

MEDICATING ONIONS FOR THRIPS INFESTATIONS: NEW REMEDIES TO CONSIDER

Brian A. Nault, Professor, Department of Entomology, Cornell University, NYSAES, 630 W. North St., Geneva, NY 14456; Email: ban6@cornell.edu; Website: <http://blogs.cornell.edu/nault/>

Insecticide use continues to be the principal tool for managing onion thrips *Thrips tabaci* Lindeman. Research is needed to continuously evaluate the performance of new insecticides and identify strategies that minimize their use without compromising the level of control and that mitigate insecticide resistance development. This article provides information on **1) efficacy of a new product that is in the registration pipeline, 2) best strategy for using Exirel, 3) best product to use for early-season thrips management, 4) impact of co-applying insecticides and surfactants on thrips control and incidence of foliar diseases, and 5) historical performance of Radiant over the past decade.**

1) EFFICACY OF MINECTO PRO FOR THRIPS CONTROL. There are several highly effective insecticides available for managing onion thrips and a few that are much less effective (**Fig. 1**). One product in the registration pipeline is Syngenta's Minecto Pro, which includes two insecticides – abamectin and cyantraniliprole. While both of these active ingredients are known to kill onion thrips, it was not known if the combination of the two would provide better thrips control than either active ingredient alone. In a 2015 field study in western NY, levels of onion thrips control using Minecto Pro at two rates (7 and 10 fl oz/acre) were compared with levels of control provided by either Agri-Mek SC (3.5 fl oz/acre) or Exirel (13.5 fl oz/acre) alone.

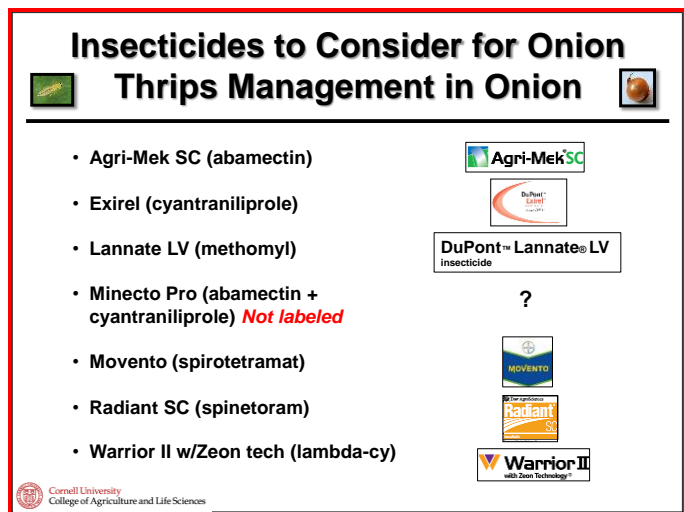


Figure 1. Products for onion thrips management in onion. Note: Minecto Pro is not yet labelled in the US.

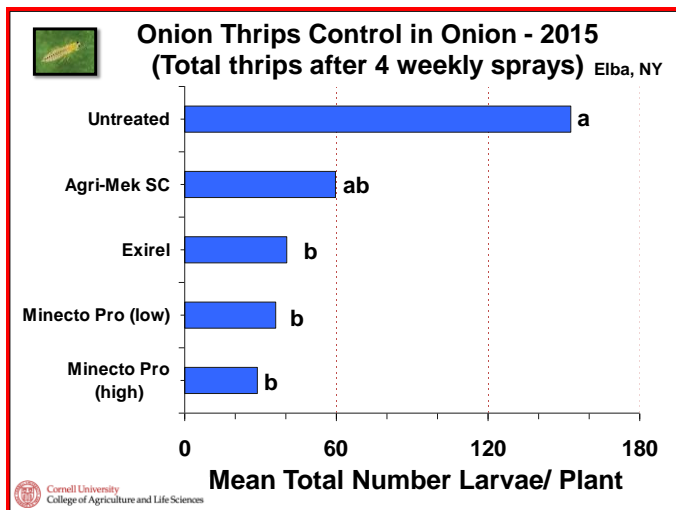


Figure 2. Comparison of onion thrips control in an onion field trial in 2015. Means with similar letters are not different ($P > 0.05$; Tukey's HSD).

