COMBINATION OF HYPERSPECTRAL REFLECTANCE, SOIL ELECTRICAL CONDUCTIVITY AND REAL TIME NDVI FOR ESTIMATING INFIELD RENIFORM NEMATODE NUMBERS

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Abstract

The reniform nematode has become an economically serious pest to cotton production in the southeast United States. This nematode is rapidly spreading across the southeast cotton belt and now has been identified in all coastal states from Texas to Virginia and Arkansas, Missouri, and Tennessee. The reniform nematode has become the most economically serious cotton pest in Alabama, Louisiana, and Mississippi. In these three states the reniform population numbers are higher on average compared with the other southeast cotton growing states. In fact nematode numbers in the other southeast states rarely at any time of the growing season reach the levels that Alabama, Louisiana, and Mississippi experience at planting in the spring. Over 328,073 bales of cotton are lost due to the reniform nematode valued at over $128 million dollars in theses three states alone. On a per farm bases it has been estimated that the reniform nematode costs each of our producers 100 to 500 lb of lint per acre or $55 to $275 per acre each year. To implement a successful reniform nematode management program, the producers must first identify that the nematode is present in a field and determine population densities present in each location before implementing nematicide applications. If the nematode is present then a management strategy is developed in accordance with his farming practices. Currently the most common means of reniform management is with the addition of nematicides. Recent studies in Louisiana have demonstrated that nematicides have been less effective relative to soil EC measurements. Current observations are that higher EC measurements or soil texture the less effective the nematicide. This indicates that soil properties have a major impact in nematicide response. The collection of a representative number of soil samples is a limiting factor for any nematode management program especially for site-specific placement of nematicides. In Mississippi, remotely sensed hyperspectral imagery has been correlated with reniform nematode population levels to obtain an accurate estimation of the infield nematode distribution without taking a soil sample. This will provide the producer with a more accurate nematode distribution across the field. Alabama is currently working with the Greenseeker. The Greenseeker emits its own light source, allowing for on-the-go collection of NDVI readings regardless of cloud cover. This may help provide our producers

with real-time readings to help in the delay from aerial imagery.

In 2008, cotton production fields naturally infested with the reniform nematode were selected in Alabama, Louisiana and Mississippi. Hyperspectral reflectance data, shallow and deep EC soil electrical conductivity zones and NDVI vegetative index maps have been prepared. We are now examining the various parameters and relationships to cotton yields to determine the best management methods or combination of methods for reducing economic nematode damage to maximize cotton yields with site specific management.