

Cabbage Maggot Control in Brassicas, 2024

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Cabbage maggot (CM) feeds on brassica seedlings by tunneling into the stem of the plant just below the soil line (Fig. 1). Their feeding can result in unsightly and unmarketable produce in the case of root brassicas like turnips, and in stunting, reduced stand, and reduced yield in head and stem brassicas like cabbage and broccoli (Fig. 2). Lorsban and other formulations containing the active ingredient chlorpyrifos were the first line of defense for control of cabbage maggot in several brassica crops, because 1) at ~\$10 per acre, it was affordable, and 2) it was easy to apply and avoided worker exposure as a directed spray at the base of the plant.



Figure 1. Cabbage maggot feeding on stem of cabbage plant just below the soil line. Photo by Faruque Zaman, CCE Suffolk County



Figure 2. Economic damage caused by cabbage maggot in root brassicas (left) and in head and stem brassicas (right). Root brassicas have no tolerance for cabbage maggot feeding, because it results in unmarketable produce. In stem and head brassicas such as cabbage, cabbage maggot feeding only results in unmarketable damage when it kills or severely stunts the plants. Photos: Ben Werling, MSU (left), and Faruque Zaman, CCE Suffolk County (right).



Lorsban is Banned in New York and Nationwide

Since the brassica industry's go-to for cheap, easy and effective control of cabbage maggot, Lorsban along with its generic products (active ingredient chlorpyrifos) was banned in 2021, Brian Nault (Cornell Entomology) and Cornell Vegetable Program Specialist Christy Hoepting have been conducting cabbage maggot trials annually from 2021 to 2023 in search of an effective and affordable alternative(s).

==> See the [Cornell "Cheat Sheet" for Insecticide Options for Control of Cabbage Maggot in Brassicas, 2024](#)

Key Findings

- **Best: Diazinon AG500 3 qt/A applied in transplant water (TW)** has consistently resulted in near-perfect control of cabbage maggot with the longest residual activity. Note, that broadcast and pre-plant incorporated application of equivalent rate resulted in poor control.
 - Drawbacks include:** 1) Requires extensive Personal Protective Equipment (PPE) for workers and handlers; 2) It is a Federally restricted-use pesticide, which means that handlers who do not have a pesticide license must be supervised by a licensed pesticide applicator who must be on-site and within voice contact when they are transplanting cabbage treated with diazinon. 3) Diazinon does not offer control of other common pests of brassicas. 4) TW application may cause stunting.

- **Best: Verimark applied as a tray drench (TD)** has consistently resulted in very good to excellent control of cabbage maggot.

Advantages include: 1) Excellent control of other common pests of brassicas including worms and flea beetles. 2) Minimal PPE for workers and handlers.

Disadvantages include: 1) Expensive. 2) Tricky to apply – see *Tips for Using Verimark as a Tray Drench*.

- **Mustang Maxx, Hero and Capture LRF failed to control cabbage maggot in Cornell trials.**
- **Generally, TD applications are more effective than TW applications, which are more effective than directed sprays at the base of the plant (DS).**
- **As a TW application, Coragen 5 fl oz/A in 400 gpa water failed to control cabbage maggot** in all 3 trials in Western NY.

In an attempt to improve efficacy of this relatively affordable option, Coragen 5 fl oz/A was trialed as a TD application (= 0.000286 to 0.00057 fl oz/plant) in 2023. This treatment resulted in 92% control of cabbage maggot (Plants damaged by CM: Untreated – 38%; Coragen TD – 2.7%; Coragen TW – 36%). Unfortunately, this application method is not labelled at this time.

