

**RENIFORM NEMATODE (*ROTYLENCHULUS RENIFORMIS*) DEVELOPMENT ACROSS THE
VARIABLE SOIL TEXTURE IN A COMMERCE SILT LOAM FIELD**

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Abstract

Populations of *Rotylenchulus reniformis* were not strongly correlated with sand or clay content but were with soil zones ($R^2 = -0.47$; $P = 0.0000$). However, the highest populations of this nematode were found when clay content was between 10-20%. Nematode samples that were collected in six inch increments to 24 inches were found to have much higher populations of nematodes in the lower depths. Soil zones had a highly significant impact on reniform populations in the deep samples and higher levels were present in the soils with the least amount of clay through the soil profile. Soil texture is certainly important in population development of reniform nematode, and soil zones may be useful to delineate levels within a field.

Introduction

According to the National Cotton Council of America 2011, cotton yield losses due to nematodes have increased substantially since 1990. Currently *Rotylenchulus reniformis* is one of the most important pests of cotton in Louisiana and other southern states with losses estimated at \$166 million in 2004. Soil texture is known to both influence nematode reproduction and damage potential to a crop such as cotton. Site-specific management (SSM) of nematodes is currently being investigated in cotton to deal with specific nematodes such as *R. reniformis*. The factors involved in developing SSM include such things as soil texture, presence and population densities of a pathogenic species of nematode, and potential crop yield. Many of the soil types found in Louisiana are the result of alluvial deposition of soils and often have considerable variation in soil texture within a field. Our study looks at population development of *R. reniformis* across soil textures within and through the soil profile in two fields in Louisiana which are primarily Commerce Silt Loams.

The objectives of this study were to evaluate the influence of soil texture, electrical conductivity of the soil (EC_a), and soil zones on reproduction of *Rotylenchulus reniformis* on cotton.

Materials and Methods

The experiment was conducted in two commercial cotton fields located at Waterproof, LA in Tensas Parish and Tallulah, LA in Madison Parish. Both fields are highly variable in soil texture, and reniform nematode is the dominant nematode present. The fields were divided into five management zones based on data from the Veris 3100 EC_a soil mapping implement. Plots were 12 rows wide and consisted of untreated and treated rows (Telone at 3 gal/a applied pre-plant) running through the entire length of each field. Sampling sites were established based on soil zones for each plot and identified in the field with a Trimble Juno handheld GPS receiver and a FarmWorks SiteMate Pro program. Soil samples for nematode and texture analysis were collected from each of the zones. Nematode samples were collected at planting and after harvest. Twelve soil cores to a depth of 6-8 inches were collected within a 15 foot area around each sample site. In early June, a single sample was collected by soil cores of

six inch diameter in the center of each sampling site. These cores were collected at each site in six inch increments through 24 inches and evaluated for both nematode populations and soil texture. Nematodes were extracted from the samples by elutriation and centrifugation and identified by an inverted microscope. Soil texture was determined from each partition of soil by using a hydrometer method.

