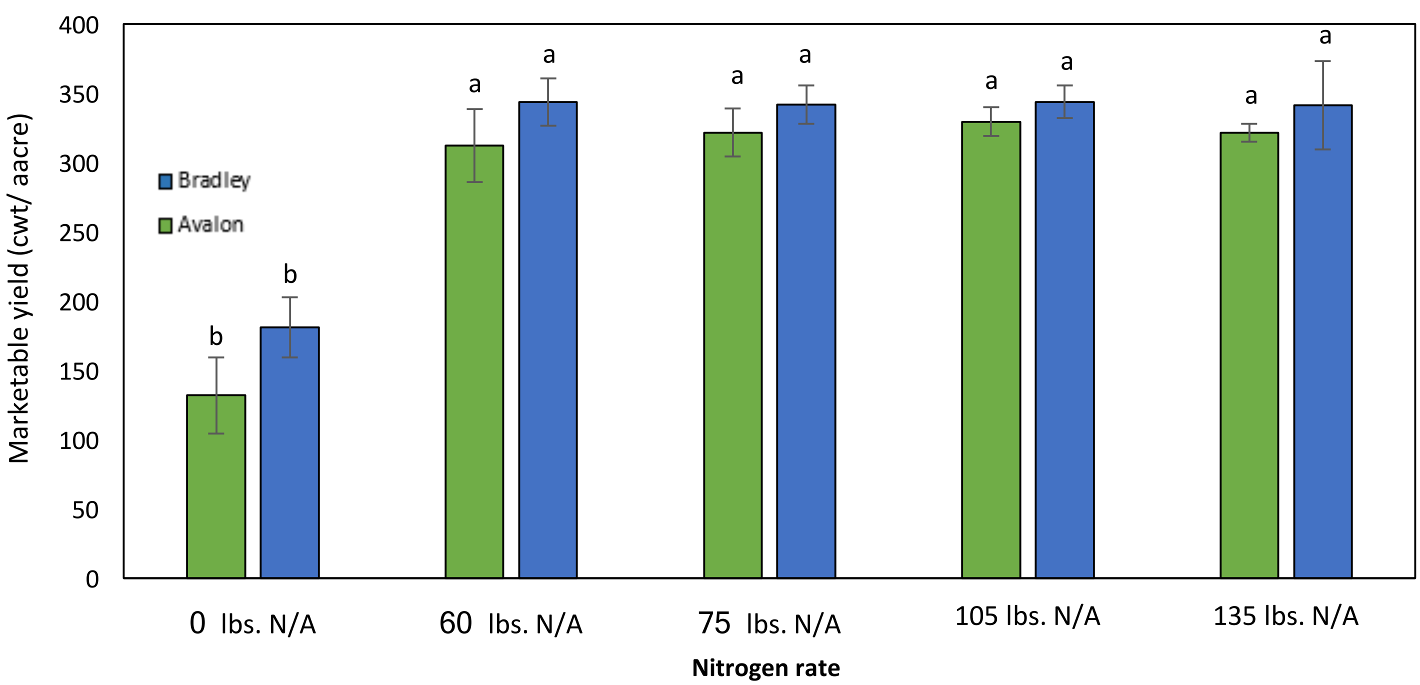


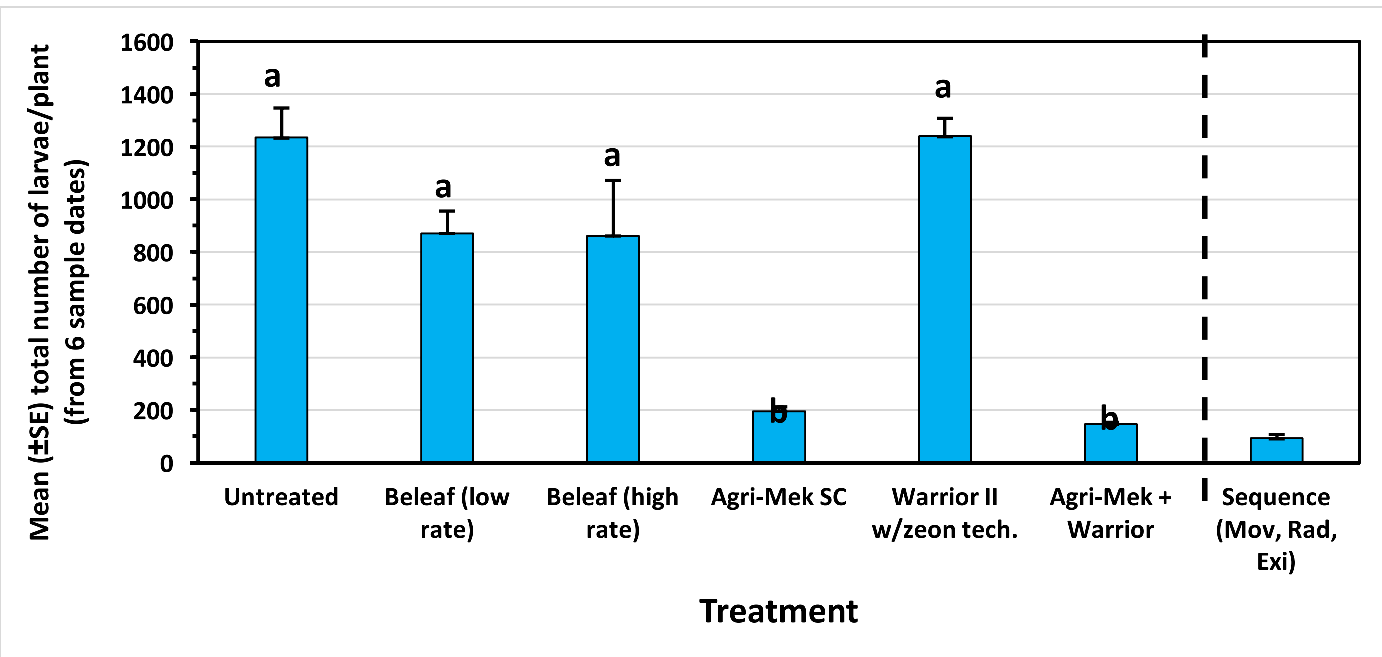
Figure 5: Marketable yield in 2017 in 'Bradley' and 'Avalon' within differing rates of nitrogen (0, 60, 75, 105, and 135 lbs. of N per acre).

Question 1: **a) Will Agri-mek SC co-applied with Warrior II be more effective against thrips than without it, and b) how does the new product, Beleaf, manage thrips infestations compared with these treatments?**

Approach: Treatments were arranged in a RCBD replicated 4 times. Applications were made 6 times on 7/3, 7/9, 7/16, 7/23, 7/30 and 8/6. Dyne-Amic was included at 0.25% v:v.

Treatment[a]	Chemical	Rate (amount product/acre)	Company
Agri-Mek SC	abamectin	3.5 fl oz	Syngenta
Warrior II w/zeon technology	lambda-cyhalothrin	1.92 fl oz	Syngenta
Agri-Mek SC + Warrior II w/zeon tech.	abamectin + lambda-cyhalothrin	3.5 fl oz + 1.92 fl oz	Syngenta
Beleaf	flonicamid	2.8 and 4.3 oz	FMC

Results:



[a] Means followed by the same letter are not significantly different ($P > 0.05$; Tukey's Studentized Range [HSD] Test; n= 4). Data we transformed using a $\log_{10}(x + 1)$ function before analysis, but untransformed means are presented.

Outcomes:

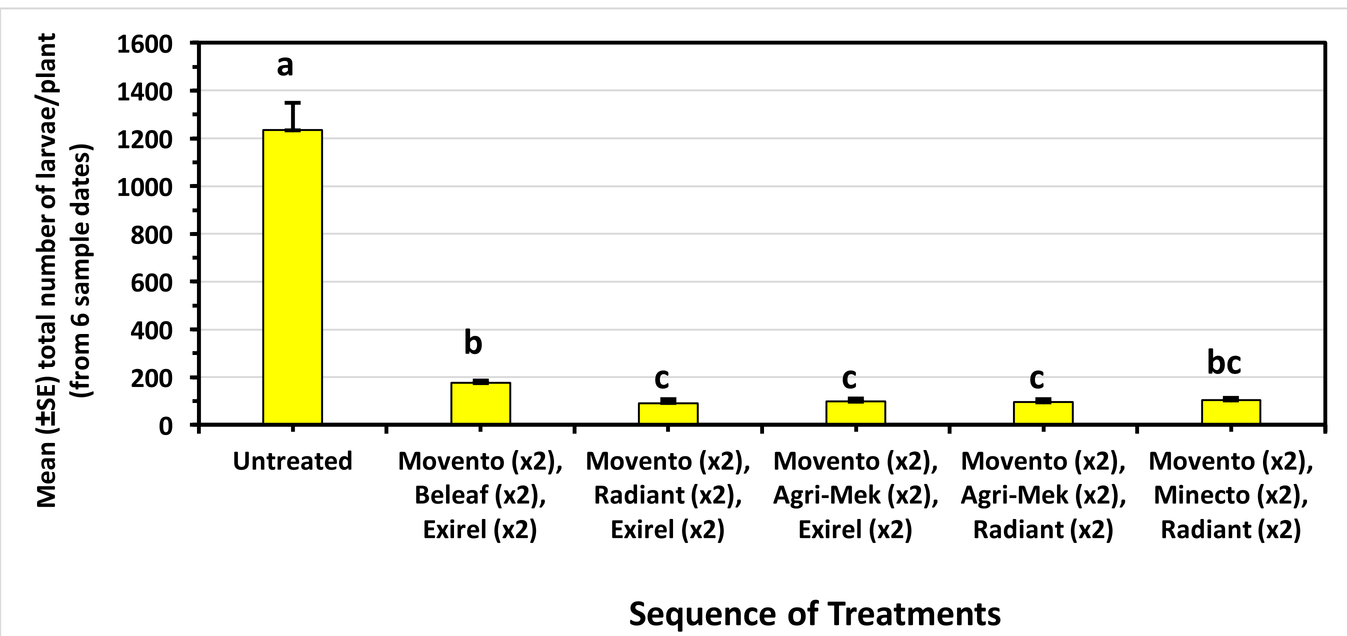
- **Adding Warrior to Agri-Mek did not significantly improve thrips control; Warrior was ineffective against thrips.**
- **Agri-Mek was effective against thrips, even under high thrips pressure in this trial.**
- **Beleaf failed to control onion thrips and did not differ significantly from the control.**

Question 2: **After beginning a sequence of insecticides with Movento, where should other products be placed in a sequence to provide the best season-long thrips control?**

Approach: Treatments were arranged in a RCBD replicated 4 times. Applications were made 6 times on 7/3, 7/9, 7/16, 7/23, 7/30 and 8/6. Dyne-Amic was included at 0.25% v:v.

Treatment (week numbers applied)	Chemical	Rate (amount product/acre)
Untreated	-	-
Movento (1,2), Beleaf (low rate) (3,4), Exirel (5,6)	spirotetramat, flonicamid, cyantraniliprole	5 fl oz, 2.8 oz, 13.5 fl oz
Movento (1,2), Radiant (3,4), Exirel (5,6)	spirotetramat, spinetoram, cyantraniliprole	5 fl oz, 8 fl oz, 13.5 fl oz
Movento (1,2), Agri-Mek (3,4), Exirel (5,6)	spirotetramat, abamectin, cyantraniliprole	5 fl oz, 3.4 fl oz, 13.5 fl oz
Movento (1,2), Agri-Mek (3,4), Radiant (5,6)	spirotetramat, abamectin, spinetoram	5 fl oz, 3.4 fl oz, 8 fl oz
Movento (1,2), Minecto Pro (3,4), Radiant (5,6)	spirotetramat, abamectin+cyantraniliprole, spinetoram	5 fl oz, 7 fl oz, 8 fl oz

Results:



* Means followed by the same letter are not significantly different ($P > 0.05$; Tukey's Studentized Range [HSD] Test; n= 4). Data were transformed using a $\log_{10}(x + 1)$ function before analysis, but untransformed means are presented.

