Seed Maggots a Problem in Many Vegetable Fields This Spring

I have been amazed by the number of problems I have seen in growers’ vegetable fields the past few weeks. Rotting, yellowing transplants or bulb plants or where seed was planted none have come up or they have come up sporadically. This cool spring has been good weather for a pest of early planted seeds, transplants and bulbs—the seed corn maggot *Delia platura* (SCM) and other seed maggots such as Cabbage maggot *Delia radicum* (it prefers to feed on cole crops) and Onion maggot *Delia antiqua* (it primarily feeds on crops in the onion family). The seed corn maggot is one of the earliest seed maggots in a field and it has a huge host range of seeds and plants that it attacks. The seed maggots overwinter as pupae in the soil usually in wooded areas where the maggots feed on decaying plant material. In early spring (usually early to mid-March for SCM and mid-late April for onion maggot), the adults emerge. Adults are elongated and dark greyish-brown, with wings that overlap their bodies when they are at rest (fig. 1). Large swarms of flies can be seen in the spring flying over newly tilled fields. The flies mate within 2-3 days after emerging and lay eggs in soil that has a great deal of decaying organic matter including any rotting vegetation or manure as well as bulbs, germinating seeds or newly set transplants—SCM flies are not fussy and will target the artificial medium in the root ball of transplants. That is why even fields that have been fumigated can still have problems with SCM.

Maggots will move into small stems and move up the plant causing a swelling of the stem just above ground level, while also causing root collapse and decay. If these stems are split you will usually find the white cylindrical larvae (figs. 2 and 3). The eggs hatch in 2-4 days in temperatures as low as 50°F. The larvae develop over a large temperature range of 50°-90°F. However, I have found that the flies do not like to lay eggs in soil that has reached 71°F at a 2-4 inch soil depth for 2-3 days in a row. Larvae or maggots are yellowish-white, about ¼ inch in length, legless with head-ends that are wedge-shaped (fig. 3). The maggots complete their entire development within the soil by burrowing into seeds or bulbs or feeding on cotyledons or young transplants. The pupae are brown, oval-shaped capsules 1/5 inch in length. Generally, seed corn maggots complete their life cycle within three weeks and have 3-4 generations. It is the first generation that causes the most crop damage in our area.

Although it can take 5 maggots per large seed like a snap bean to cause significant damage, once the seed has been opened up by the maggots it becomes much more susceptible to invasion from soil borne pathogens and under the cool conditions we had earlier in the spring a damaged seed or root is much more susceptible to attack. The maggots also can burrow into the bulb or stem of transplants such as watermelon or cantaloupe as well as cole crops, garlic, onions, etc.

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The adult flies are often found dead, stuck to vegetation during periods of warm wet weather—like we have had the last week or so. These flies have been infected by a fungus, *Entomophthora* sp. These infected flies usually will be found at the top of a tall object in the field such as a grass seed head or a wire field-flag (fig. 4). Just before the fungus kills them the flies cement their body via their mouthparts to the tall object and die. If you look closely you’ll see the body is filled with the white fungus that has ruptured between the segments (fig. 5). Being on a tall object allows the spores of the fungus to move longer distances and infect more flies than if the fly had died on the ground. Even though we have had a fairly dry spring in places, I still have seen many fungus infected dead flies. Unfortunately, the infection rate is not enough to reduce the seed maggot population and stop infestations.

Management: As most of you know there is no rescue treatment once maggots are found in the seed or plant. Fields with moist, heavy-textured soil usually have the worst problems. To reduce the appeal of a field to egg-laying adults, disc or plow early in the season to incorporate residues from the previous crop and allow time for residues to completely decompose before planting. Destroy any weed growth. Avoid planting a crop following root crops or cole crops such as cabbage and cauliflower or after fall tomatoes. Ensure rapid seed germination by planting in moist soil not very deep when weather conditions are good. Later-season plantings may avoid the early season infestation of this pest. For crops like onions or garlic row covers can be used as soon as transplants are put in the field. Plants can remain covered until the ground warms. Organic medium seems to be particularly attractive to seed maggots. The use of treated seed or in-row banding of an insecticide gives some control of seed maggots, however, replacing dead transplants is the only solution after maggots kill a plant. Once seed maggot damage is noticed, it is too late to apply control procedures. Thus, economic thresholds are not useful and all management options are preventative.