Results indicated that Minecto Pro (at both low and high rates) was effective for managing onion thrips (**Fig. 2**). Minecto Pro did not provide a significantly better level of control than the level provided by either Exirel or Agri-Mek alone. Syngenta intends to submit a Section 3 package for Minecto Pro by the end of 2015 with hopes that the product will receive federal registration in 2016 and registration in New York for use in 2017.

2) BEST STRATEGY FOR USING EXIREL. Exirel (cyantraniliprole) is one of the newest insecticides registered on onion for managing thrips. Identifying when best to use Exirel for managing onion thrips during the season was not known and field research was needed to determine whether a more conservative or liberal approach should be taken. In 2015, efficacy of Exirel (@ 13.5 fl oz/acre) was evaluated by applying it when the infestation reached either 1 thrips larva/leaf (conservative) or 3 thrips larvae/leaf (liberal); a standard application treatment was included by applying Exirel weekly (7 July through 31 July; 4 applications total).

Results in 2015 revealed that a more conservative action threshold of 1 thrips larva/leaf provided better control of the thrips infestation than using the more liberal threshold of 3 thrips larvae/leaf (**Fig. 3**). Densities of thrips were similar in plots in which Exirel was applied weekly and when it was applied following the 1 larva/leaf threshold (**Fig. 3**).

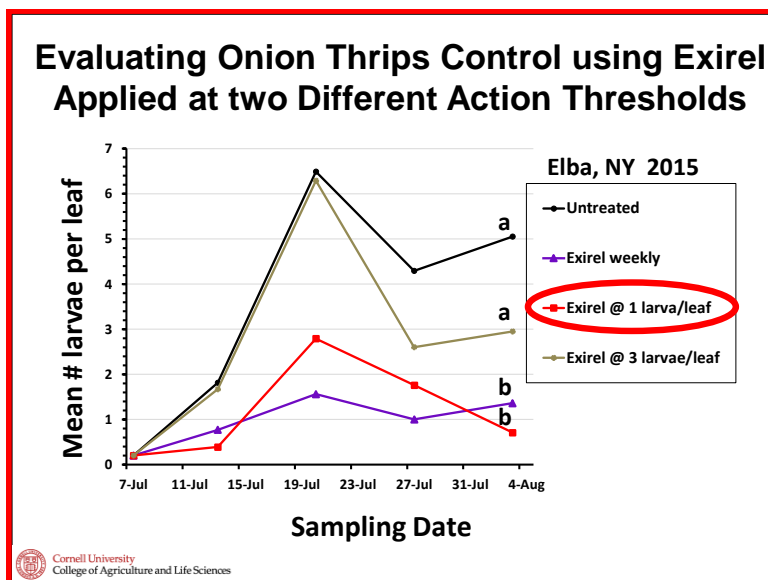


Figure 3. Exirel (cyantraniliprole) was applied either weekly or when the thrips population reached 1 larva/leaf or 3 larvae/leaf in a small-plot field study in Elba, NY in 2015. Sprays were initiated on 7 July. Means followed by the same letter are not significantly different ($P > 0.05$; Tukey's HSD).

3) BEST PRODUCT TO USE FOR EARLY-SEASON THRIPS MANAGEMENT. Movento (spirotetramat) and Radiant SC (spinetoram) are two of the most effective products for managing onion thrips infestations in onion. Movento and Radiant have excellent activity against immature thrips, but Radiant has better activity against adult thrips than Movento. The current recommendation is to use Movento as the first product and Radiant as the third product in a season-long sequence to manage thrips (**Fig. 4**). However, Radiant could be a better choice than Movento for killing thrips adults that initially colonize onion fields in June, thereby considerably reducing subsequent larval populations. In 2015, a field experiment was conducted to compare levels of thrips control using either Movento or Radiant as the first product in a sequence. One treatment included applying Movento (@ 5 fl oz/acre) twice followed by two applications of Radiant SC (@ 6 fl oz/acre), whereas the other treatment started with two applications of Radiant and then followed by two applications of Movento (same rates as the first treatment). All applications were made weekly beginning on 7 July.

