

# New Seed Treatment Options for Onion Maggot: What Onion Growers Need to Know

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## Finally! We have options!

Believe it or not, I have worked on control of onion maggot via seed treatments for the past 15 years. In fact, my Master's Degree involved management of onion maggot. And, I am absolutely thrilled that New York onion growers FINALLY have not one, but TWO new seed treatment options for control of onion maggot. Sepresto® was first introduced for the 2011 growing season, but is available only on Nunhem's onion varieties. Also available for the 2012 growing season on all onion varieties is Farmore® FI500. Both of these insecticide seed treatments are only available in packages that also include fungicides. Altogether, NY onion growers now have FIVE insecticides (counting diazinon), labeled for onion maggot control (Table 1). Of these, 3 are seed treatments; decisions for which one to use must be made when seed orders are placed. In making these decisions, it is important to know the relative efficacy of the insecticides, what diseases the fungicides in the seed treatment packages control and how to extend the useful life of these precious new insecticides. The information that follows addresses these questions and should assist you in making a decision on how to control maggots as well as early season seedling diseases.

Table 1. Insecticide roster for control of onion maggot in onion in New York, 2012.

| Trade Name                                               | Company                                                   | Active Ingredient for OM       | Chemical Class (IRAC <sup>2</sup> group) | Application                                                      |
|----------------------------------------------------------|-----------------------------------------------------------|--------------------------------|------------------------------------------|------------------------------------------------------------------|
| Diazinon AG500<br>Diazinon 50WP<br>Etc.                  | Makhteshim                                                | diazinon                       | OP (1)                                   | Pre-plant broadcast & incorporate                                |
| Lorsban 4E,<br>75WG,<br>Advanced<br>and OLF <sup>1</sup> | Dow AgroSciences (Lorsban),<br>other companies<br>for OLF | Chlorpyrifos                   | OP (1)                                   | At planting in-furrow,<br>Post-planting banded<br>spray over row |
| Trigard                                                  | Syngenta                                                  | Cyromazine                     | Triazine (17)                            | Seed treatment                                                   |
| Sepresto                                                 | Bayer Crop Sciences                                       | Clothianidin<br>+ imidacloprid | Neonicotinoid (4)<br>+ Neonicotinoid (4) | Seed treatment                                                   |
| Farmore FI500                                            | Syngenta                                                  | Thiamethoxam<br>+ spinosad     | Neonicotinoid (4)<br>+ Spinosyn (5)      | Seed treatment                                                   |

<sup>1</sup>OLF: other labeled formulation such as Warhawk. <sup>2</sup>IRAC: Insecticide resistance action committee

## The new seed treatments on the scene

**Sepresto®** has a novel mode of action compared to Lorsban and Trigard and is a combination of two neonicotinoids with a 3:1 ratio of clothianidin (same active as Poncho) and imidacloprid (same active as Gaucho and Admire). It also controls seedcorn maggots, which can also kill onion seedlings if left unprotected. Sepresto is available exclusively on Nunhem's onion varieties such as Hendrix and Pulsar, and only as part of a seed treatment package, "CAPS". The "C" is for Coronet, "A" is for Allegiance, "P" is

for Pro Gro and “S” is for Sepresto. Diseases controlled by these fungicides are discussed later in this article.

**Farmore® FI500:** Syngenta’s Farmore Technology has been around for a few years now: Farmore F300 consists of 3 fungicides including mefenoxam, fludioxonil and azoxystrobin that make up a seed treatment package for control of mostly soil-borne pathogens and is labeled on several crops. A couple of years ago, Syngenta launched Farmore FI400, which includes the insecticide thiamethoxam (same active as Cruiser, Platinum and Actara), and is labeled on cucurbits, leafy Brassicas and carrots, predominantly for control of beetles and aphids. Farmore FI500 is essentially FI400 with the addition of spinosad for control of onion maggot and seedcorn maggots and it is only labeled on onions, but on all varieties. Spinosad represents yet another different chemical class for managing onion maggot in NY.

