Stem and Bulb Nematode in Garlic

*Ditylenchus dipsaci*
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**IMPORTANCE**

Although not widely distributed throughout Minnesota, stem and bulb nematode can be introduced to a production area on infected seed. Once present on a farm, the nematode can survive many years in plant debris, soil and on weed hosts. A small population of nematodes can reproduce rapidly throughout the growing season, resulting in significant yield loss.

**IDENTIFICATION**

The University of Minnesota Plant Disease Diagnostic Clinic (http://pdc.umn.edu) can test garlic seed, plants and field soil for the presence of *Ditylenchus dipsaci*, the stem and bulb nematode. Contact the clinic for more information about how to send a sample.

- Leaves turn yellow, wilt and collapse. Plants may be stunted or senesce prematurely.
- Infected plants are often clustered together, resulting in one or more patches of symptomatic plants.
- Garlic bulbs turn brown, are light weight and shriveled. Wrapper layers often crack and become detached from the basal plate of the bulb.
- Secondary organisms may cause extensive rot within the bulbs.
- Damage to bulbs can progress in storage.

**BIOLOGY**

The stem and bulb nematode, *Ditylenchus dipsaci*, can infect over 450 genera of plants but most races of the pathogen primarily infect a limited number of plants. The race of stem and bulb nematode that infects garlic also infects onion, chive, leek, celery, parsley, salsify, shasta pea, hairy nightshade, and miner's lettuce. The nematode can be introduced to a field on infected seed, plant debris, soil or water.

Stem and bulb nematodes live and feed within plant leaves, stems and bulbs. Nematodes can directly penetrate young plant tissue below ground or they can climb through films of water on the plant stem and enter through stomates, natural openings within leaves. Multiple generations...
of nematodes live within a plant, migrating to soil only when the plant becomes so degraded that it is no longer a suitable site for nematode feeding and reproduction.

Populations can increase dramatically over the growing season. Female nematodes lay 8-10 eggs a day for 25-50 days (a total of 200-500 eggs per female). Eggs hatch into a juvenile nematode which looks similar to the adult nematode. The nematode goes through four molts before becoming a reproductive adult. A nematode can go from egg to maturity in about 20 days at 60F. Mature nematodes live for 43-73 days.

Stem and bulb nematodes can survive on weeds or volunteer crop plants during crop rotation. Stem and bulb nematodes also survive multiple years in a desiccated state in plant debris, seed and soil. These desiccated nematodes rehydrate and infect a new crop in the presence of moisture.

**MANAGEMENT**

Plant only clean, nematode free seed. Garlic seed can be tested at the UMN Plant Disease Diagnostic Clinic (http://pdc.umn.edu).

Hot water treatments were recommended in the past to kill nematodes in infested seed. Unfortunately this treatment only reduces the number of nematodes in seed and does not completely eliminate them. Increasing the temperature or duration of the treatment damages the garlic seed. This treatment is therefore no longer recommended.

If stem and bulb nematode is identified in a field, use strict sanitation procedures to prevent further spread of the pathogen. Clean all tools and equipment on site after working in an infested field. Do not use garlic from an infested field for seed. Even healthy looking bulbs may be infested with a small number of nematodes. Infested seed can be sold for food if damage is not severe enough to make the product unmarketable.

Nematodes survive in infested bulbs and wrappers. Do not bury culls in the field. Do not move culls or crop debris to a new area.

Rotate out of garlic for four years. Carrots, potatoes, spinach, corn and wheat are poor hosts for stem and bulb nematode and are good choices for rotation crops. Control weeds and volunteers during rotations.

Mustard, rapeseed, oilseed radish and sorghum-sudangrass can be used as a green manure. When tilled into the soil, these crops release compounds toxic to nematodes. Use of green manure has been shown to reduce nematode populations in other crops. Research on the effectiveness of green manure in controlling stem and bulb nematode in garlic is ongoing.

*Figure 3: Stem and Bulb nematode, viewed with magnification. B. Watt, Univ. Maine, Bugwood.org*