NEMATODE VERTICAL DISTRIBUTION IN PEANUT-COTTON CROPPING SYSTEMS

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Introduction

Cotton and **peanut** are important crops in the southeastern United States. Reniform nematode (***Rotylenchulus reniformis***) is a parasite of cotton capable of reducing lint yields, so crop rotation is commonly used for its management [1]. One system, sod-based rotation (SBR), uses two years of **bahiagrass** followed by one year each of peanut and cotton compared with a conventional peanut-cotton-cotton crop rotation. Some benefits of SBR (e.g. improved cotton root growth) are well-known, but information about its effects on **free-living nematodes** (fungivores, bacterivores, omnivores, predators) is limited [2]. These nematodes contribute to soil nutrient cycling and may be beneficial in crop production. Additionally, reniform nematode is present deep in the soil profile, but not much is known about free-living, spiral (***Helicotylenchus dihystera***), and ring (***Mesocriconema ornatum***) nematodes at deeper depths.

Materials and Methods

Objective: investigate irrigation (+/-), crop rotation (conventional vs. sod-based rotation), and depth (0-30, 30-60, 60-90, and 90-120 cm) effects on nematodes.

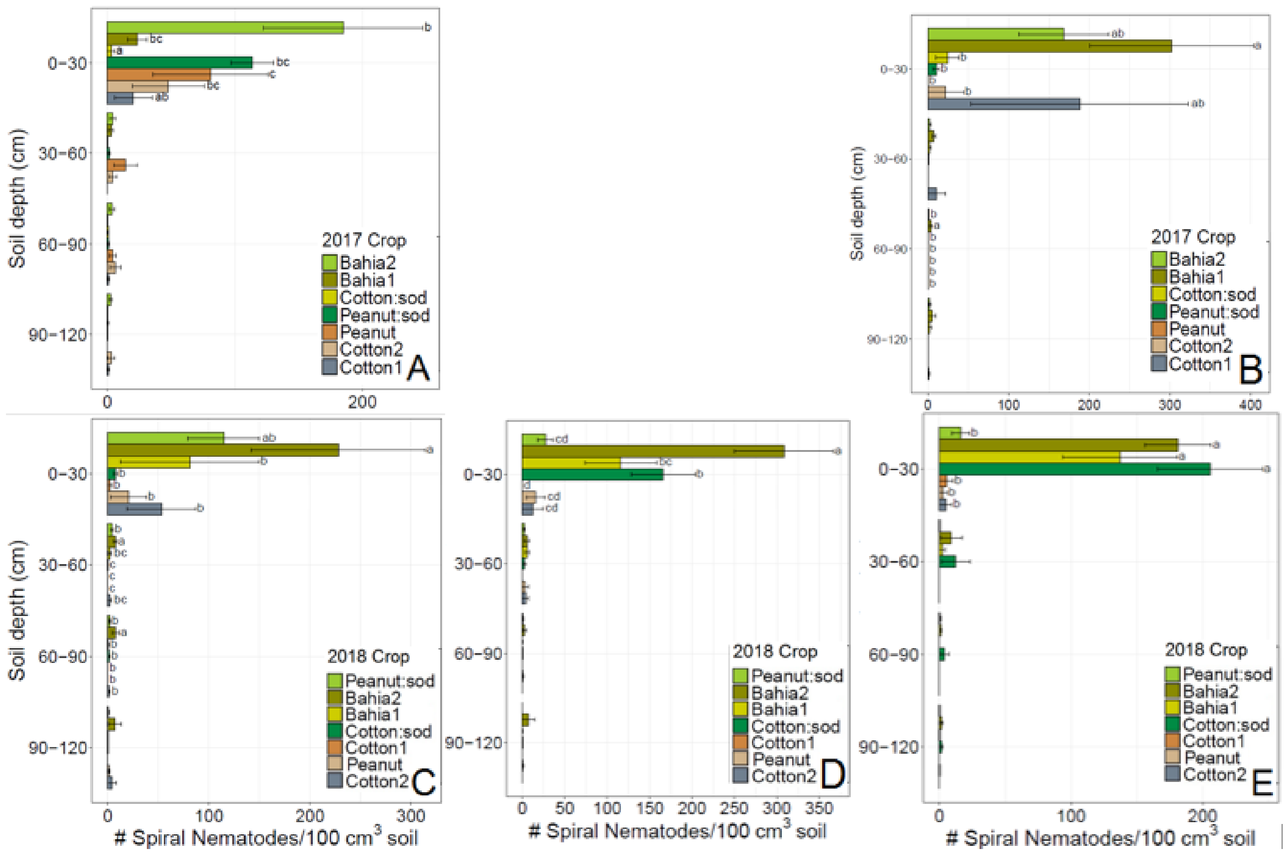
Soil samples were collected to a depth of 120 cm before planting (March 2017/2018), after harvest (October 2017/2018), and in winter (January 2018/2019) using a hydraulic probe (3 cores per plot) at a long-term research site in Quincy, FL, USA. Nematode abundances were analyzed in 30 cm-sections following sucrose-centrifugation extraction [3]. Crop phases for the **sod-based rotation** were first-year bahiagrass (Bahia1), second-year bahiagrass (Bahia2), sod-based peanut (Peanut:sod), and sod-based cotton (Cotton:sod). Crop phases for the **conventional rotation** were conventional peanut (Peanut), first-year conventional cotton (Cotton1), and second-year conventional cotton (Cotton2).

