SOIL ORGANIC C AND N FRACTIONS AND CHEMICAL PROPERTIES ACROSS A DIVERSITY OF COTTON NITROGEN TRIALS IN 2020

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Abstract

Soil fertility conditions are important for optimizing field crop production. Characterization of soil organic C and N fractions along with routine soil chemical analyses has not been common, but we explored these conditions to see if they might affect cotton lint yield and quality responses to N fertilizer application. Field trials were established by a collaborative research group in Texas, Oklahoma, Missouri, Mississippi, South Carolina, North Carolina, and Virginia. Soil was sampled at depths of 0-10, 10-30, and 30-60 cm at all sites and at 60-90 cm at some sites in spring 2020. Our hypothesis was that surface soil organic N and deep-profile inorganic N might alter yield response characteristics among sites. Total, mineralizable, microbial biomass, and water-soluble C and N fractions were determined, along with soil pH, cation exchange capacity, base saturation, and extractable P, K, cations, and anions. The interquartile range of soil-test biological activity at 0-10-cm depth was 57 to 120 mg CO2-C/kg soil/3 days with a median of 84 mg CO2-C/kg soil/3 days. The interquartile ranges of Mehlich-III-extractable P and K were 52 to 141 g P/m3 and 89 to 177 g K/m3, respectively. Soil pH varied from 5.9 to 6.9 in the surface 10 cm. Soil nutrient levels will be assessed with specific reference to cotton lint yield and quality results obtained at the end of the 2020 cotton growing season. We expect this to be the first of several years of cross-location collaboration to optimize N fertilizer recommendations based on a more holistic soil fertility evaluation.