### **How do the new seed treatments stack up?**

In Table 2, the relative performance of several insecticides that were evaluated for onion maggot control on muck in NY is summarized. Clearly, the active ingredient, fipronil has been an outstanding performer for onion maggot control. Unfortunately, after more than a decade of outstanding results, we had to give up the dream of this active ever seeing the light of day as a registered product on onion as all of its agricultural uses were discontinued a couple of years ago.

It is very exciting that the newly registered Sepresto has performed neck and neck with the industry standard, Trigard + Lorsban (in-furrow). Thus, ***when using Sepresto seed treatment, it does not need to be accompanied with an application of Lorsban*** in order to achieve excellent control of onion maggot. Unfortunately, this option is only available on Nunhem’s onion varieties.

Although far from a robust database, the newly registered Farmore FI500 provided an average of 81% control of onion maggot. This trial was conducted under very high onion maggot pressure and under such conditions, Farmore FI500 performed neck and neck with Trigard and slightly better than Sepresto. We do have a lot of trial experience with the spinosad component of Farmore FI500, which has consistently provided excellent control of onion maggot (88%) and we expect this to be an excellent seed treatment for control of onion maggot. Research is planned for 2012 to elucidate the need for Lorsban with Farmore FI500.

Interestingly, one of the neonicotinoid components of Sepresto (specifically, imidacloprid) and one in Farmore FI500 (specifically, thiamethoxam) provided very poor control of onion maggot in NY studies. In fact, clothianidin and spinosad are the active ingredients doing all the work in Sepresto and Farmore FI500, respectively. In other onion growing regions where onion thrips is a problem earlier in the season than they are in NY, these systemic components might provide some protection against onion thrips, but that is NOT the case in NY.

All registered seed treatments provided better control of onion maggot than Lorsban alone. It is important to note that resistance to Lorsban and Trigard had occurred at several of the trial locations, which brought the averages down. However, with implemented resistance management strategies at these sites that involved rotating away from Trigard, Trigard provided excellent control of onion maggot in the last two years of trials. Trigard is the only insecticide labeled for onion maggot that does not also control seedcorn maggots; where this pest is a concern Lorsban should be used in-furrow with Trigard seed treatment.

Table 2. Relative efficacy of seed treatments evaluated (not all labeled) for control of onion maggot, listed in order of best to worst performance: B. Nault *et al.* (Cornell University) 2004 to 2009.

| Rank | Insecticide ( <i>a.i</i> )                                                         | No. of Trials  | Average OM control | Comments                                                                                              |
|------|------------------------------------------------------------------------------------|----------------|--------------------|-------------------------------------------------------------------------------------------------------|
| 1    | <b>Regent*/Mundial ST<sup>1*</sup></b><br>( <i>fipronil</i> )                      | 12             | 94%                | Provided significantly better control than Trigard 38.5% of the time                                  |
| 2    | <b>Trigard ST + Lorsban IF<sup>1</sup></b><br>( <i>cyromazine + chlorpyrifos</i> ) | 11             | 90%                | Provided significantly better control than Trigard alone 36% of the time                              |
| 3    | <b>Poncho*/Sepresto ST</b><br>( <i>clothianidin ± imidacloprid</i> )               | 13             | 90%                |                                                                                                       |
| 4    | <b>Entrust*/Regard ST*</b><br>( <i>spinosad</i> )                                  | 17             | 88%                |                                                                                                       |
| 5    | <b>Farmore FI500</b><br>( <i>spinosad + thiamethoxam</i> )                         | 1 <sup>2</sup> | 81%                | Trial conducted under very high pressure. Trigard provided 80% and Sepresto 74% control in this trial |
| 6    | <b>Avicta ST* (<i>abamectin</i>)</b>                                               | 4              | 81%                | Also controls nematodes                                                                               |
| 7    | <b>Trigard ST</b><br>( <i>cyromazine</i> )                                         | 15             | 80%                | Did not provide significant control over untreated 6% of the time                                     |
| 8    | <b>Lorsban IF</b><br>( <i>chlorpyrifos</i> )                                       | 14             | 68%                | Did not provide significant control over untreated 14% of the time                                    |
| 9    | <b>Gaicho*</b><br>( <i>imidacloprid</i> )                                          | 1              | 31%                | Did not provide control of onion thrips in NY                                                         |
| 10   | <b>Cruiser*</b><br>( <i>thiamethoxam</i> )                                         | 1              | 20.6%              | Did not provide control of onion thrips in NY                                                         |