Results and Conclusion

Irrigation did not affect nematode community structure ($P>0.05$). There were significant crop by depth interactions ($P<0.05$) for plant-parasitic and free-living nematode population densities (shown in figures below). Different letters denote significant differences between crops within a depth (Fisher's LSD, $P<0.05$). SBR reduced reniform nematode populations at all depths compared to the conventional rotation. Plant-parasitic and free-living nematodes were present up to 120 cm deep in the soil profile, yet they were more abundant closer to the surface.

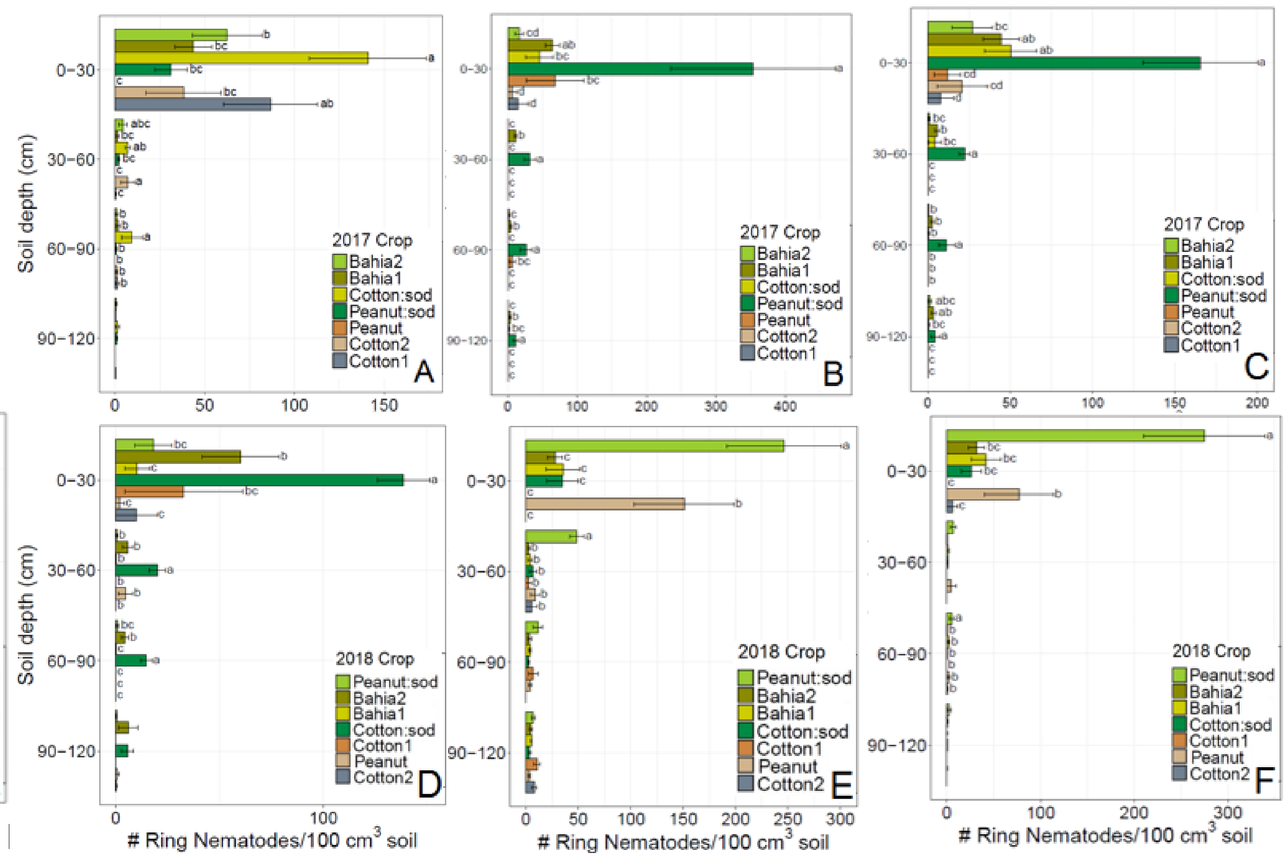
Spiral nematodes greater in second-year bahiagrass