Outcome:

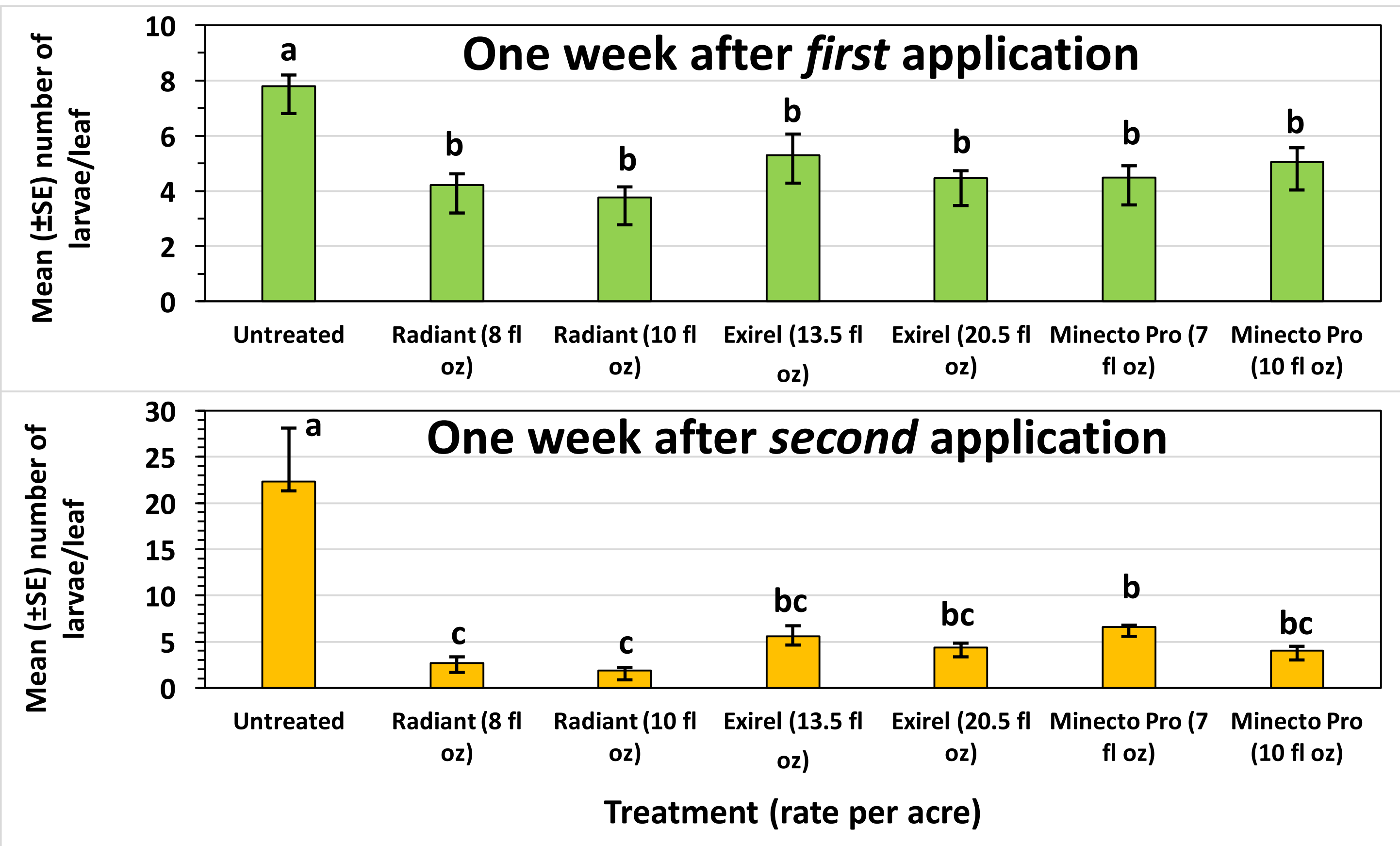
- **Thrips control was effective using all sequences of treatments; however, control was significantly lower when Beleaf was included in the sequence compared with all others.**

Question 3: **Could newer products like Exirel and Minecto Pro take down a "runaway" onion thrips infestation?**

Approach: Treatments were arranged in a RCBD replicated 4 times. Applications were made 2 times on 7/16 and 7/23. Induce was included at 0.5% v:v.