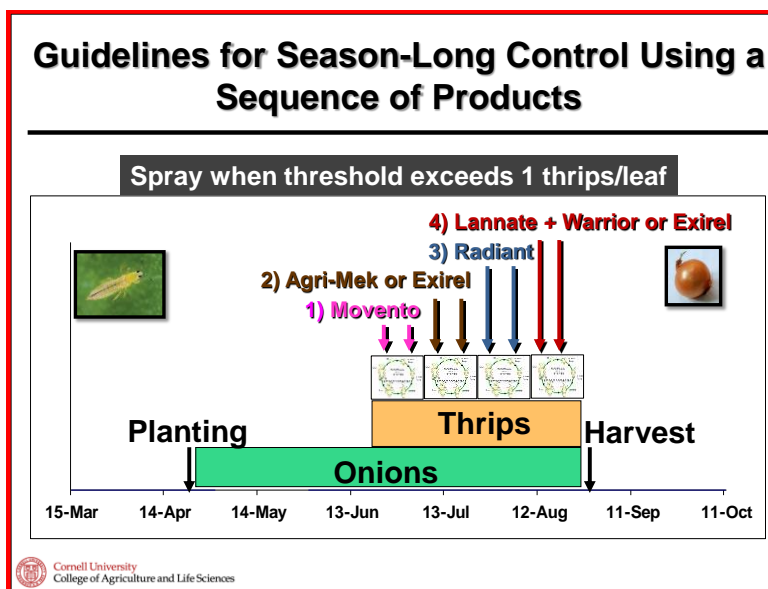


Figure 4. Products suggested to use in a season-long sequence to manage onion thrips infestations in onion. Each small box represents the theoretical duration of a thrips generation; there may be up to 4 generations per year.

Results in 2015 indicated that both insecticide treatment regimes effectively controlled the onion thrips infestation (Fig. 5). Overall, there was no difference in the cumulative number of onion thrips larvae between the insecticide treatments at the end of the study on 4 August. However, the sequence that began with two applications of Movento and finished with two applications of Radiant (red line) provided significantly better thrips control than the sequence that began with Radiant SC and finished with Movento (blue line) on 21 July (Fig. 5). Therefore, initiating a season-long program with Movento and using Radiant later in the season should continue to be practiced.

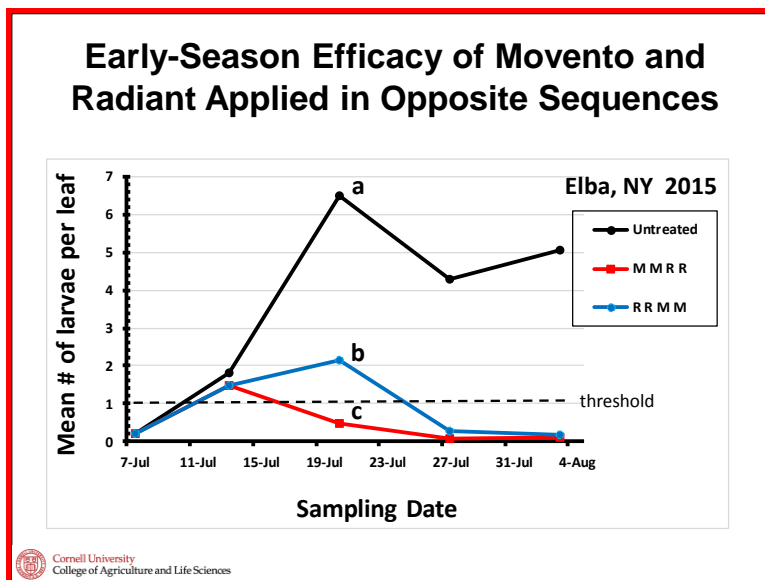


Figure 5. Movento (M) and Radiant SC (R) were applied weekly in different sequences to determine which was most effective for managing early-season infestations of onion thrips in a field study in Elba, NY in 2015. Sprays were initiated on 7 July. Means followed by different letters are significantly different ($P < 0.05$; Tukey's HSD).

