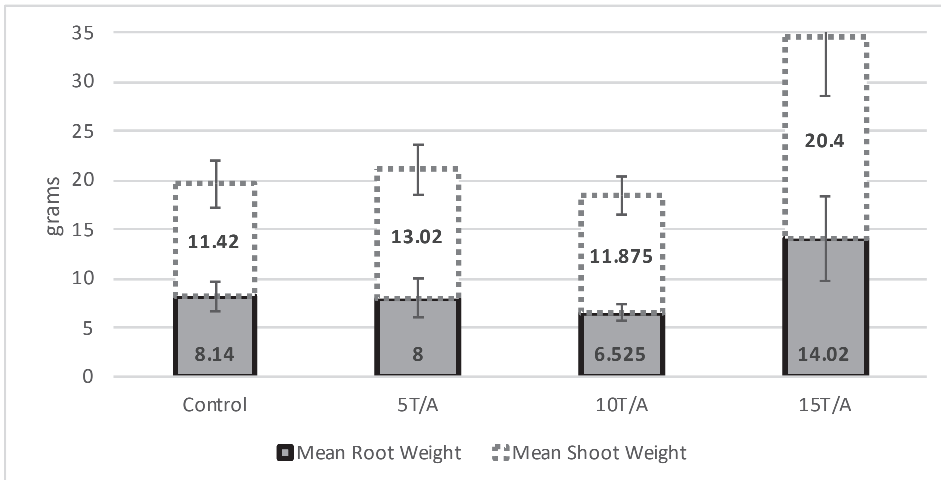
Evaluating Biochar in Field Production of Ornamental Woody Plants

Mina Vescera, Nursery/Landscape Specialist, Cornell Cooperative Extension of Suffolk County

Biochar is a carbon-rich, soil amendment that has been found to improve soil moisture and nutrient retention in both degraded and sandy soils. Its large surface area and high porosity decrease soil bulk density and increase porosity, enhancing water and nutrient retention. However, the application and impacts of biochar on nutrient and water retention in field nursery crops is limited, with currently no recommended application rates of biochar in ornamental production. In spring 2019, two on-farm trials were installed in fields planted with California privet (*Ligustrum ovalifolium*) and Douglas fir (*Pseudotsuga menziesii*) liners. The objective of this on-going trial, conducted with Deborah Aller, CCE-Suffolk Agricultural Stewardship Specialist, is to test the impact of three rates of biochar (5, 10, and 15 tons/A) on nutrient availability, soil water retention, and plant response. This article reports on some of the data collected during year one of the field trials.

Experimental plots consisted of ten plants with data collected from the eight inner plants (plants at either end of the plot were used as buffers). Soil type differed by farm. In June and May 2019, respectively, rooted cuttings of California privet were transplanted into a sandy loam (Riverhead series), while Douglas fir Christmas tree seedlings were transplanted into a loamy soil (Haven series). Treatments consist of equivalent biochar rates of 5, 10, and 15 tons/A; experimental units without biochar serve as control plots. Treatments are replicated five times. To evaluate soil moisture effects, soil moisture and wa-

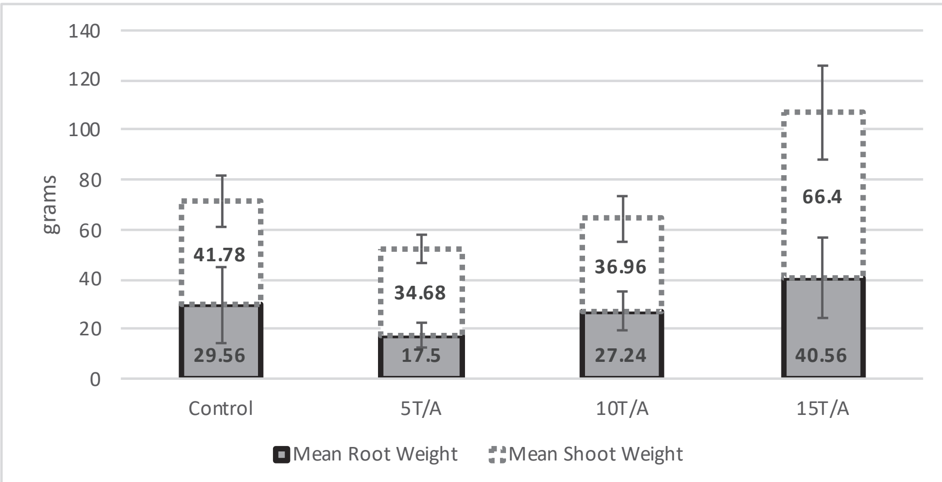
Figure 1. Mean root and shoot dry weight of field-grown California privet harvested in October 2019, Jamesport, New York



Error bars represent standard error of the mean. Only the negative error bar for the 15 T/A treatment could fit in the charted area.

Installation of the California privet trial in June. Biochar was incorporated into experimental plots after plugs had been planted in late May. Deborah Aller is pictured in the background applying the biochar.

Figure 2. Mean root and shoot dry weight of field-grown Douglas fir harvested in October 2019, Cutchogue, New York



Error bars represent standard error of the mean.

Dominick Zeppetella, Agricultural Stewardship Technician, harvests a Douglas fir sample for root and shoot dry weight analysis.

ter potential sensors were installed to continuously record soil moisture levels at a 4-inch and 10-inch depth and at the 4-inch depth for plant available water sensors. Low-tension, porous-cup lysimeters were installed to a depth of 18 inches to measure nitrogen loss. Leachate was extracted from lysimeters after every rain event. Growers fertilized and managed pests as needed. In October, the roots and shoot (upper portion of the plant) of one plant from each experimental plot were harvested, washed, and dried in the drying ovens for three days. Dry weights were recorded and summarized (Figures 1 and 2).

Douglas fir root and shoot dry weights had greater variability overall than California privet samples. This may be because of the genetic diversity inherit in the seed-grown Douglas fir plants when compared to the cutting propagated California privet plants. Data analysis is still on-going and will be reported in later articles. Considering this trial goes through 2021, data collection will resume in early spring 2020.

This material is based upon work supported by the National Institute of Food and Agriculture, U.S. Department of Agriculture, through the Northeast Sustainable Agriculture Research and Education program under subaward number LNE19-384R. ●