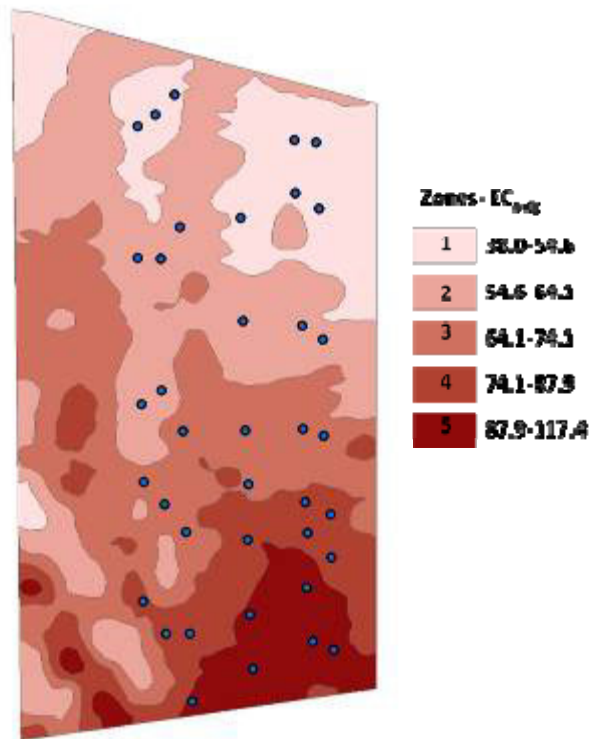


Figure 1. Collins field in Madison Parish divided into five soil zones based on EC_{a-dp} .

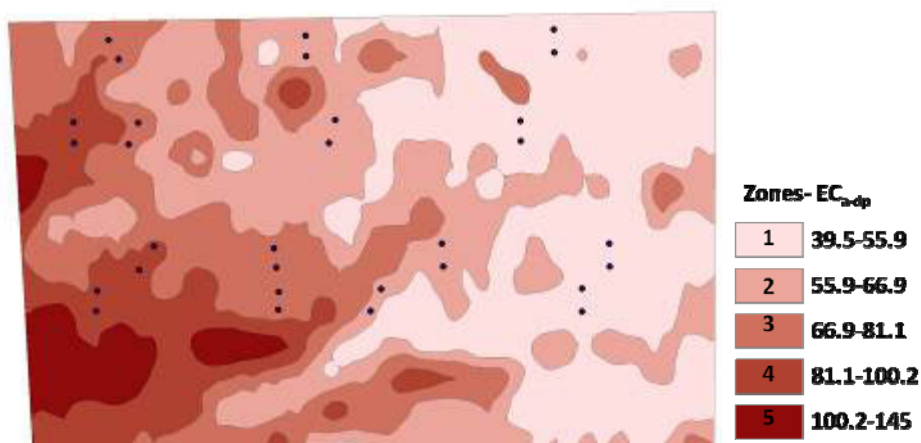


Figure 2. Waterproof field in Tensas Parish divided into five soil zones based on EC_{a-dp} .

Results and Discussion

There were no significant differences observed with nematode populations in either location between the treated and untreated plots. Data were pooled between the two treatments. Figures 1 and 2 show the two cotton fields that have been divided into five soil zones based on apparent EC_{a-dp} readings and the sampling sites within each zone. Figures 3 and 4 show the correlation between increasing levels of sand or clay and reniform nematode populations. Correlations were fairly low for clay, $R^2=0.17$ ($P=0.02$). There was a higher correlation with populations and soil zones $R^2=-0.47$ ($P=0.0000$). The highest populations did occur between 10-20% clay content. Nematode populations were highly significant by zones ($P=0.002$) and depth ($P=0.003$) in the Waterproof field (Figures 5 and 6). Clay content was also highly significant by zones and depth, ($P=0.00$) and ($P=0.04$), respectively. The Collins field followed similar trends and was highly significant for nematodes and clay with zones or depth (Figures 7 and 8).

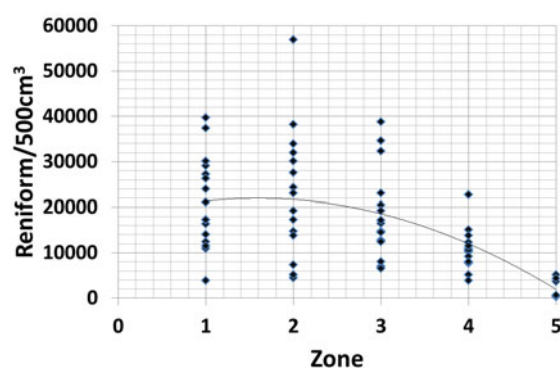


Figure 3. Reniform populations from both sites based on zones.

