Carrot Root Decay at Harvest Time

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It's been a good growing season for carrots in western, NY once we passed initial establishment problems from dry planting conditions in many fields. Carrot tops have been vigorous for the most part and growers have done a good job with fungicide applications. However, now that carrot harvest is underway there can be some previously undetected root problems. Several pathogens can cause decayed carrot roots. In addition, insects can tunnel into roots causing blemishes and wounds for bacteria and fungi to enter. Let's look at the most common root diseases you might see at harvest time in NY:

Cavity Spot (*Pythium violae; Pythium spp.)*

Symptoms of cavity spot are irregularly shaped and depressed lesions that run across the tap roots. Several species of *Phythium* may cause cavity spot, with *Pythium violae* being one of the most important. Roots may become infected at an early stage but become visible only after a considerable time. Susceptibility increases as the carrot matures and older carrots can become infected quickly. The disease is thought to be associated with high soil moisture either early or late in the growing season, as well as with high nitrogen levels.

Cavity spot. *Photo Source: Lindsey du Toit, Washington State University* [Alt text]: multiple orange carrot roots with elongated and sunken brown spots.

Rhizoctonia Crown Rot, Foliar Blight, and Crater Rot (*Rhizoctonia solani*)

Crater rot can be common in New York when conditions are warm and moist, especially when carrots are grown in short rotations with other susceptible hosts. Infections begin on the tap root, often where lateral roots emerge. The lesions enlarge and develop into brown and black sunken cankers. The lesions may penetrate several millimeters into the taproot, which distinguishes them from *Phythium* spp. which are much shallower. Foliar blight and crown rot are the same disease expressed on the plant in different

locations. Crown rot can result from infections on either the crown or on the main root. Early symptoms are horizontal dark brown lesions, which can later develop into black sunken cankers that may penetrate several millimeters into the taproot and petioles. Tops may die in patches in the field. Infections can occur early in the season but may not be detected until much later. The fungus easily spreads from plant to plant and thus, high plant densities and narrow row spacing will increase the severity of the disease, especially under moist conditions. Excessive hilling under moist conditions will also increase disease. It is advised to rotate fields out of susceptible vegetable crops.

Rhizoctonia rot on carrot roots. Photo: Robert L. Wick, Univ. Massachusetts [Alt text]: Long orange carrot roots with black sunken areas.

Rhexocercosporidium Black Spot Disease (*Rhexocercosporidium carotae*)

Rhexocercosporidium carotae was first reported in the United States in 2015 in carrots grown in Essex County, NY. It appears to be fairly widespread in New York. The fungus can affect both the leaves and the roots. In roots, lesions first appear as small, dark spots on the surface. Later, circular dark brown to

black lesions develop and may coalesce to cover large areas or the entire root. The pathogen is believed to only affect carrots.

Rhexocercosporidium black spot. Photo: Sarah Pethybridge, Cornell. [Alt text]: Orange carrot roots with large patches of black spots.

Cottony Rot/White Mold (*Sclerotinia sclerotiorum*)
This disease more commonly shows up in storage, however, it can be found in crops in the field. Cottony rot is characterized by a cotton-like, white mycelium on the lower plant parts and roots. The mycelium mounds up and turns black into the characteristic overwintering structures called sclerotia. *Sclerotinia sclerotiorum* has a wide host range including snap beans, lima beans, dry beans soybeans, cabbage, lettuce and sunflower and rotation to grain crops is recommended to reduce the soil population.

Cottony rot. Photo: William M. Brown, Jr. Bugwood.org Image 5356789**.** [Alt text]: Orange carrot covered in cottony white fluff with dark brown balls.

Soft/Wet Rot (*Erwinia carotovora and other species*)
Bacterial soft/wet rots most commonly occur in storage but may be found in the field under very wet fall conditions. *Erwinia carotovora* is most commonly associated with this condition, but other species of *Erwinia* or even *Pseudomonas* spp. can infect carrot. Erwinia is widespread in soil and is considered a secondary pathogen because it enters the root after there has been previous damage from root cracking, insects, or fungal infections. The tissues disintegrate quickly and turn into a soft, slimy mass.


Watery and slimy carrot suspected to have bacterial soft rot that invaded the root in an open wound. Photo: J. Kikkert, CCE Cornell Vegetable Program. [Alt text]: Orange tap root with a watery area coming from a crack.