Rooting Rose Cuttings in Whole Pine Tree Substrates©

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Increased demand for alternatives to pine bark (PB) and peat moss (P) has led to extensive research on wood-based substrates, such as processed whole pine trees (WPT), for nursery and greenhouse crop production. Limited information is available on how WPT may perform as a rooting substrate for cutting propagation. Four substrates [WPT, WPT : P (1 : 1, v/v), PB, and PB : P (1 : 1, v/v)] were used to evaluate root development of single-node cuttings of *Rosa* 'Moorcap', Red Cascade™ climbing miniature rose. Cuttings rooted in WPT had the least total root length and total root volume, while cuttings rooted in PB : P exhibited the greatest total root length and total root volume. The addition of peat resulted in increased root development for WPT and PB, suggesting substrate physical properties may have a greater effect on root development compared to substrate chemical properties. Future analysis of substrate physical properties, together with substrate bioassays, will assist in the development of protocols for enhancing root development in WPT substrates.

OBJECTIVE

The objective of our experiment was to evaluate processed whole pine trees (WPT) as a rooting substrate for cutting propagation of *Rosa* 'Moorcap', Red Cascade™ climbing miniature rose. A number of experiments have been conducted to demonstrate the effectiveness of wood-based substrates for container production, while cutting propagation in such substrates has not been widely addressed. Demonstrating the versatility of WPT substrates is essential to expanding their commercial use and availability.

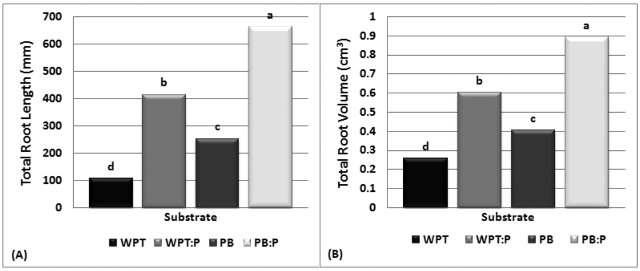

Figure 1. Total root length (A) and total root volume (B) of single-node *Rosa* 'Moorcap', Red Cascade™ climbing miniature rose cuttings rooted in 100% whole pine tree (WPT), (1 : 1, v/v) whole pine tree : peat (WPT : P), 100% pine bark (PB), and (1 : 1, v/v) pine bark : peat (PB : P) substrates. Means with different letters indicates significance at α = 0.05.

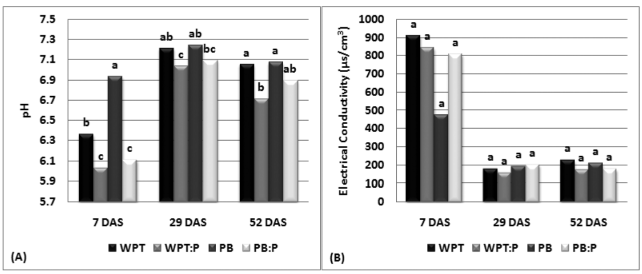

Figure 2. Substrate pH (A) and electrical conductivity (B) of fallow containers of substrate at 7, 29, and 52 days after sticking (DAS) cuttings. Substrates include 100% whole pine tree (WPT), (1 : 1, v/v) whole pine tree : peat (WPT : P), 100% pine bark (PB), and 1 : 1, (v/v) pine bark : peat (PB : P). Means with different letters for each DAS indicates significance at α = 0.05.

MATERIALS AND METHODS

Root development on single-node *R.* 'Moorcap', Red Cascade™ climbing miniature rose cuttings was evaluated in four substrate [peat (P), pine bark (PB), and processed whole pine trees (WPT)] treatments [WPT, WPT : P (1 : 1, v/v), PB, and PB : P (1 : 1, v/v)]. The WPT (made from *Pinus taeda*) was processed with a hammer mill to pass through a 0.95-cm (0.375-in.) screen. Each substrate was amended with 1.07 $kg{\cdot}m^{-3}$ (4 lb/yd^3) Harrell's 16-6-12 (N-P-K) Plus 5-month formulation and 1.36 $kg{\cdot}m^{-3}$ (5 lb/yd^3) dolomitic limestone. Single-node cuttings of container-grown *R.* 'Moorcap', Red Cascade™ climbing miniature rose were prepared on 17 Apr. 2009. All cuttings received a 1-sec basal quick-dip in a 1000 ppm IBA solution (Dip'N Grow Lite, Dip'N Grow Inc., Clackamas, Oregon) and a single cutting was inserted into each container. Throughout the experiment, intermittent mist was maintained at 8 sec every 15 min from 8:00 am to 6:00 pm. Root development was evaluated at 60 days after sticking (DAS) cuttings. At that time, roots (if present) were washed and digitally scanned for analysis using WinRhizo software to obtain total root length and total root volume. Substrate pH and electrical conductivity (EC) were obtained from pour-through extractions performed on fallow containers of substrate at 7, 29, and 52 DAS.

RESULTS AND DISCUSSION

Cuttings rooted in WPT had the least total root length and total root volume among all treatments, but the addition of peat resulted in 75% and 57% greater total root length and volume, respectively (Figs. 1A and B). Similarly, the addition of peat to PB resulted in 62% and 56% greater total root length and volume, respectively, compared to PB. In a previous experiment, substrate physical properties (air space and container capacity) were significantly affected by the addition of peat and a correlation between root development and substrate physical properties was noted. Substrate physical properties will be analyzed for this experiment to determine if they had an effect on root development. Substrate pH was between 6.7 and 7.2 for all treatments at 29 and 52 DAS (Fig. 2A). Further investigations into physical and biochemical properties will be conducted to determine their effect on root development in WPT substrates.