A = preplant 2017, B = winter 2018, C = preplant 2018, D = harvest 2018, E = winter 2019



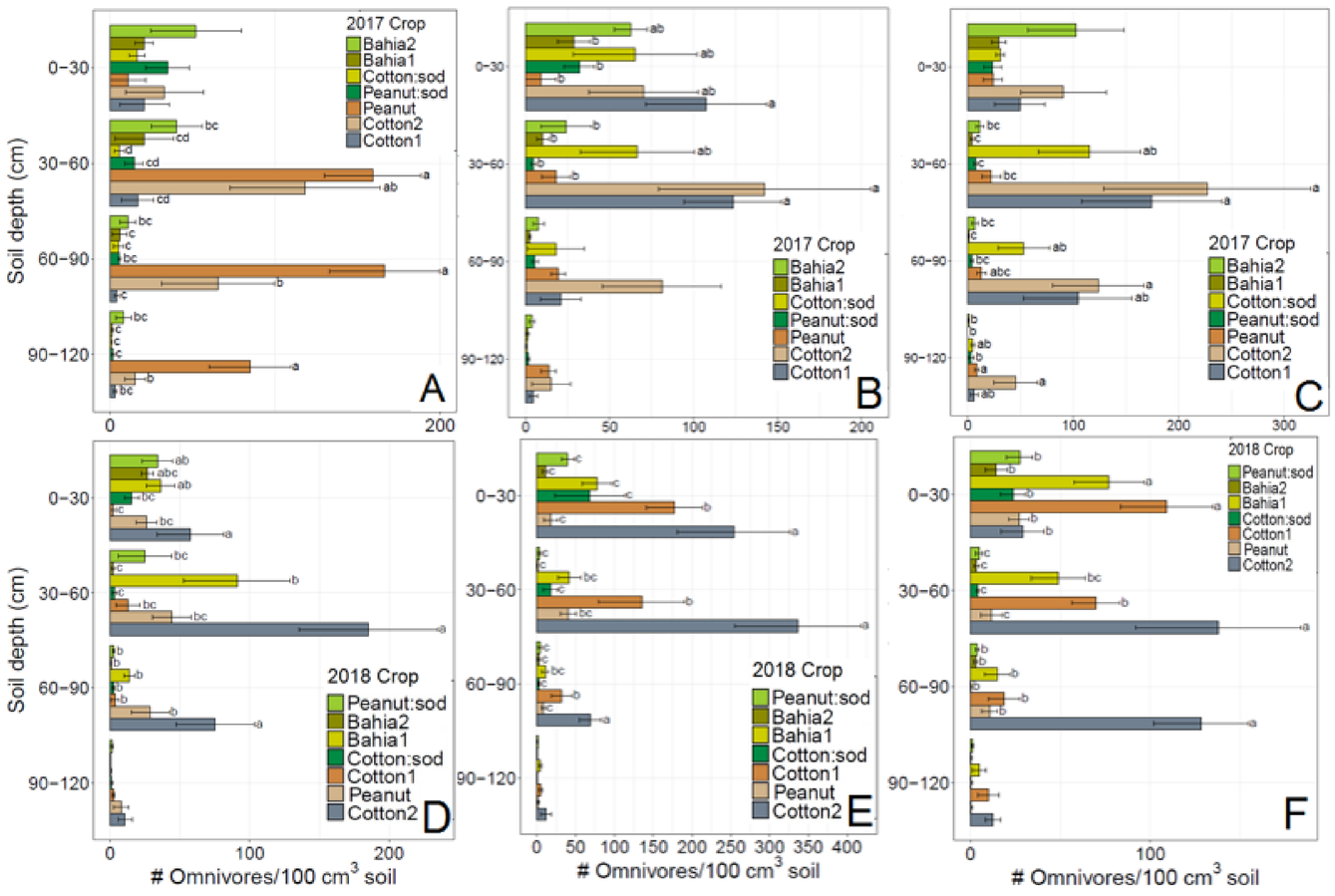
Ring nematodes greater in peanut phase of sod-based rotation

