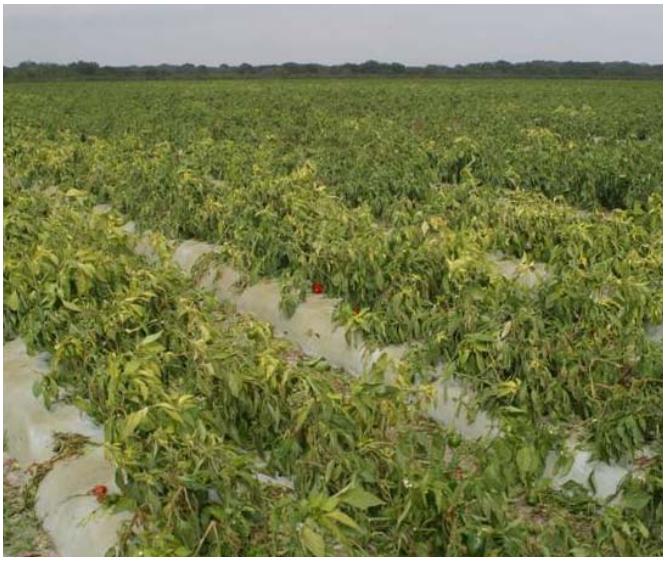
NEMATODE MANAGEMENT:
Root-Knot Nematode of Tomato and Pepper



***Meloidogyne* spp.** *M. incognita, M. javanica, M. arenaria, M. floridensis* and *M. mayaquensis.*

Root-knot nematodes (RKN) pose the greatest overall nematode threat to tomato and pepper on a global basis. They are obligate parasites requiring living plant tissue. Life stages include the egg, four juvenile stages and the adult male or female. Females reproduce without mating, laying upwards of 2000 eggs. With a life cycle of as little as 21 days, populations are capable of increasing rapidly to cause extensive damage.

SIGNS & SYMPTOMS:

- Plant symptoms occur because of root dysfunction, reducing rooting volume and foraging and utilization efficiency of roots for water and nutrients.
- Foliar symptoms include stunting, a general unthrifty appearance, leaf chlorosis (yellowing) and general symptoms of nutrient deficiency.
- Leaves wilt, particularly during hot afternoon sun, recovering slowly when irrigated.
- Stunted or declining plants occur in patches rather than uniformly throughout entire field.
- Positive diagnostic confirmation is provided by symptoms of root galling, where gall size may range from a few spherical swellings to extensive areas of elongated, convoluted, tumorous swellings along the entire surface of roots.

DISEASE CYCLE & EPIDEMIOLOGY:

- RKN attack almost all plant species and reproduce at very rapid rates, resulting in many billions of eggs and juveniles per acre of soil. In Florida, RKN problems are particularly severe because soil moisture and soil temperature seldom deviate from the nematode's optimal range.
- RKN is infamous for its predisposition of wilt susceptible tomato cultivars to infection by *Fusarium*, and of increased incidence and severity of bacterial wilt of tomato caused by *Ralstonia solanacearum*.

DAMAGE THRESHOLDS & MONITORING

- Yield losses are directly related to initial preplant soil population levels and interaction with soilborne pathogens and environmental stresses imposed on the plant during crop growth.
- The mere presence of RKN in soil or plant samples suggests a potentially serious problem, particularly with fall plantings when soil temperatures favor high levels of nematode reproduction.
- In-field soil samples and root bioassay is used to determine whether management is required.

PHOTOS:

Figure 1. RKN on pepper causing leaf chlorsis and stunting. Photograph by: Joe Noling.

Figure 2. RKN causing differnt levels of galling in tomato. Photograph by: Joe Noling.

Figure 3. Severe galling in tomato. Photograph by: Joe Noling.

Prepared by: Dr. Joe Noling

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CULTURAL CONTROLS:

- Clean fallow during the off-season is an important and effective control measure for root-knot nematode.
- Due to the wide host range of RKN, weeds and crop volunteers must be controlled during the fallow period and production season to minimize nematode reproduction and further population increase.
- Quickly destroy the infested pepper, tomato or double crop root system after harvest, thereby preventing further nematode population growth and exposing existing populations to killing actions of sun and wind.
- Avoid use of ditch or pond waters which might contain nematodes for irrigation or spray mixtures.
- Use nematode-free transplants.

CHEMICAL CONTROL:

- Root-knot nematode management must be viewed as a preplant consideration because once root infection occurs and plant damage becomes visible, it is not possible to resolve the problem completely so as to avoid potentially significant crop yield losses.

- As a preplant treatment, use a multi-purpose fumigant such as methyl bromide or Telone C35 to reduce RKN populations and soilborne disease pressure to avoid significant yield loss.

RESISTANCE MANAGEMENT:

- Although response to use of a post-plant nematicide is inconsistent, the sooner the nematode problem is recognized in the field and oxamyl applications started, the greater the improvement to tomato or pepper yields.

Figure 4. RKN interacting with Fusarium wilt in tomato. Photograph by: Joe Noling.

RESISTANT CULTIVARS:

- Use nematode-resistant cultivars containing the *Mi* gene in tomato when possible to limit nematode reproduction and to minimize tomato yield loss. RKN resistant cultivars are not commercially available for pepper.
- RKN-resistant cultivars may not confer resistance to other major soilborne diseases, may breakdown at high soil temperature, and should not be repeatedly planted without alternation with susceptible cultivars to minimize development of resistance breaking nematode populations.

CONTACT INFORMATION:

Dr. Joseph W. Noling
UF/IFAS CREC
700 Experiment Station Rd
Lake Alfred, FL 33850
jnoling@ufl.edu
863-956-1151 ext.1262

IPM Integrated Pest Management Florida

UF UNIVERSITY of FLORIDA IFAS Extension

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