THE RENIFORM NEMATODE

G.W. Lawrence
Department of Entomology and Plant Pathology
Mississippi State University
K.S. McLean
Department of Entomology and Plant Pathology
Auburn University

Introduction

The reniform nematode is rapidly becoming the most economically important pest associated with cotton production in the Southeast United States. In many locations the damage incurred by this nematode has surpassed the root-knot nematode in both the reduction of plant development and effects on cotton yields. The reniform nematode has been found in the eleven states that make up the southeast cotton belt.

Excluding Texas, over 6.2 million acres of cotton are produced in the southeast. It is estimated that 1.2 million or 19% of these acres are infested with the reniform nematode. The percent of acres infested in each state range from 1.4 to 55%. In Texas 2.7% of over 5.5 million acres are estimated to be infested. The highest infestations occur in Alabama, Georgia, Louisiana and Mississippi. In Mississippi 32.4% of the cotton producing acres in 51 counties are infested with the reniform nematode.

Symptoms

The reniform nematode will reduce cotton plant growth and lint yield. Symptoms will vary due to the length of time a particular field has been infested with the nematode. Fields in which the nematode has recently been introduced will display areas of stunted and uneven plant growth giving the field a spotty appearance. Nematode numbers will generally be higher in the areas of poor plant growth. After a field has been infested with the reniform for several years, the nematode will become more uniform in its distribution. In these fields no typical foliar symptoms of nematode damage are visible. Overall plant growth in generally reduced across the entire field and yields will continue to decline each year cotton is planted.

The only definite way to determine if cotton is infected with the reniform nematode is to examine the roots for the presence of the nematode. Although the reniform nematode does not produce a characteristic root symptom as with the root-knot nematode, it will produce a small egg mass that can be observed on the root surface. The egg masses are small and soil particles will stick to the egg mass giving it the appearance of a soil particle. The reniform female is observed by carefully rinsing the soil from the root and examining the roots for egg masses with a stereoscopic microscope. The characteristic kidney- shaped female can be observed surrounded by eggs in the egg mass.

Yield Losses

The reniform nematode is capable of reducing cotton yields by 60 percent or higher when cotton is planted in fields infested with high nematode numbers. Therefore, steps are necessary to manage this nematode and maintain low nematode numbers. Yield loss estimates in 2000 ranged from 0.02 % in North Carolina to 8.0% in Alabama. Cotton lint reductions attributed to this nematode ranged from 1,382 to 152,616 bales in Florida and Mississippi, respectively. Average yield reductions across the southeast were estimated at 330,907 in 2000.

Reniform Management

The tactics for the management of plant-parasitic nematodes includes resistant or tolerant cultivars, crop rotation, and the use of nematicides. The availability of these tactics are limited for the reniform nematode. Therefore a management strategy should include an integrated approach with a combination of all available tactics.

The first step in a management strategy is to determine that the reniform nematode is actually present. With the lack of obvious or notable root symptoms, the only means to determine if the nematode is present in the soil is with a soil analysis. If the reniform is present then a combination of the following tactics are recommended:

1) Resistant cultivars: Currently there are no commercially available cotton cultivars with an appreciable level of resistance to the reniform nematode. Although no resistance has been identified, several cultivars have

exhibited a degree of tolerance by producing high yields when planted in reniform infested fields. However, these cultivars are not consistent in their results to the reniform nematode across the southeast.

2) Crop rotation: The rotation of cotton with a crop which is a non-host to the reniform nematode or with a crop that has resistance to the reniform is an effective management tactic and should be practiced when possible. The inclusion of a non-host such as corn, peanut, sorghum, wheat, or a crop which has resistant varieties such as soybean, in a cropping system are effective in reducing reniform nematode numbers. Corn is practically immune to the reniform nematode and is considered a good rotation crop in areas where corn can be produced. Fields should also remain weed free during the rotation to prevent nematode increases on weed species. Numerous hosts of the reniform nematode have been reported.
3) Nematicide treatments: The use of a nematicide is the most common management tactic for the reniform nematode. Nematicides reduce nematode numbers early in the growing season, however, their effects are short term and must be applied annually.

The fumigant nematicides, such as Telone II and Vapam, are non-selective biocides that are applied prior to planting the crop. Once applied to the soil the material will volatilize forming a vapor that will move through the air spaces in the soil and mix with the moisture film around the soil particles killing nematodes and other soil microorganisms. To be effective, the soil temperature must be high enough to ensure volatilization of the chemical and a moisture content low enough to allow movement of the gas through the air spaces of the soil. The fumigant nematicides generally require a 7 to 14 day waiting period once applied before the crop is planted.

The non-fumigant nematicides are also effective in reducing reniform numbers and can be applied at planting. Materials such as Temik 15G, Nemacur 15G, and Vydate C-LV can be applied in the seed furrow at planting. These are absorbed into the developing seedling and provides systemic protection from nematodes. However, results vary due to soil types, soil moisture, and environmental conditions found across the southeast.

Post-plant applications of Temik 15G, as a side-dress treatment 5 to 6 weeks after planting, in combination with at plant applications have also been effective in increased cotton yields. Side-dress applications, however, have not been consistent in university tests across the southeast. Vydate C-LV when applied at as two foliar sprays starting at the sixth true leaf stage plus 7-14 days later in combination with an at plant application of Temik 15G has been consistently beneficial in reducing reniform numbers later in the growing season and increasing cotton yields. The reduction in nematode numbers associated with post-plant nematicide applications coincides with the cotton physiological growth stages of flower set and boll production.

The availability and use of nematicides vary from location to location. Specific precautions and requirements should be obtained from the appropriate state agency in each location that a nematicide is to be used.

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