4) IMPACT OF CO-APPLYING INSECTICIDES AND SURFACTANTS ON THRIPS CONTROL AND INCIDENCE OF FOLIAR DISEASES. Many of the commonly used insecticides for managing onion thrips infestations require co-application with a surfactant to maximize their efficacy. The surfactants modify the leaf surface in a manner that more easily permits penetration of the insecticide into the leaf. While this physical change in the leaf surface is important for improving the efficacy of the insecticide, there is concern that alteration of the leaf's surface may improve the ability of plant pathogens to infect the plant. There are a number of devastating foliar diseases of onion in New York that will reduce yield (Fig. 6).

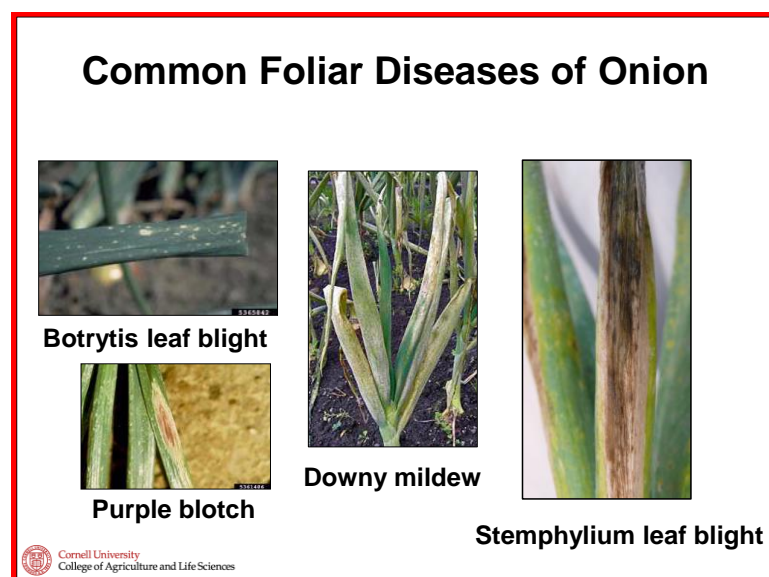


Figure 6. Common foliar diseases of onion that are managed in New York.

To investigate the potential negative impact of co-applying insecticides with surfactants on the incidence of foliar diseases, a field trial was conducted in New York in 2015 in which various surfactants were combined with insecticides. Surfactants representing four different classes were evaluated using recommended rates: Induce (non-ionic), MSO (methylated seed oil), JMS Stylet Oil (mineral oil), and Silwet L-77 (organosilicone). The insecticide sequence was evaluated either with or without these surfactants for four weeks. The insecticide sequence was Movento, Movento, Agri-Mek and Agri-Mek [=MMAA]).

Results indicated that the insecticide-only treatment (M M A A Only) provided poor control of the thrips infestation (**Fig. 7**). Insecticide treatments co-applied with surfactants significantly reduced thrips densities compared with the untreated control. Treatments that included either Induce, JMS Stylet oil or Silwet performed the best (**Fig. 7**). These results confirm previous studies that have shown surfactants to be important for improving the efficacy of insecticides to control onion thrips in onion.