- **The key timing to protect against cabbage maggot is April through June.**

Tips for Using Verimark as a Tray Drench

- Our research results suggest that a minimum rate of **0.0008 fl oz/plant will provide the best control of cabbage maggot when using Verimark as a tray drench**. When pressure is low, 0.0004 fl oz/plant has also been effective.
- **Because planting density varies widely for brassica crops** (e.g. ~ 10,000 – 17,000 plants/A for cabbage, ~25,000 plants/A for some broccoli plantings, ~5000 plants/A for Brussels sprouts), **the amount of Verimark per plant will also vary widely when the rate per acre is divided by the planting density**. The table below outlines how rate/plant converts to rate/A and No. plants/A.
- 16,875 plants/A is the maximum planting density that will allow for 0.0008 fl oz/plant when the highest per acre rate of Verimark is used (13.5 fl oz/A).
- If your planting density was 14,500 plants/A and you want to use 0.0008 fl oz/plant, then your Verimark rate/A would be 14,500 x 0.0008 = 11.6 fl oz/A.
- To figure out how much product to use per tray: 288 plants/tray x 0.0008 fl oz/plant = 0.23 fl oz/tray.
- **Verimark is supposed to be applied to transplant trays to saturate the soil media without allowing it to run out the bottom**. Stop watering 24 h before applying the insecticide tray drench. I had good luck in my experiments when applying ~ 1 pt of insecticide + water to a 288-cell tray with a backpack sprayer (more uniform coverage than using a watering can), and then washing the insecticide residue off of the leaves into the soil media with a second application of ~ 1 pt of clean water.

Verimark 10-13.5 fl oz/A Rates

Rate/Plant	No. Plants/Acre	Rate/Acre
0.0008 fl oz	16,875	Max: 13.5 fl oz
0.0008 fl oz	12,500	Min: 10 fl oz
0.0016 fl oz	8,438	13.5 fl oz
0.0004 fl oz	33,750	13.5 fl oz

Head and Stem Brassicas Can Tolerate Some Cabbage Maggot

Root brassicas have a low tolerance for cabbage maggot, because the feeding damage renders radishes and turnips unmarketable. Alternatively, in head and stem brassicas, unless plants are severely infested to the extent that stand is reduced or stunting reduces marketable yield, **minor CM feeding damage does not cause yield reduction or economic losses** (Fig. 3). In the Cornell trials, even though % CM-infested plants in many of the treatments was not significantly lower than in the untreated, the severity of the root damage was significantly less than the untreated and generally minor. In our trials over the past 3 years, we rarely see stunting in plants that are infested with CM. Even if a product is not perfect at controlling CM and kills only 65% of the maggots, 2 or 3 maggots feeding per stem is much less damaging than 6 or 9. Therefore, **unless cabbage maggot pressure is high, chances are that any of the products listed in the [Cornell “Cheat Sheet” for CM Control](#) would provide adequate control of CM in head and stem brassicas**, provided they are applied correctly.



Figure 3. Minor feeding damage (left) from cabbage maggot is not likely to impact yield of head and stem brassicas, while severe feeding damage (right) will. Photo by Christy Hoepting, CCE Cornell Vegetable Program

Protection Against Cabbage Maggot Most Critical from April through June

CM flies begin to emerge from overwintering pupa in the soil in mid-April in New York, and continue to emerge for about 6 weeks until the end of May. The peak of spring emergence occurs in early May and coincides with full bloom of yellow rocket (*Barbarea vulgaris*). The flies mate and lay their eggs at the soil line at the stem of brassica seedlings. The eggs hatch within 3 days and maggots feed on the brassica stems for about 3 weeks before they pupate. First-generation CM flies emerge from pupae 2-4 weeks later beginning in late-May through the end of June with the peak flight occurring in mid-June, which coincides with full bloom of orange day lily (*Hemerocallis fulva*). **Although there are two more CM generations, they are much less favored by hot and dry summer conditions, and larger plants (stem diameter > pencil-sized) are much more tolerant to CM.**

It is recommended to consider applying protection beginning one week after initial fly emergence and continued until at least a week after peak flight activity, a total period of 2-4 weeks. You can track CM emergence in your area using [NEWA](#) and by paying attention to bloom of yellow rocket and orange day lily for overwintering and first CM generations, respectively.