THE INFLUENCE OF SEED TREATMENTS ON EARLY ROOT GROWTH IN COTTON UNDER DIFFERENT ENVIRONMENTAL CONDITIONS

Bobbie L. McMichael
USDA-ARS
Plant Stress and Germplasm Development Unit
Lubbock, TX

Abstract

The increase in pathogen activity brought on by adverse conditions at planting such as low soil temperatures combined with increased soil moisture can reduce seedling establishment and impact productivity by reducing the growth of the seedling root system in many cases. Since the development of the root system is critical to plant establishment, a series of experiments were conducted under controlled environment conditions to determine the impact of a commercial seed treatment on the growth of young cotton seedling roots when subjected to low soil temperatures. The growth of the above ground portion of the plant was also evaluated. The seedlings were grown in soil rated relatively high in pathogens in PVC containers designed for harvesting roots at various depths. The containers were placed in constant temperature chambers inside a larger growth chamber. The soil temperatures were maintained at 18C during the experiments. The plants were allowed to grow under these conditions for a period of thirty days after which they were harvested. The above-ground portion of the plant was separated into leaves and stems and the dry weights of each were measured. The containers were sectioned into 10cm sections (total of 40cm) and the roots were washed from each section and separated into the tap root and lateral roots. The length of the roots in each section were measured as well as the dry weights. The treatments consisted of planting seed treated with a commercial seed treatment (RTU Baytan-Thiram @ 3.0 fl. oz/cwt and Apron FL @ 0.75 fl. oz/cwt (Treatment 1) and an untreated control (Treatment 2)). The experimental design consisted of 12 plants per treatment replicated three times in a completely randomized design. The results indicated that emergence at the low temperature was significantly increased in the treated seed. Root growth of both the taproot and the lateral roots was significantly increased in the treated plants particularly at the 0-30cm soil depths. There was no effect of seed treatment on the relative size of the roots (specific root length) even though the total root length and root mass were significantly increased. There was also a significant increase in the above-ground parameters measured (ie., leaf area, leaf number, and shoot dry weight) in the treated seedlings. The increased emergence coupled with the increased growth of both the root systems and above-ground portion of the plant at low soil temperatures emphasizes the importance of protecting seedlings under adverse environmental conditions conducive to increased pathogen activity.

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