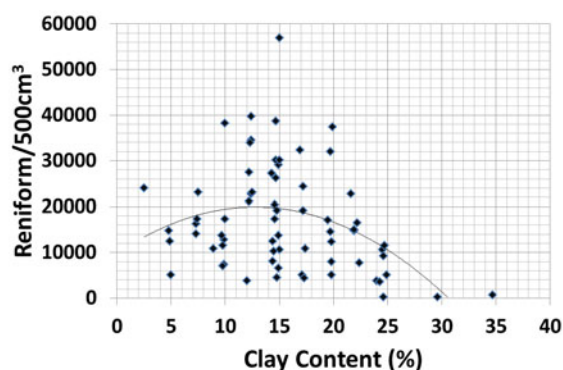


Figure 4. Reniform populations from both sites with increasing levels of clay.

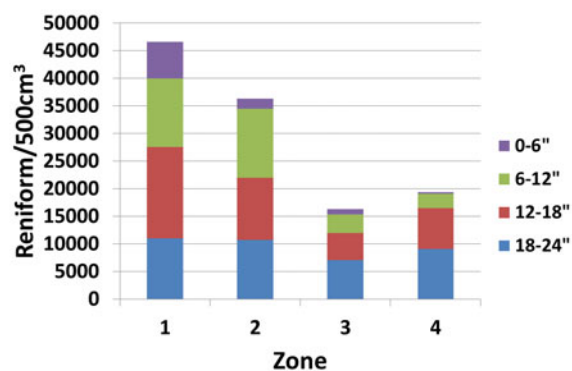


Figure 5. Reniform by zones at different depths in the Waterproof field.

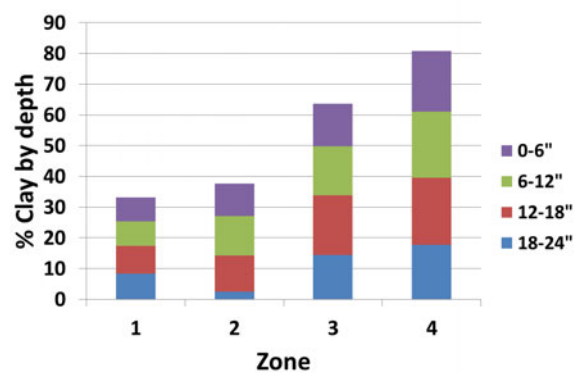


Figure 6. Clay % by zones at different depths in the Waterproof field.

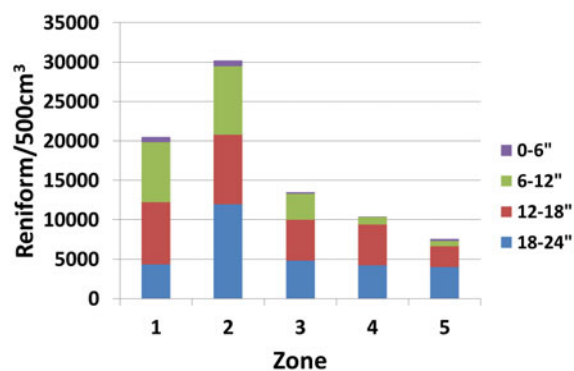


Figure 7. Reniform by zones at different depths in the Collins field.

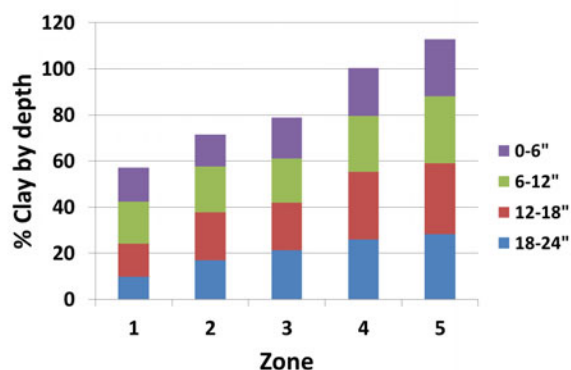


Figure 8. Clay % by zones at different depths in the Collins field.

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