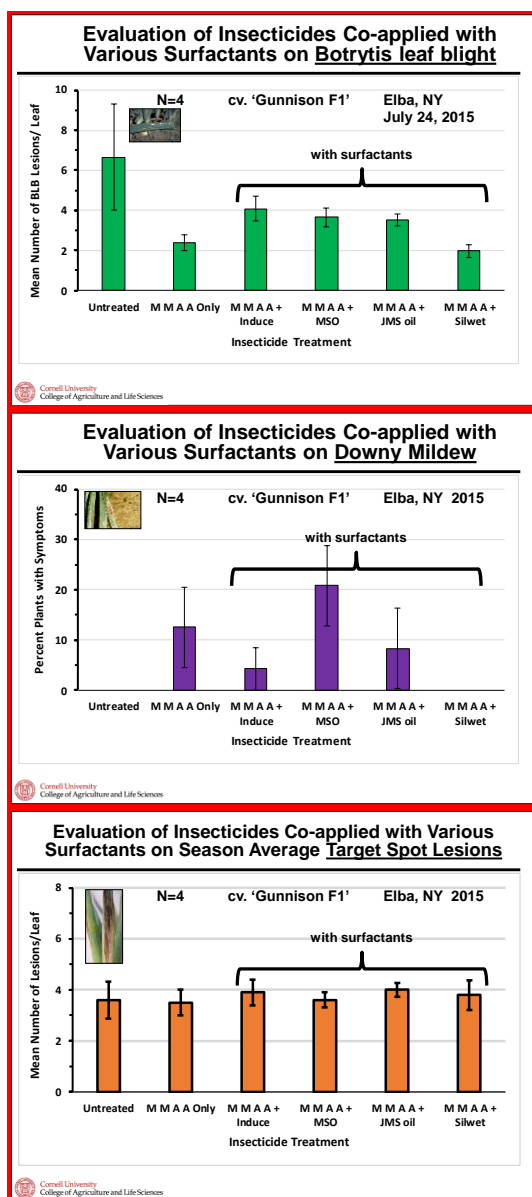


Figure 8. Mean incidence of foliar pathogens in treatments that received no pesticides (untreated), insecticides only, or insecticides plus surfactants in a field study in Elba, NY in 2015. Sprays were applied weekly for 4 wks.

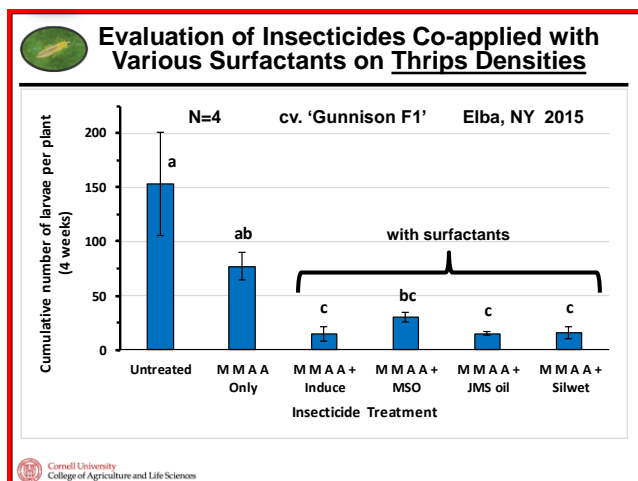


Figure 7. Mean total number of thrips larvae in the insecticide only treatment (Movento [M] and Agri-Mek SC [A]; =MMAA) and those co-applied with various surfactants in a field study in Elba, NY in 2015. Sprays were applied weekly for 4 wks. Means followed by different letters are significantly different ($P < 0.05$; Tukey's HSD).

Results in 2015 indicated that surfactants did not exacerbate the incidence of foliar diseases (**Fig. 8; all three graphs**). The incidence of Botrytis leaf blight was similar between the levels in the insecticide only treatment and those that received surfactants. The highest incidence of Botrytis leaf blight occurred in untreated plots that also had the most thrips damage; perhaps, an association exists between the two. Levels of downy mildew were highly variable; percent plants with downy mildew symptoms that received or did not receive surfactants ranged from 0 to over 10%. The incidence of target spot lesions (caused primarily by Stemphylium leaf blight) was similar among all treatments and untreated plots.