A = preplant 2017, B = harvest 2017, C = winter 2018, D = preplant 2018, E = harvest 2018, F = winter 2019



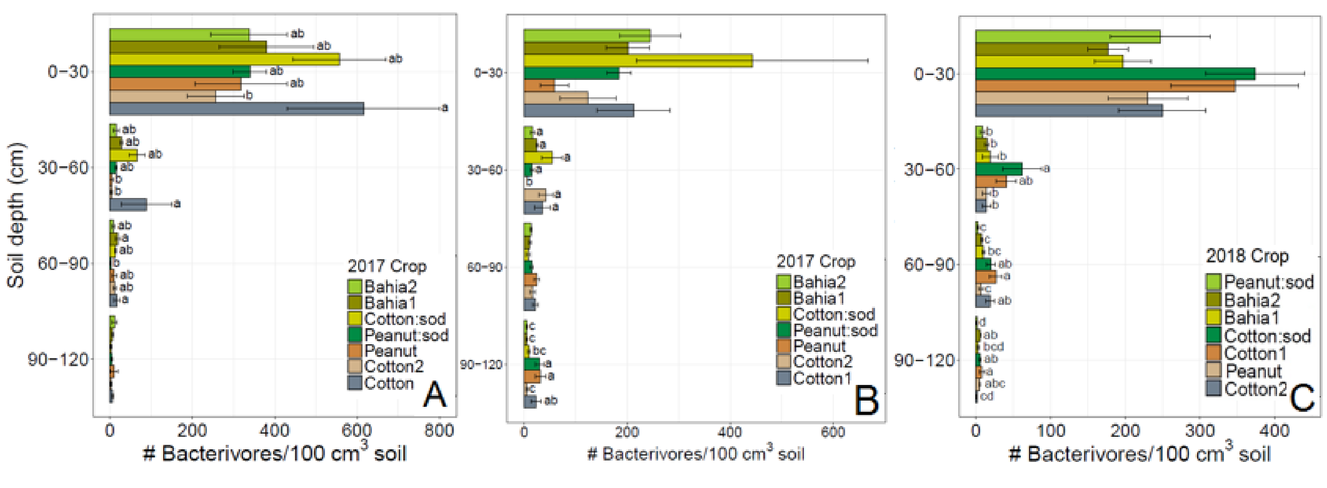
Omnivores greatest in cotton phases of conventional rotation from 30-120 cm

A = preplant 2017, B = harvest 2017, C = winter 2018, D = preplant 2018, E = harvest 2018, F = winter 2019



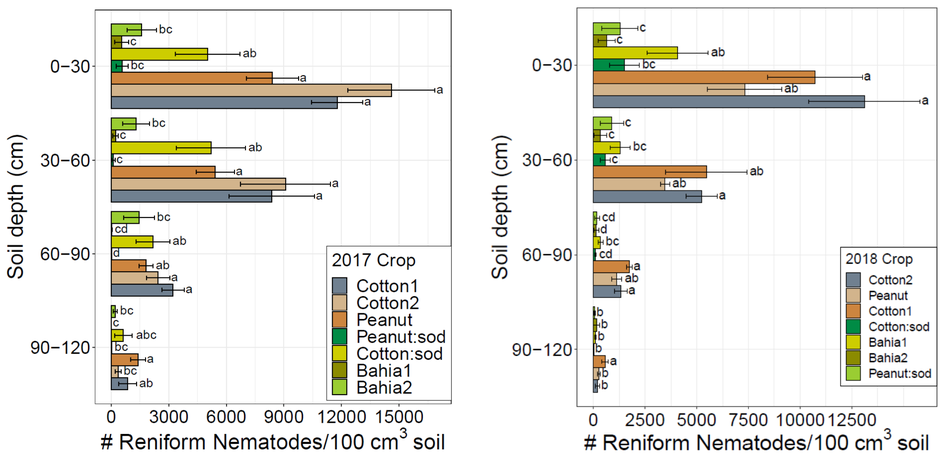
No difference in **bacterivore** abundances between rotations at 0-30 cm