Product	Chemical	Rates evaluated
Untreated	-	-
Radiant SC	spinetoram	8 fl oz/acre & 10 fl oz/acre
Exirel	cyantraniliprole	13.5 fl oz/acre & 20.5 fl oz/acre
Minecto Pro	cyantraniliprole + abamectin	7 fl oz/acre & 10 fl oz/acre

Results:



* Means followed by the same letter are not significantly different (*P*> 0.05; Tukey's Studentized Range [HSD] Test; n= 4). Data were transformed using a $\log_{10}(x + 1)$ function before analysis, but untransformed means are presented.

Outcomes:

- **One week after the first application, all products significantly reduced thrips densities, but none were reduced to an acceptable level.**
- **One week after the second application, both rates of Radiant provided the best thrips control, although levels did not differ significantly from the others, except Minecto @ 7 fl oz.**
- **Only Radiant at 10 fl oz/acre reduced thrips density to below 2 thrips per plant.**

Question 4: How effective is Sepresto seed treatment compared with other insecticide seed treatments like FarMore FI500 and Trigard for onion maggot control?

Approach: Insecticides were applied to seeds of the cultivar 'Lasalle' (Seminis) by Dr. A. Taylor. Treatments were arranged in a RCBD replicated 5 times. Trial was planted on 18 and 27 April 2017 and 2018, respectively, in **Oswego Co**. In June and July, all maggot damaged onion plants were recorded weekly until most first-generation larvae had pupated (early July). Before the second generation emerged, a final plant stand count was taken in all plots. **NOTE**: Dithane F45 Rainshield was applied in furrow at planting in **treatments #1-7** to control onion smut, but not **treatment #8**.

#	Treatment	Mean (±SEM) percent plants killed by maggots 2017	2018
1	No insecticide control+ Dynasty + Maxim + Apron XL + Pro-Gro	**87 ± 5 a**	**86 ± 5 a**
2	Sepresto + Dynasty + Maxim + Apron XL + Pro-Gro	**61 ± 5 b**	**71 ± 9 ab**
6	Sepresto + Thiram +Penflufen	**62 ± 4 b**	**48 ± 8 cd**
8	Sepresto + Thiram +Penflufen ONLY	**68 ± 6 b**	**39 ± 7 de**
3	Regard + Cruiser + Dynasty + Maxim + Apron XL (=FarMore FI500) + Pro-Gro	**29 ± 3 d**	**56 ± 6 bc**
4	Regard + Dynasty + Maxim + Apron XL + Pro-Gro	**44 ± 6 c**	**57 ± 6 bc**
7	Entrust only (=FarMore OI100)	**46 ± 9 c**	**57 ± 4 bc**
5	Trigard + Dynasty + Maxim + Apron XL + Pro-Gro	**37 ± 6 cd**	**30 ± 4 e**

* Means followed by the same letter are not significantly different ($P > 0.05$; Tukey's Studentized Range [HSD] Test; n= 5). Data were transformed using a sqrt (x + 0.001) function before analysis, but untransformed means are presented.

Outcomes:

- **Onion maggot pressure was extremely high and none of the insecticide seed treatments provided a commercially acceptable level of maggot control in either year.**
- **In 2017, Regard and Entrust (same active ingredient – spinosad) provided better suppression of onion maggot damage than Sepresto treatments; performance was similar to Trigard.**
- **In 2018, Regard, Entrust and Sepresto seed treatment performance were relatively similar against onion maggot; Sepresto + Thiram + Penflufen provided better protection against maggots than the others.**
- **In both years, Trigard provided better management of onion maggot than the other treatments, including the industry standard FarMore FI500 in 2018.**

Understanding Onion Maggot Control Failures: Project Description and Preliminary Findings

Question: **How do abiotic factors (e.g. precipitation, temperature) affect onion maggot damage?**

Approach: Beginning 5/14 and ending 7/11, soil and air temperature and weekly precipitation was monitored in 15 fields across central NY in 3 distinct regions: Oswego/Wayne, Steuben/Yates, and Orleans/Genesee counties (Figure 1). Weekly, at each site, adult fly activity was monitored with sticky cards, and beginning 6/4, fields were assessed for onion maggot damage. Onion maggot damage was assessed each week by walking two 50 m transects within each field and identifying plants with symptoms of maggot damage (wilted leaves, wounds, and feeding).