5) HISTORICAL PERFORMANCE OF RADIANT SC OVER THE PAST DECADE. In 2008, Radiant SC became commercially available in New York for use on onion to manage onion thrips. Radiant SC has been consistently effective for managing onion thrips and most onion fields are treated one to two times during the season. This year, some New York onion growers noticed that Radiant at lower rates did not work as effectively as it had in past years and other growers needed the highest recommended rate (10 fl oz/acre) to achieve control. These discussions prompted an investigation into determining levels of onion thrips control using Radiant SC over the past decade. Since 2005, field research in the Nault Program has included evaluations of Radiant SC at various rates (typically 6 fl oz/acre). In each trial, Radiant was applied twice one week apart and densities of thrips were recorded one week after each application; the two recordings then were summed. The reduction in thrips densities in plots treated with Radiant relative to densities in the untreated control was calculated in each small plot field trial and then plotted through time (Fig. 9).

Results show a negative trend in percent reduction of thrips densities using Radiant. These results suggest that resistance to Radiant is developing in these onion thrips populations. Research is needed to confirm levels of onion thrips susceptibility to Radiant in New York onion fields using laboratory bioassays. Such information will be helpful to know whether resistance has developed and where control failures may be most likely to occur throughout New York.

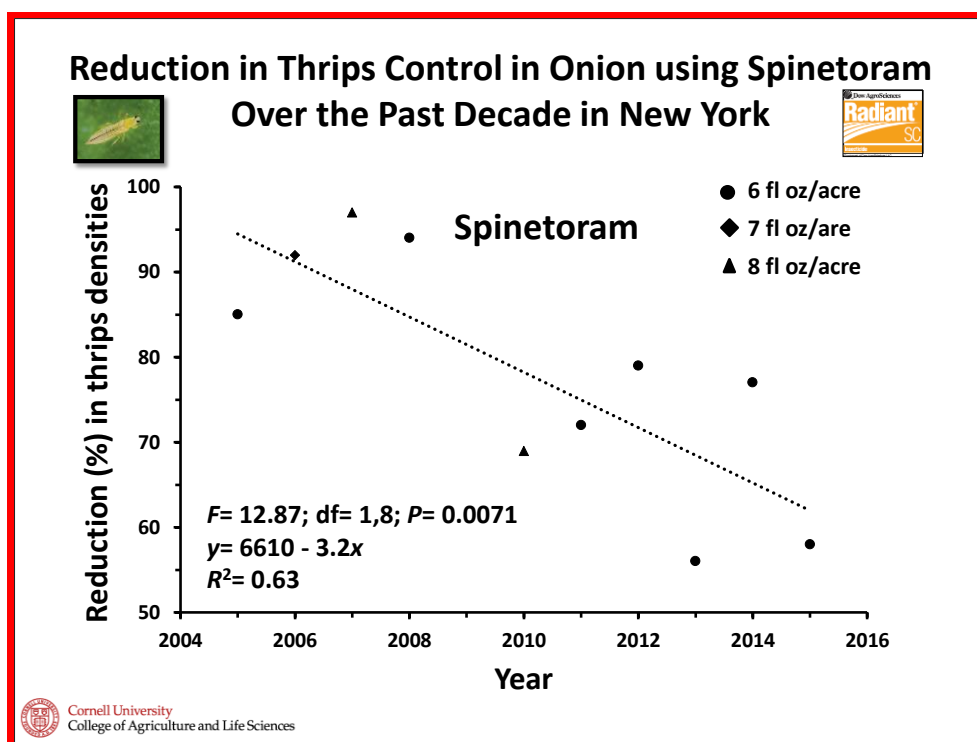


Figure 9. Percent reduction in onion thrips control using spinetoram (Radiant SC) in a series of onion field trials near Elba, NY. Circles, diamonds and triangles signify 6 fl oz/acre, 7 fl oz/acre and 8 fl oz/acre rates of spinetoram, respectively. Onions were treated twice with spinetoram one week apart and the numbers of onion thrips larvae were recorded from 15 plants per plot one week after each application. The total number of thrips after both samplings were used to calculate percent reduction in the infestation relative to densities in the untreated control plots. Densities of onion thrips in untreated plots were similar among years (data not shown). **Note:** the y-axis spans 50-100% reduction in onion thrips larval densities.