Combined Proceedings IPPS 68:221-222. 2018.

Biochar and Sand-Amended Cutting Substrates: Particle Size Effects

Benjamin K. Hoover
Department of Horticulture and Crop Science, California Polytechnic State University, San Luis Obispo, California 93407, USA

bkhoover@calpoly.edu

Keywords: Biochar, herbaceous cuttings, K-IBA.

Abstract

Auxin is frequently used to improve rooting uniformity of herbaceous cuttings. Indole-3-butyric acid (IBA) is normally applied in a powder to the base of the stem or in solution as a dip or foliar spray. The objectives of this study were to: (1) assess the rooting of herbaceous cuttings after treatment with auxin in powder form or as a liquid drench applied to the substrates and (2) assess if biochar incorporation in the substrate affected auxin drench efficacy.

The base substrate was 1:2 (v/v) sphagnum peat and coarse perlite, and amended with biochar (0%, 10%, 20%, 40%, or 80% by vol.). The biochar was a coconut-based product obtained from a commercial supplier (Bay Area Biochar, Concord, California, USA) and screened to a maximum particle size of 2 mm prior to incorporation. Cuttings of two herbaceous perennial plants (*Salvia* ×*sylvestris* 'Blue Hills' and *Scabiosa columbaria* 'Pink Mist') were obtained from a commercial supplier.

Auxin was supplied as a powder [Rhizopon (Phytotronics, Earth City, Missouri, USA) at 1,000 ppm and 3,000 ppm] by dipping the stem and knocking off excess, or as a substrate drench (Hortus Water Soluble Salts at 1,000 and 3,000 ppm K-IBA) applied as 10 ml solution per rose pot (top width: 2.25 inches, depth: 3.25 inches, vol: 185 cm^3) prior to sticking cuttings. One cutting was stuck in each rose pot. A separate randomized complete block design was used for each species. There were 4 replicates per treatment for *Scabiosa* and 9 replicates per treatment for *Salvia*.

The cuttings were placed in an enclosure with high humidity (~95% RH), with bottom heat supplied at 70°F. Data were collected after 28 days for *Salvia* and 29 days for *Scabiosa*. Cuttings were removed from the rose pots, the roots were washed, and each cutting was assigned an adventitious rooting rating. Roots were excised from the stem and scanned with a flatbed scanner (Epson Perfection V19). Scans were analyzed for

first-order lateral root counts and two-dimensional root area with ImageJ software.

Neither species showed an interaction effect between auxin treatment and biochar on rooting responses. Substrates with the 80% rate of biochar produced plants with lower ratings and lower root area than the control ($P < 0.05$). Drenching substrates with 1,000 ppm K-IBA produced increased rooting in all metrics compared to the control. Drenching substrates with 3,000 ppm K-IBA did not improve the rooting rating of cuttings compared to the control but did increase primary root counts ($P < 0.05$). Cuttings receiving the 3,000 ppm K-IBA drench frequently initiated many short roots from the petioles of leaves near the substrate surface. This study suggests that drenching of substrates prior to sticking may be an effective method of auxin application.