Good time to check for root knot nematode in vegetables

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As this growing season winds down and for the next few weeks it is a good time to examine vegetable roots for root knot nematode (RKN). I would be suspicious of having RKN if my vegetables seemed to need more water than normal or wilted during the heat of the day and recovered later or plants had nutrient deficiency symptoms and the addition of fertilizers did not seem to alleviate the deficiency symptoms. Other symptoms to be suspicious of include some plants appearing stunted with either lower yields or poorer fruit quality. If these vegetable problems were noticed in spots that seemed to follow down a row, there is a chance you have RKN and you should check your vegetable roots for galls.

When you are done harvesting your field dig—do not pull up-- your plants that are having problems and some of the plants that border these problematic plants. If the ground is moist when you dig it makes the whole process much easier. Wash the roots with water or dip plant roots into a barrel of water and gently swish the roots around. Inspect the roots of the plants for the tell-tale symptoms of RKN, i.e., galls on the fine and larger roots of a plant (fig. 1b) vs uninfected roots being smooth and thin (fig. 1a). At other times entire roots can become swollen and appear ‘lumpy’ and rotted with other roots being much thinner (fig. 2).

Root-knot nematodes start out as eggs that develop into J1 or first-stage juveniles, when J1s molt they become J2 nematodes. The J2 stage is mobile and is the only stage that can start infections. They attack the root tips and enter roots behind the root cap where they initiate a feeding site by injecting secretions that cause the cells to greatly enlarge. The male RKNs eventually leave the roots, but the females stay in the root and lay their eggs in a jelly-like mass that reaches into the soil.

Soil fumigants or nematicides can be effective in reducing RKN damage to vegetable roots, but they will not eliminate the pest from the soil and populations will still be high at the end of the season, but roots will be protected long enough for a crop to be produced. More information on fumigants and nematicides can be found in the 2020-2021 Mid-Atlantic Commercial Vegetable Production Recommendations guide.

There are other options that can be used to reduce RKN populations. One of these options is using certain cover crops that can decrease RKN severity and crop damage. Rapeseed (relative of canola) is one of these cover crops that is planted in late September early October in Maryland at 800,000-900,000 seeds per acre and letting it grow throughout the fall, winter and early spring and then tilling it under in mid-March through mid-April. Rapeseed crops have a high sulfur requirement, so be sure you have adequate levels of sulfur in your soils for this cover crop. The key is getting a good solid stand of the cover crop so that weeds do not grow along with the crop as many weed species can act as hosts for RKN.

In the summer a good cover crop to use is sorghum-sudangrass that can be planted following an early season vegetable crop such as cucumber, pea or snap bean. Planting seed at 200,000 seeds/a or 20 lbs/a in mid to late July produces enough biomass to reduce RKN populations. For best control, the sorghum-sudangrass crop should be chopped while green into smaller pieces and incorporated into the soil by mid-October. Well incorporated sorghum-sudangrass can be as effective as fumigation. Adding poultry litter or poultry litter compost into the sorghum-sudangrass biomass produces the most effective reduction in nematodes.
Fig. 1 Tomato roots without (a) and with galls (b) from root knot nematode infection

Fig. 2 Lumpy rotted roots of a cucumber plant caused by RKN infection