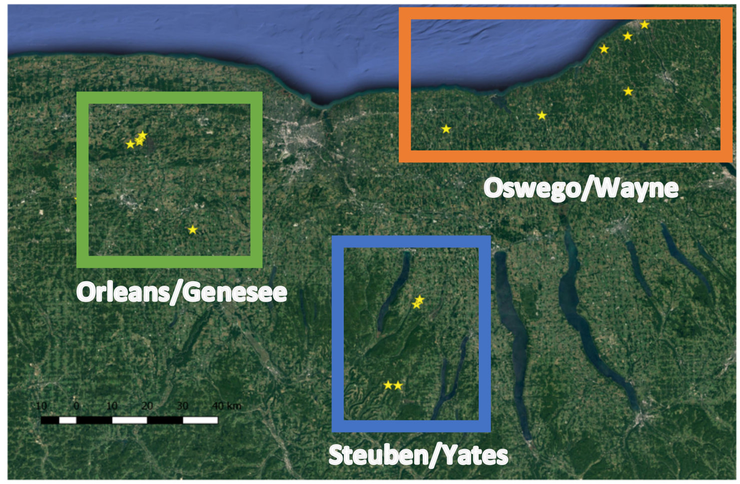


Figure 1. Field sites monitored for onion maggot damage, fly activity, precipitation, and temperature in three regions of NY.

Results:

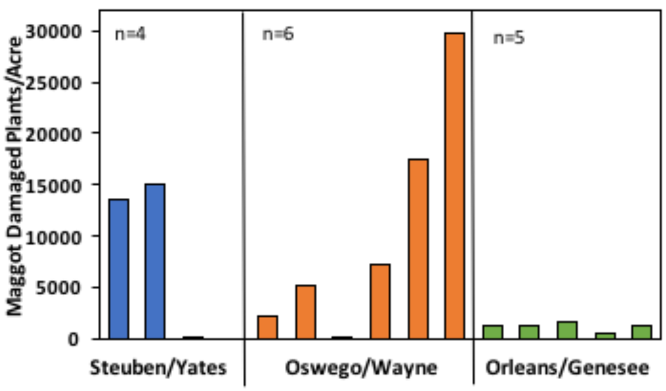


Figure 2. Cumulative number of maggot damaged plants extrapolated to a per acre basis.

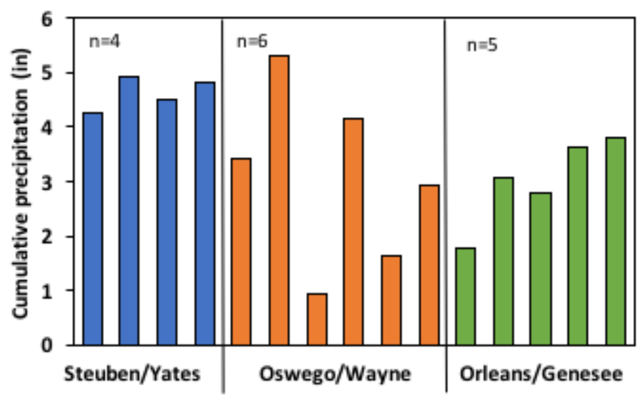


Figure 3. Cumulative precipitation for fields measured from mid-May to mid-July

Outcomes:

- Onion maggot pressure varied greatly across all of the regions studied (Figure 2).
- The highest damage was observed in two fields in Oswego/Wayne and two fields in Steuben/Yates. The lowest damage was consistently observed in all fields in Orleans/Genesee.
- Precipitation varied among some fields, but was generally similar across all regions (Figure 3).
- **Preliminary results suggest that precipitation from mid-May through mid-July has no impact on the amount of onion maggot damage from the first generation of flies.**

Future Work:

- Analyze the effects of soil and air temperature, fly activity, and soil texture and chemistry on maggot damage
- Assess management at each site (i.e. seed treatment package, crop rotation, cultivar, seeding density, planting date, etc.). **Please complete survey**