

# Importance of northern root-knot and lesion nematodes for Florida strawberries

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## Summary

**Presence and importance of northern root-knot and lesion nematodes in FL strawberry fields is not very well documented. These nematodes have probably been introduced over the years with strawberry transplants from northern nurseries. Especially northern root-knot nematodes appear to be more widespread in Florida strawberry fields than previously thought.**

In recent years, several “new” nematodes have been detected in Florida strawberry fields. Among them are the northern root-knot nematode (*Meloidogyne hapla*) and the northern lesion nematode (*Pratylenchus penetrans*). Both of these nematodes are not common in Florida, and were likely introduced to the state with infected plant material from the north (Canada and northern US states). Root-knot and lesion nematodes are some of the most problematic nematodes in the world, and the species above are known to cause considerable damage to strawberries and many other crops in temperate climates. There can be little doubt that they can inflict considerable damage to strawberries in Florida as well. At the moment, it is not known what the distribution and damage potential is of these nematodes in Florida. Because of their wide host range, both root-knot and lesion nematodes, pose a significant threat not just to strawberries, but also to many vegetables, field and cover crops, that are grown in rotation with strawberries. It is not known if these northern nematodes can get a foothold in Florida strawberry fields or if they have to be introduced with infected transplants repeatedly. High summer temperatures in Florida may be

prohibitive to survival of these nematodes in the off-season, but no data exists on this.

The goal of this project is 1) to determine the prevalence and distribution of northern root-knot and lesion nematodes in Florida strawberry fields and to monitor their survival capability in the off-season, and 2) to evaluate their damage potential and best management options.

We believe this research is essential to ensure the sustainability of Florida’s strawberry industry. Understanding the spread, survival and damage potential of northern nematodes is the first step in dealing with them. In the meantime it is also critical to identify means and methods to limit introduction of these nematodes with transplant material. The knowledge gained from this project will help strawberry growers improve nematode management in their crop.

In 2016-17 northern root-knot nematodes (NRKN) were found on four strawberry farms. The presence of these nematodes is often not recognized until late season and especially when a double-crop is planted. NRKN prefers cooler soil temperatures, which is why crop damage is usually observed in late winter when temperatures are lower. Double-crops (like cantaloupe and watermelon) can be severely damaged by NRKN. This was clearly demonstrated by the severely stunted cantaloupe and watermelon double-crops that we observed in strawberry fields both in March 2016-17 and March 2017-18 (Fig. 1). Often the damage to strawberries is not very clear, as their root systems are well established by the time the nematode becomes more active. Double-crops,

however, are exposed to much higher levels and more active nematodes at the time of planting, and particularly when direct-seeded the young roots can be attacked and severely damaged by root-knot as soon as they emerge (Fig. 1).



**Fig. 1** Root-knot infected strawberry plant (top) with roots showing small galls; root-knot infected cantaloupe double-crop seedling (bottom) in the same bed with roots showing severe root galling.

During the past year, 2017-18, NRKN were found in several other strawberry fields around Plant City, again often causing late-season collapse of the strawberry crop. Out of the 30 fields that were sampled between March 2017 and 2018, NRKN was found in ten of them, usually in high numbers.

Lesion nematodes (LN) were less commonly found, only in four fields. Proper identification of lesion nematode species is still ongoing, and for some fields we need to confirm if the RKN is NRKN, but so far all RKN we found in strawberry fields have turned out to be NRKN. There is no evidence so far that any of the more tropical (and probably native) root-knot nematodes in Florida can affect strawberries.

At one farm where NRKN was found in March 2017, the field was monitored throughout summer and sampled again during the 2017-18 strawberry season. Strawberry beds were left in his field through the summer, and the same beds were planted with strawberry in fall 2017. Root-knot nematode juveniles were found in the beds throughout summer

(although no plants or weeds were growing in the beds), and by the end of March 2017-28 symptomatic strawberry plants infected with NRKN were observed in the same areas of the field. More definitive sampling needs to be done from other fields where NRKN was found, but this indicates that NRKN can survive during the hot Florida summers, even in the absence of a double-crops or other host plants.

During the 2<sup>nd</sup> year of the project we propose to do more sampling in other fields, and further evaluate the impact of crop termination treatment and field management during summer on nematode survival and spread.

We also evaluated strawberry transplants from different nurseries for the presence of root-knot and lesion nematodes. Roots from 11 different cultivars and 5 different nursery sources were extracted for the presence of nematodes in late September 2017. Most samples contained various non-plant-parasitic nematodes (bacterial and fungal-feeding nematodes). We did not find NRKN in any of these samples, but one of the samples showed the presence of live lesion nematodes in the roots. We will continue to evaluate plants from different nurseries in the upcoming season.

Several presentations on this topic were given at extension and scientific meetings in and outside the US (AgriTech, Plant City 2017, Organization of Nematologists of Tropical America (ONTA), Puerto Rico, 2017, International Strawberry Congress, Antwerp, Belgium, 2017). We are also working on an EDIS publication on root-knot nematodes in Florida strawberries (<http://edis.ifas.ufl.edu/in1184>).

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