New study will look at biochar impacts on water and nutrient retention in nursery production

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Deborah Aller and Mina Vescera, of CCE – Suffolk County were recently awarded a competitive 'Research for Novel Approaches in Sustainable Agriculture' grant from the Northeast Sustainable Agriculture Research and Education (Northeast SARE) Program. This new study, which begins April 2019 and has funding for 3 years, will investigate the effects of biochar on nutrient availability and uptake and soil water retention in field and container nursery production on Long Island.

Biochar is a carbon-rich highly porous material intended for soil application to improve soil and crop productivity (Figure 1). Interest in using biochar for ornamental horticulture applications across Suffolk County has increased dramatically since 2013. Yet biochar is still a relatively new product for the ornamental horticulture industry and specifically in nursery production, with limited research available regarding its application and impacts. This study seeks to expand biochar research in nursery crops and contribute to on-going agricultural stewardship efforts in Suffolk County by implementing new technologies that have the potential to decrease runoff and leaching losses.

Figure 1. Hardwood biochar (left) and switchgrass biochar (right).

We will be working with four industry cooperators through on-farm trials as well as implementing a trial at the Long Island Horticulture Research and Education Center (LIHREC). The field trials will be conducted on California Privet (*Ligustrum ovalifolium*) and Douglas Fir (*Pseudotsuga menziesii*) Christmas Trees, while container trials will investigate boxwood (*Buxus spp.*) and switchgrass (*Panicum virgatum*) plants. These plants were selected for study because they are grown in large numbers, are economically important to nursery production, and experience recurring nutrient management challenges that have not been corrected through conventional methods (Figure 2).

Data will be collected for two years in the container experiments and three years for the field experiments. We will collect data on chlorophyll leaf levels, annual foliar and soil samples, annual root and shoot biomass, and make periodic plant health evaluations. Soil health samples that measure the soils physical, chemical, and biological properties will also be collected at the start and end of the experiment. Time domain reflectometer (TDR) probes will be installed at each field site to continuously

record soil moisture, electrical conductivity (EC), and soil temperature. Lysimeters will also be installed to gather data on field nutrient concentrations. Lastly, the PourThru procedure will be conducted weekly in the container trials to monitor pH and EC levels.

Figure 2. Year one planting of California privet showing symptoms of chlorosis. Chlorosis has been linked to plant nutrient deficiencies. Photo credit: Mina Vescera

In addition to the research experiments, our findings will be shared at local conferences and workshops, and we plan to host a field day on biochar use in nursery production in 2020. Based on our knowledge of biochar, it has the potential to be a useful product for the ornamental horticulture industry by improving soil water retention and nutrient availability to nursery crops. We look forward to initiating this study and sharing our findings with you over the next few years!

NORTHEAST SARE
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Northeast SARE is a regional program of the national SARE program, which is part of the USDA National Institute of Food and Agriculture.