NC STATE UNIVERSITY
CROP AND SOIL SCIENCES

Department of Crop and Soil Sciences Seminar Series

Please join us on November 3, 2021, from 3:30 – 4:45 PM for two student seminars.

Lori Gorczynski
MS Student in Soil Science

Coastal Soil Mapping and Histosol Blue Carbon Stocks in North Carolina

Abstract

There is currently a great need to know how much blue carbon is stored in coastal environments and how these pools will change over time. North Carolina has approximately 400,500 ha of land within 500 m of the tidal coastline expected to undergo some degree of salinization. This study used a soil survey approach to examine twelve tidal wetlands mapped as Histosols in the Albemarle-Pamlico Sound along a salinity gradient and related attributes including peat depth, water salinity, fetch, and ecosystem condition to soil organic carbon (C) and shoreline change rates. The major coastal ecosystems evaluated include intact tidal forested wetlands (average water salinity, 0.16- 1.64 ppt), degraded oligohaline “ghost forest” wetlands (4.32-8.32 ppt), and established mesohaline marshes (12.0-15.5 ppt). Organic soil material depths were measured at each wetland and soil C data was quantified to 200 cm for the fine organic, coarse organic (>2.0 mm), and mineral soil fractions. Total soil organic C pools (Mg C/ha) were greater in both tidal forested (924 ± 131) and mesohaline marsh (659 ± 72) sites when compared to degraded ghost forests (572 ± 76). Ghost forests also had significantly less soil C than freshwater floodplain Histosols of the region ($p = 0.008$). This information will allow us to establish baseline soil C inventories and redefine coastal soil map unit boundaries for more useful interpretations to increase coastal resiliency in North Carolina.

Cara Mathers
PhD Student in Soil Science

When Soil Health Metrics Don't Account for Yield Stability Differences, What Does?

Abstract

With projected increases in global temperatures and changes in regional climate, understanding the impact of soil management choices on yield stability is critical for farmer decision-making and agricultural resiliency. Because no-till and conservation tillage have had variable yield effects depending on crop and location, system-specific studies are necessary to gauge potential benefits. Yield and weather data from a long-term tillage study (28 years) in the Piedmont of North Carolina were analyzed to determine the effect of various conservation tillage practices on corn and soybean productivity and stability under a variety of growth conditions. Mean yield and yield stability (coefficient of variation) varied depending on the intensity of tillage and weather conditions, particularly during growth stages vulnerable to stress. However, of 12 soil health tests conducted in 2015, only two showed statistically significant differences between tillage treatments, and overall soil health scores were not correlated with yield. A soil moisture study was conducted over two growing seasons to examine if differences in soil water dynamics (water storage, rates of evaporation and infiltration) which are not directly captured by soil health metrics could explain the historic yield differences. Three tillage treatments (no-till, chisel/disk, moldboard plow/disk) were selected to represent a spectrum of tillage intensity, and instrumented with soil moisture sensors. Additional soil properties including infiltration rates and crusting were also evaluated. Preliminary analysis indicates that soil water availability was higher and crusting potential was lower for conservation tillage treatments.