<sup>1</sup>ST: seed treatment; IF: in-furrow treatment. <sup>2</sup>trial conducted by C. Hoepting, 2010.

\*not labeled for use on onion.

### Precautions for resistance management

Onion maggot is notorious for developing resistance to insecticides, first to organochlorines, then to carbamates and OPs, including Lorsban and probably also to Trigard (resistance never confirmed, but efficacy noticeably declined in many fields). Onion maggot can develop resistance to an insecticide within 4-5 years of continuous exposure. Because many onion fields are grown in the same field or adjacent field year after year, local populations of onion maggot get exposed to the same insecticide year after year. Once resistance to a chemical class has developed in an onion maggot population, the population can become controllable again after eliminating exposure for a few years, but, resistance and difficulty in controlling the infestation will occur faster with resumed continuous exposure. Because onions are a minor use crop and onion maggot is mostly a problem only in New York, Michigan and Wisconsin within the United States, there is not a lot of interest from chemical companies to pursue the registration of insecticides for onion maggot control. Consequently, it is imperative to preserve the useful life of Sepresto and Farmore FI500. The best way to ensure this happens is to follow a resistance management strategy.

First, individual growers should rotate among chemical classes on all of their acreage every year. Unfortunately, Sepresto is only available on Nunhem's varieties, so unless a grower has exclusively

Nunhem's varieties, it will be impossible to have his entire acreage treated with Sepresto. In this case, it is recommended to rotate the ground from year to year that is cropped to Nunhem's varieties treated with Sepresto. Better yet, use Sepresto every other year. Second, do not use Lorsban in-furrow in combination with Sepresto seed treatment. A practical rotation sequence to cautiously bring in new chemistries follows:

**The onion maggot plan:**

- 2012
  - Trigard (+ Lorsban in-furrow if you have seed maggots) on majority of acreage
  - Continue to experiment with Sepresto on Nunhem's varieties
  - Experiment with Farmore FI500 on whatever acreage you feel comfortable, we encourage trialing at least a portion without the addition of Lorsban in-furrow
- 2013
  - Sepresto on Nunhem's varieties rotated to different ground than previous year (ideally the ground that had Farmore FI500 in 2012)
  - Farmore FI500 on all remaining varieties (verdict will be in on need for Lorsban accompaniment)
- 2014
  - Trigard (+ Lorsban in-furrow if you have seed maggots) on all varieties
- 2015
  - Sepresto on Nunhem's varieties
  - Farmore FI500 on all other varieties

**Reminder!** Add Pro Gro for onion smut to Trigard and Farmore FI500.

For large onion growing regions like Elba and Orange County where several growers' acreage is intermingled, it would be ideal if all growers followed the same rotation strategy (such as the one outlined previously), so that the onion maggot population in the region is not exposed to all chemical classes every year. Implementing such a regional management strategy would require a lot of grower cooperation. If this is simply not possible, rotating chemical classes on individual fields, even if out of synchrony with the neighboring field will still go a long way towards preserving the useful life of our new (and old) chemistries, because onion maggot flies do not move great distances, any level of chemical rotation should be beneficial.

