IDENTIFYING ROOT-KNOT NEMATODE AREAS IN COTTON USING SOIL ELECTRICAL CONDUCTIVITY

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Introduction

The primary cotton production area in Louisiana is located in the Northeast region of the state and the soil area is referred to as Southern Mississippi Valley Alluvium (Figure 1). Many of the fields in this area have the southern root-knot nematode (*Meloidogyne incognita*) present. However, variable soil textures are found in most of these fields and root-knot nematode is generally found only in the sandy areas of a field. Nematicides are one of the most common management tools used by our producers. Currently, producers treat the entire field as technology and methodology to the manage the variability has not been developed. Identifying the precise areas where nematodes are found and treating only these areas could reduce pesticide application.

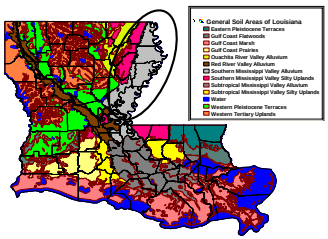

Figure 1. Soil areas in Louisiana and major cotton production area.

Objectives

To determine if soil electrical conductivity as measured by a Veris 3100 soil mapping system would be effective in Mississippi alluvial soils and could it be used to define areas in a field where root-knot nematode would likely occur.

Methods

The initial field evaluated (Gin Ridge site) was a typical alluvial soil that had a wide range of soil textures from very fine sand to clay. A Veris 3100® soil mapping system (Figure 2) was used to measure apparent electrical conductivity (EC_a) at 0-1'(30 cm) and 0-3' (91cm) depth, $EC_{a\text{-}sh}$ and $EC_{a\text{-}dp}$ respectively, throughout this field. The field was divided into 1 acre (0.4 ha) grids and nematode samples collected from the dominant $EC_{a\text{-}sh}$ class within each grid. A number of additional fields were included in the study.

Figure 2. Veris® 3100 soil mapping system.

Results

The Veris 3100® EC mapping system was found to be an especially effective tool for delineating soil texture in the Mississippi alluvial soils evaluated in this study. Clay content was highly correlated with $EC_{a\text{-}sh}$ (R^2 = 0.89). Root-knot nematode was present in the Gin Ridge site but limited to areas which generally had $EC_{a\text{-}sh}$ readings of <30 mS/m and clay content of 18% or less (Figure 3). A number of additional fields were included in the study to show the relationship between root-knot nematode and texture as defined by EC_a (Figures 4-7). Figures 8a &b shows typical nematode damage in one of the low $EC_{a\text{-}sh}$ areas in a cotton field.

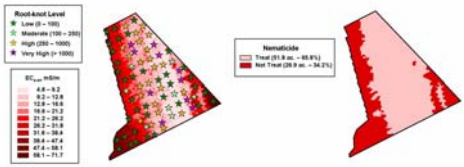

Figure 3. Root-knot populations, $EC_{s\text{-}sh}$, and treatment zones in the Gin Ridge field (Tensas parish).

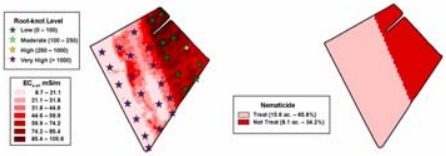

Figure 4. Root-knot populations, $EC_{s\text{-}sh}$, and treatment zones in the Cemetery North field (Tensas parish).

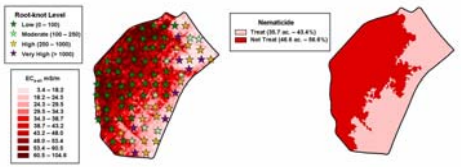

Figure 5. Root-knot populations, $EC_{s\text{-}sh}$, and treatment zones in the Ken's Corner field (Tensas Parish).

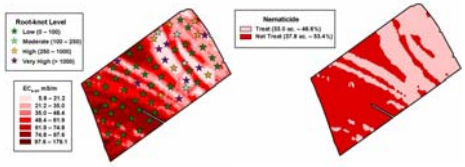

Figure 6. Root-knot populations, $EC_{s\text{-}sh}$, and treatment zones in the Roger Carter field (Concordia parish).

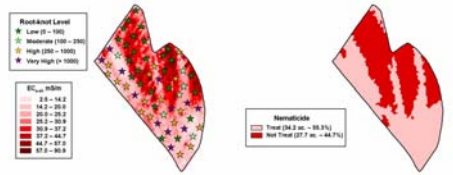

Figure 7. Root-knot populations, $EC_{s\text{-}sh}$, and treatment zones in the Cemetery South field (Tensas parish).

Figure 8a and 8b. Root-knot nematode injury to cotton. Galling of the root system by the nematode.

Table 1. Potential saving in a nematicide such as 1,3-dichloropropene (Telone) in the test fields in this study.

Test field	Entire field ($)	Specific area ($)	Savings ($)
Cemetery South	2476	1368	1108
Cemetery North	948	624	324
Gin Ridge	3148	2072	1076
Ken's Corner	3292	1428	1864
Roger Carter	2832	1320	1512

Telone costs are ca. $40 per acre.

Discussion

The alluvial soils of Mississippi River can be characterized by the use of EC_a into a number of classes or natural breaks. Root-knot nematode occurred in the classes which had the lowest readings (mS/m). Producers could take this information and develop treatment areas for their fields. In the fields included in this study, the areas of the field that would not require treatment with a nematicide ranged from 34-57% (Table 1). This could result in considerable saving to the producer and reduced amounts of pesticides applied to manage nematodes.

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