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Kona Coffee Root-Knot Nematode Sampling Procedures

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Introduction

The Kona coffee root-knot nematode (*Meloidogyne konaensis*) affects the health and survivability of coffee trees in Hawai'i (Nelson et al. 2002). This nematode creates knots or galls on the roots of susceptible trees and causes a decrease in the plant's ability to translocate water and nutrients to its branches, leaves, and berries. Ultimately, *M. konaensis* will reduce yield and cause tree death earlier than the normal lifespan of the tree.

Physical tree symptoms during early infection can be difficult to diagnose; however, trees with severe nematode infestation can exhibit symptoms of wilt, leaf yellowing and flagging, overbearing dieback, stump wobbliness, corky taproot, fewer and swollen feeder roots, and overall decline (Serracin et al. 1999) (see Figures 1 and 2). Flower and fruit drop and premature ripening or mummification of the berries can also occur. Overall, *M. konaensis* will result in significant yield losses over time if not managed.

Determining the presence (or absence) of *M. konaensis* on coffee farms can assist growers with decisions for tree planting and replacement, as well as understanding symptoms of coffee tree decline. Making an educated decision about planting root-knot nematode-resistant grafted trees can alleviate losses over time as well as potentially restore lost revenue once the resistant coffee trees bear fruit.

Figure 1. A visual comparison of 11-year-old 'Kona Typica' coffee trees grafted onto *M. konaenesis*-susceptible or -tolerant rootstocks: 'Kona Typica' rootstock (L) versus 'Nemaya' (R) rootstock.

When to sample for root-knot nematode

The timing of sampling is important because nematodes prefer moist soil conditions and live roots. Nematodes can move out of roots and through the soil to preferred hosts and locations. This means that if a sample is taken during a drought or a dry period, or from a tree with

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Figure 2. Symptoms of nematode presence in the field include (A) swollen lateral roots and (B & C) a corky tap root with a lack of feeder roots. A healthy coffee root system exhibits numerous feeder roots (D).

already unhealthy or dead roots, then the sample results may indicate a false negative. False negative results could give a farmer the wrong impression that *M. konaensis* nematodes are not present when in fact they may be but simply were not recovered in the sample because they had already vacated the sampled area or root system. Resampling and submission may be required.

For high-confidence root-knot nematode sample results, follow these sampling procedures:

- Sample roots and soil (Fig. 3) during the wet season.
- Sample roots and soil from trees exhibiting early symptoms of yellowing leaves and stunting.
- Do not sample roots and soil from a tree that is dead or near death.

How to sample for root-knot nematodes

Tools

- Farm map
- Clean bucket
- Shovel, pick, trowel, o‘o, and/or soil-coring device
- Quart-size or larger plastic bag (i.e., Ziploc®) for each sample

Figure 3: A good coffee root-knot nematode sample (L) should have ample amounts of roots and some soil and should not contain rocks, plant debris, or weeds (R).

- Permanent marker, pen/pencil
- Optional: spray bottle with 70% alcohol solution and coarse bristle brush to cleanse tools and/or shoes between sample locations

Procedures (adapted from Schmitt and Sipes 1998, Serracin et al. 1999):

- Locate trees with symptoms of leaf yellowing and slower-than-normal growth.
- With a shovel, pick, trowel, o‘o, and/or soil-coring device, sample the zone of soil where the coffee roots are found, typically near the tree’s leaf-canopy dripline (Fig. 4) and to about 6 inches below the soil surface.
- To diagnose a suspected infection, sample two or three spots near the canopy dripline from each of several trees that are showing symptoms, preferably early symptoms (yellow leaves, tree stunting).
- To do an overall assessment (Fig. 5) of a field, take samples from about 20 spots. The samples should include roots. The number of samples required is situational and may be influenced by plot size, terrain, variety, dispersion, and severity of symptoms, etc. It is better to take more samples rather than fewer.
- Mix the subsamples together and take about a pint (2 cups) of root and soil mixture to be submitted. Quickly put this sample in a plastic bag and keep it in an insulated cooler. Keep the sample away from extreme heat and cold.

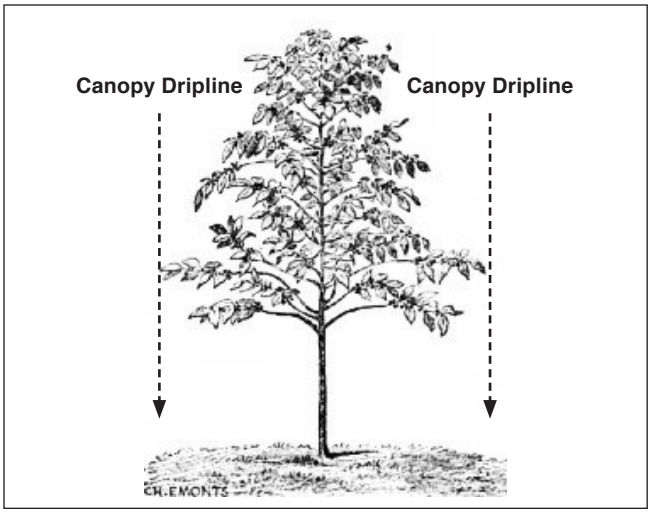

Figure 4. Coffee root-knot nematode sampling zone.

- Label the sample with your name, field identification number or description, date, and any other information that will be useful for submission and analysis.
- Check with your local Cooperative Extension office or agent to find out the best day and time to bring in a sample for prompt shipping to the UH Agricultural Diagnostic Service Center. Complete forms and payment at the Extension office. As of May 2, 2018, a nematode analysis (D2) costs $12.00 per sample.

Results

Sample results can take 2–3 weeks to return. Positive or negative results of Kona coffee root-knot nematode will be provided to you for each sample. Consult with your local Cooperative Extension agent on your results and following actions.

Acknowledgements

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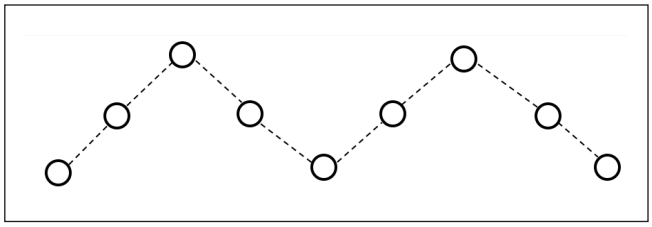

Figure 5: Collect composite samples in a zig-zag pattern.

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