**Regarding fungicides in seed treatment packages – make sure you have onion smut protection!**

Direct seeded onions cannot be grown in muck soils where onions have been grown for decades without fungicide treatments for control of onion smut due to the high buildup of this very persistent pathogen in muck soils. Treatment to combat this disease includes Pro Gro seed treatment plus mancozeb in-furrow. Fortunately, Nunhem's Sepresto seed treatment package (CAPS) includes Pro Gro for control of onion smut. Despite containing three fungicides, Farmore FI500 does not provide control of onion smut, so Pro Gro still needs to be added to this seed treatment, as it would to Trigard. Application of mancozeb in-furrow is still recommended in addition to both of these seed treatments for adequate onion smut control.

Pro Gro provides decent control of damping off pathogens caused by *Pythium* spp. Additional protection against *Pythium* spp. is provided by Allegiance in the Nunhem's seed treatment package. In Farmore FI500, Apron and Maxim provide control of damping off pathogens caused by *Pythium* spp. and *Rhizoctonia solani*, respectively. In addition, Maxim provides some protection against *Fusarium* spp., which can especially be problematic in some red onion varieties. In the Nunhem's seed treatment package, Coronet is unique in providing control of *Botrytis allii* and *Aspergillus* spp., which are both seed-borne fungi that cause losses from neck rot and black mold, respectively, especially in storage. If Nunhem's varieties are grown from bare root transplants, it is recommended that the seed be treated

with Coronet (via CAPS), because bare root onion transplants can become infected with *B. allii* during transplant production in Arizona.

Table 3. Summary of fungicide packages included in Nunhem’s varieties and Farmore FI500.

| Trade Name                                            | Active Ingredient              | FRAC <sup>3</sup> group | Disease Controlled                      |                                 |                                                                             |
|-------------------------------------------------------|--------------------------------|-------------------------|-----------------------------------------|---------------------------------|-----------------------------------------------------------------------------|
|                                                       |                                |                         | Onion Smut                              | Damping Off                     | Other                                                                       |
| <b><i>Nunhem’s CAPS seed treatment package:</i></b>   |                                |                         |                                         |                                 |                                                                             |
| <b>Coronet<sup>1</sup></b><br>(BASF)                  | Pyraclostrobin<br>+ boscalid   | 11<br>7                 | No                                      | Yes – <i>Rhizoctonia solani</i> | <i>Botrytis allii</i><br><i>Aspergillus spp.</i><br><i>Penicillium spp.</i> |
| <b>Allegiance</b><br>(Bayer)                          | Metalaxyl <sup>2</sup>         | 4                       | No                                      | Yes - <i>Pythium spp.</i>       | <i>Fusarium spp.</i>                                                        |
| <b>Pro Gro</b><br>(Chemtura)                          | Thiram<br>+ carboxin           | M3<br>7                 | ~ 44%<br>control <sup>4</sup>           | Yes – <i>Pythium spp.</i>       | <i>Botrytis allii</i><br><i>Penicillium spp.</i>                            |
| <b>Sepresto</b><br>(Bayer)                            | Clothianidin<br>+ imidacloprid | insecticides            | For onion maggot control (~90% control) |                                 |                                                                             |
| <b><i>Farmore FI500 (all Syngenta materials):</i></b> |                                |                         |                                         |                                 |                                                                             |
| <b>Apron</b>                                          | Mefanoxam                      | 4                       | No                                      | Yes – <i>Pythium spp.</i>       |                                                                             |
| <b>Maxim</b>                                          | Fludioxonil                    | 12                      | No                                      | Yes – <i>Rhizoctonia solani</i> | <i>Fusarium spp.</i>                                                        |
| <b>Quadris</b>                                        | Azoxystrobin                   | 11                      | No                                      | No                              |                                                                             |
| <b>Regard</b>                                         | Spinosad                       | Insecticide             | No                                      | For onion maggot control        |                                                                             |
| <b>Crusier</b>                                        | Thiamethoxam                   | insecticide             | No                                      | Does not control onion maggot   |                                                                             |

<sup>1</sup>same actives as Pristine. <sup>2</sup>metalaxyl = mefanoxam (Apron). <sup>3</sup>FRAC: Fungicide resistance action committee. <sup>4</sup>for 80%+ control of onion smut, include mancozeb in-furrow with Pro Gro treated seed.