PERFORMANCE OF ROOT-KNOT NEMATODE RESISTANT VARIETIES UNDER DIFFERENT IRRIGATION LEVELS

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Abstract

In the High Plains of Texas, the southern root-knot nematode (*Meloidogyne incognita*) is an important pest found in as much as 40% of the fields in the region. Severe infestations have been associated with yield losses as high as 25% when left untreated. Irrigation is important in maximizing cotton yields, especially with regards to root-knot nematodes, as nematode damage is often more severe when combined with drought stress. Chemical management options for *M. incognita* are limited and consist of at-plant or seed treatment nematicides; however, the use of partially resistant varieties is the most affordable and effective tactic. The objectives of this study were to determine the response of cotton varieties with different levels of resistance to *M. incognita* to increasing irrigation levels and to evaluate reproduction of *M. incognita* on different cotton varieties under three irrigation levels; low, base and high rates. Experiments were conducted at the Texas A&M AgriLife Research, Agricultural Complex for Advanced Research and Extension Systems (AG-CARES) from 2014 to 2017. The experimental design was a randomized complete block design with four replications for each of the irrigation levels. A total of twenty different cotton varieties were selected based on varying levels in their response to *M. incognita*, which are characterized by susceptible, partially resistant and resistant. Soil samples were taken at the end of the growing season from each plot to determine nematode populations. Overall, nematode densities increased with higher irrigation levels while the damage caused by *M. incognita* was more pronounced under low irrigation. Consistent varietal differences were observed over all four years even though nematode populations varied by year. Varieties that contain two *M. incognita* resistance genes (referred to as resistant) supported the lowest levels of reproduction, followed by varieties with a single resistance gene (referred to as partially resistant). Yields were estimated at harvest using a John Deere 484 cotton stripper equipped with electronic load cells. In 2014, yields for susceptible, partially resistant, resistant varieties were not different under the three irrigation levels. In 2015, yields of resistant varieties were similar to yields of susceptible varieties within an irrigation level. When averaged across all three irrigation levels, yields were increased by 14% with partially resistant varieties over resistant and susceptible varieties. Yield increases over susceptible varieties were observed for partially resistant and resistant varieties under all irrigation levels during the 2016 and 2017 growing seasons. In 2017, partially resistant varieties yielded on average approximately 200 pounds higher than resistant varieties. On average, susceptible varieties trended about 100 pounds lower in yield than partially resistant varieties. At the low irrigation rate, susceptible varieties also yielded lower than both partially resistant and resistant varieties. Yields were increased on average by 13, 15, and 3% for the low, base, and high irrigation levels. Partially resistant varieties increased by 28, 48 and 42% for the low, base, and high irrigation levels. These results suggest that yield responses of partially resistant varieties to irrigation were greater than those for resistant varieties. While high levels of resistance to *M. incognita* exist in resistant varieties, higher yields were achieved with partially resistant varieties. Additional studies comparing newer dual gene resistant varieties under varying irrigation rates, nematode populations and other conditions are needed.