Pest e-alerts

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Nematode Disease Update

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Invasive root-knot nematode. There is a new invasive nematode in the U.S. and it is a bad guy. The guava root-knot nematode (*Meloidogyne enterolobii*) is considered to be the most damaging root-knot species in the world because it has a very wide host range and because it can damage and reproduce on varieties of crops bred to have resistance to other root-knot species such as the southern root-knot nematode (*M. incognita*). For example, varieties of cotton, soybeans, tomatoes, etc. with resistance to southern root-knot nematode are susceptible to the guava root-knot nematode. This is problematic because genetic resistance to root knot-nematode is an important control strategy for many crops.

The nematode was reported to occur on eggplant in Puerto Rico as far back and 1988, but was not officially reported in the continental U.S. until 2012 when it was found on Jamaican poinsettia in Florida. It was next reported on cotton and soybeans in North Carolina in 2013. There are more recent reports from sweet potato in South Carolina and Louisiana. The nematode is established in several sweet-potato producing counties in North Carolina and infested slips from that area are suspected to be the source of the Louisiana outbreak. An internal quarantine has been established in North Carolina prohibiting movement of sweet potato seed roots not certified to be free of *M. enterolobii*, and slips with attached soil out of the state. Export of sweet potato roots for fresh market from North Carolina are not limited by this quarantine. However, one or more shipments of fresh-market sweet potatoes from North Carolina were apparently rejected by the European Union, a major customer of North Carolina sweet potatoes, after DNA testing for the presence of guava root-knot nematode. An external quarantine was enacted in Louisiana that restricts the import of equipment harboring soil from Florida, North Carolina, and South Carolina; and import of certified sweet potato roots will only be allowed with a special permit from the Louisiana Department of Agriculture. Nursery crops from those states will require a certificate indicating that they are free of the nematode. The Oklahoma Department of Agriculture, Food, and Forestry is working with Jen Olson to survey the state and test for the nematode under the CAPS program, an APHIS sponsored surveillance program. Fortunately, this nematode has not been found in Oklahoma, but its rapid spread in the U.S in a relatively short period of time highlights how easily a pest can be introduced into new areas on a vegetatively propagated crop such as sweet potato.

The Guava root-knot nematode cannot be distinguished by symptoms. Both the Guava (Figure 1) and the southern (Figure 2) root-knot nematodes produce galls or swellings on sweet potatoes. The swellings or galls are produced from female nematodes feeding and reproducing on roots. The nematodes are differentiated now by PCR tests with species-specific primers. Sweet potato growers should only plant slips fee of soil or seed potatoes produced in nematode-free areas. A researcher from USDA/ARS at the Vegetable Research Lab in Charleston SC reported results of research from a strain of the nematode he obtained from North Carolina sweet potatoes found in a local supermarket! For this reason, I would advise against composting or spreading sweet potato peels, or discarding sweet potatoes on garden or farm soil. It is never a good idea to transplant plants and accompanying soil from unknown areas into vegetable gardens or hoop houses.

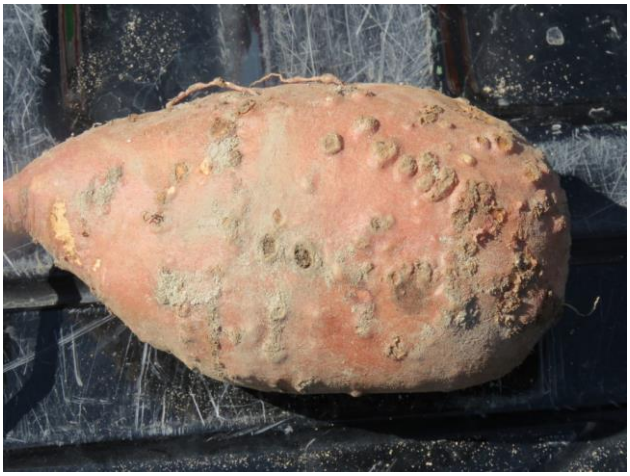

Figure 1. Galls (pimples) on sweet potato from guava Root-knot nematode (photo courtesy NCSU Extension)

Figure 2. Galls on sweet potato from southern Root-knot nematode (photo courtesy Charles Overstreet, Louisiana State University)

Susceptible crops of interest in Oklahoma include cotton, soybeans, cucurbit vegetables, tomato, pepper, eggplant, potatoes, sweet potatoes, and southern peas. Locally important crops reported to be resistant or non-hosts include corn, peanuts, small grains, and grain sorghum. Producers who find severe root-knot symptoms on crop cultivars with resistance to the southern root-knot nematode should test for the presence of guava root-knot nematode by submitting samples for testing to the Oklahoma Plant Disease and Insect Diagnostic Laboratory here at OSU.

Effectiveness of the *Mi* gene for root-knot resistance in Tomato

Root-knot nematode on tomato is a problem here in Oklahoma (Figure 3). There was an interesting presentation from Florida by Johan Desaeger, a nematologist at the UFL Gulf Coast Research Center on the effectiveness of this gene for root-knot nematode control in tomato. Tomato varieties with this gene have and 'N' designation, typically in combination with 'F' (Fusarium wilt) and V (verticillium wilt). 'Celebrity' is a well-known tomato variety with VFN resistance.

The *Mi* gene, named for resistance to the southern root-knot nematode (*M. incognita*) is also effective against the peanut root-knot nematode (*M. arenaria*) and the Javanese root knot nematode (*M. javanica*). It is not effective on the northern root knot nematode (*M. hapla*) or the guava root-knot nematode as described at length above. Apparently, northern root-knot occurs in Florida but only on strawberries. In Oklahoma, we believe the southern root knot nematode is the main nematode on tomato. Northern root-knot has been widespread on peanuts in Oklahoma and a few peanut fields have been observed with peanut root-knot. The take home here is the *Mi* gene is broadly effective as long as we don't import guava root-knot.

There has been a lot written about the effects of temperature on the *Mi* gene. The thought has been that it looses effectiveness at high temperatures. Desaeger reported that this is not the case in Florida. In fall and spring planting seasons in Florida soil temperatures exceed 90°F and he has not observed a loss in *Mi* effectiveness. The gene is not 100% effective at eliminating root galling, as there will be a few galls on the roots of plants with the Mi gene, but far less than for susceptible varieties. Planting N tomato varieties is effective and should be the first line of defense in root-knot contaminated soils.

Figure 3. Galls on tomato roots from root-knot nematode

Disease and Insect Diagnostic Laboratory

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