A = preplant 2017, B = harvest 2017, and C = preplant 2018



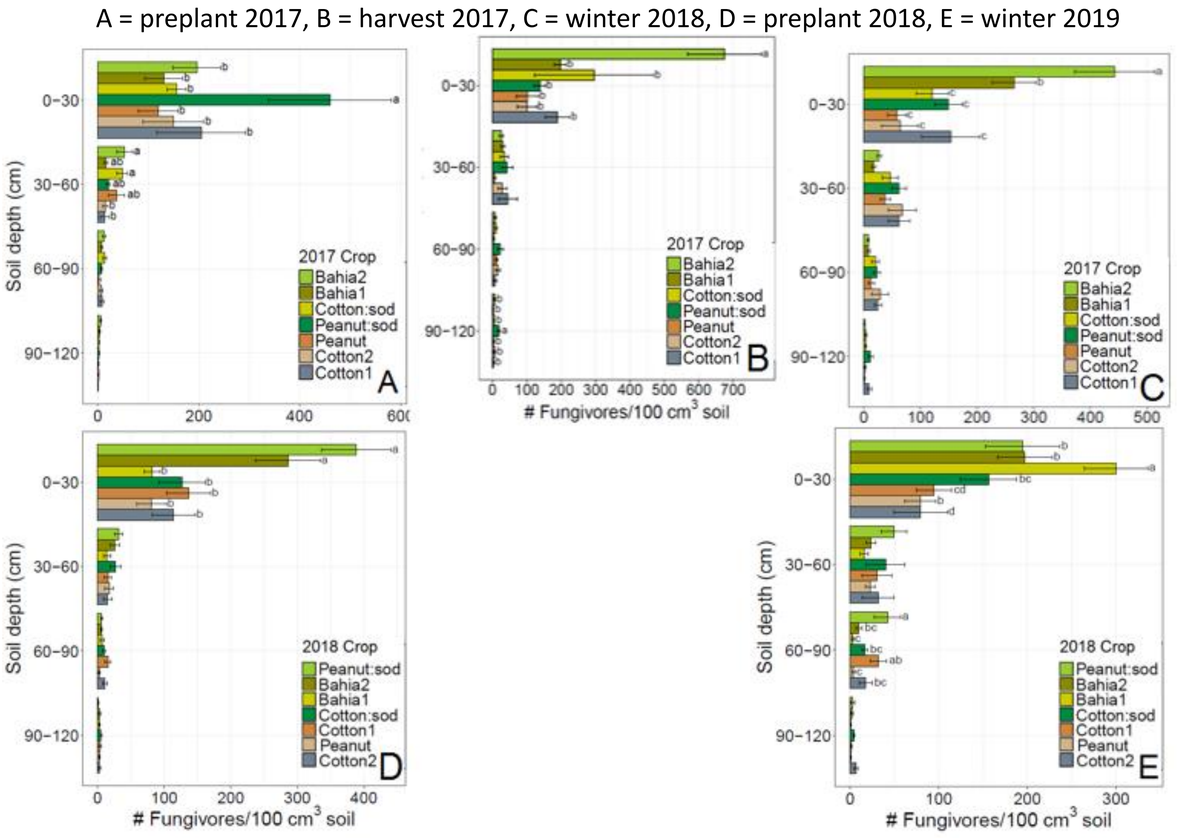
Reniform nematodes greatest in conventional rotation (all depths)

Left = harvest 2017, right = harvest 2018



Fungivore abundances greater in second-year bahiagrass at 0-30 cm

A = preplant 2017, B = harvest 2017, C = winter 2018, D = preplant 2018, E = winter 2019



Acknowledgments

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References

1. Moore and Lawrence, 2012. Nematropica 42:227-236.
2. Wright et al., 2010. ASA-CSSA-SSSA International Annual Meetings.
3. Jenkins, 1964. Plant Disease Reporter 48:692.