A participant in the on-site grower demonstration trials reported that nandina in alternate-amended substrates outperformed nandina in a traditional bark-based substrate.

stretching supplies

Extending bark supplies with alternative substrates

BY ANNA-MARIE MURPHY AND CHARLES GILLIAM

With the continuing decline of available pine bark supplies, many container-grown plant producers are asking if there are alternative substrates that can be used to stretch existing bark supplies. In an attempt to answer that question, a recent Auburn University study, evaluated two possible amendments with commercial possibilities — clean chip residual (CCR) and wholetree (WT). The study was funded by the Horticulture Research Institute.

Both CCR and WT have higher wood contents than pine bark (PB) alone. CCR is composed of approximately 50 percent wood, 40 percent bark and 10

Nine substrate treatments with varying levels of pine bark, clean chip residual and WholeTree were evaluated.

percent needles. CCR is created when transportable in-field harvesters are used to process pine trees into 'clean chips' that are used by pulp mills. CCR is a by-product of pulp wood processing that is either sold for boiler fuel or more commonly, spread back across the harvested area.

WT substrate is made up of 80 percent wood, 15 percent bark and 5 percent needles, and it's different from CCR in that it consists of the entire pine tree harvested from pine plantations at the thinning stage. Therefore, it has a higher wood content than CCR. Prior to the current study with woody ornamentals, several studies evaluated the possibility of using CCR and WT as alternative substrates in the production of greenhouse plants.

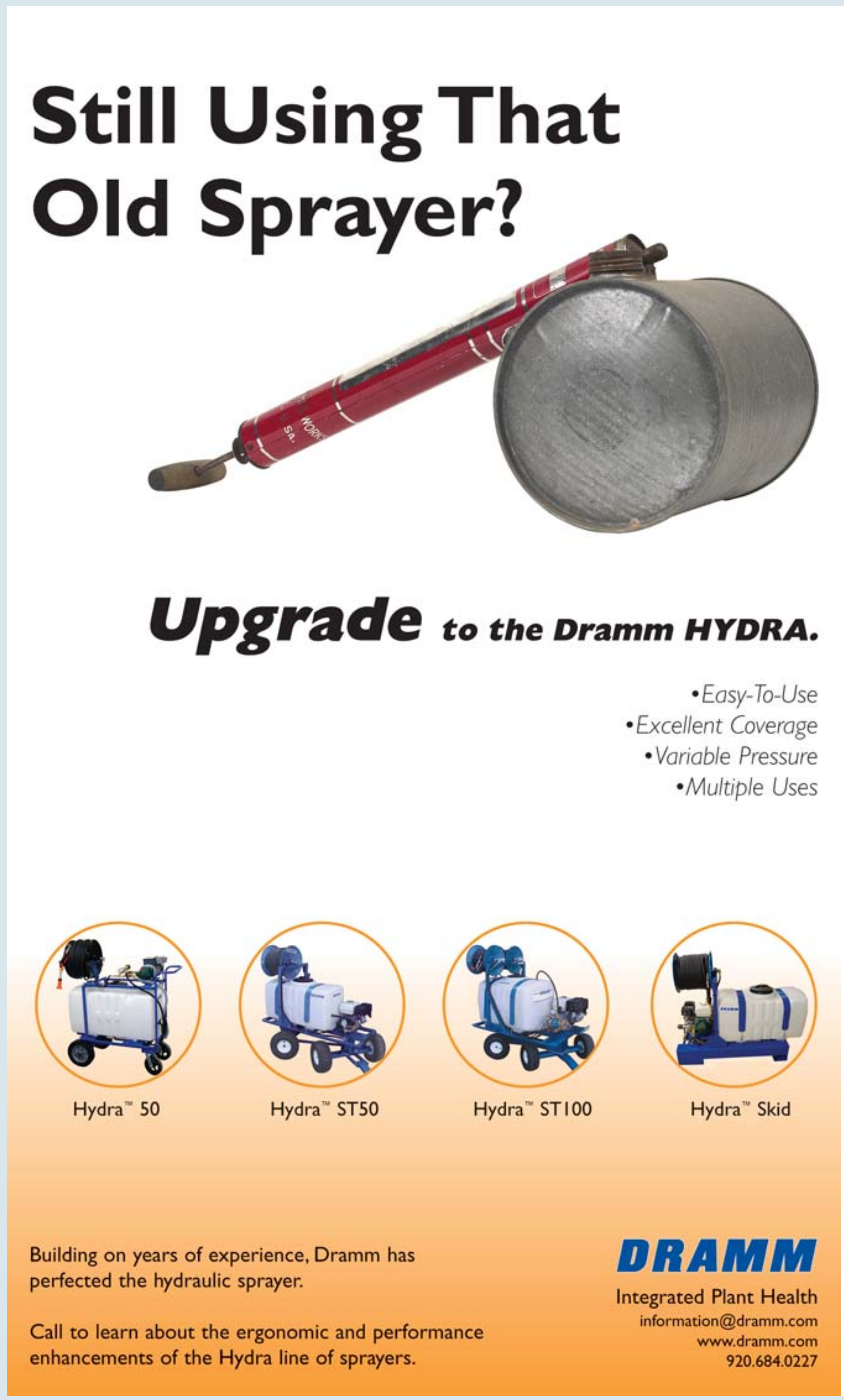
After three months in the study, plant growth for all species, in all substrates, were similar to, or larger than, plants grown in 100 percent pine bark.

While results from those studies were positive, showing that even with the higher wood content, CCR and WT could prove to be efficient alternatives or replacements for standard greenhouse media, many growers are hesitant at making a drastic switch in substrate. They are interested in seeing research showing how far current pine bark supplies could be stretched without negative impacts on plant growth. The objective of the study was to determine how much pine bark could be amended with either CCR or WT without reducing plant growth.

Substrate trials

Nine substrate treatments with varying levels of pine bark, CCR and WT were evaluated. CCR and WT used in the study were each processed through a swinging hammer-mill to pass through a 3/8-inch screen. Treatments consisted of 100 percent PB, WT and CCR; 75:25 PB:CCR; 50:50 PB:CCR; or 25:75 PB:CCR. PB:WT substrates had similar ratios as PB:CCR. All substrates were pre-incorporated with a nutrient amendment package comparable to standard nursery practices.

Five species were used in the experiment, including 'New Gold' lantana, 'Gold Mound' spirea, 'Amaghasa' azalea, tea olive (*Osmanthus fragrans* Lour.) and 'Rotundifolia' ligustrum.



This is a randomized block of azaleas in the test. All treatments are mixed in, and it's difficult to see any differences in individual plants.

pH results

With few exceptions, substrate pH remained within best management practices recommended levels of 4.5-6.5 for the duration of the study. Increasing levels of CCR and WT tended to raise substrate pH compared to pine bark alone. While the pH of 100 percent WT substrate was slightly out of the desired range (6.6 and 6.9) at two and three months into the study, PB:WT blends were well within range. By the time the study was terminated (365 days after planting), all treatments had similar pH levels to the 100 percent pine bark industry standard.

EC results

Best management practices suggests a recommended range of 0.5-1.0 mS·cm-1 for electrical conductivity values. At one week into the study, EC levels were slightly elevated for all treatments, except for 25:75 PB:WT (0.86 mS·cm-1). By one month into the study, EC levels were similar across all treatments. After six months, there were no significant differences in any substrate EC levels.

Overall plant growth

After three months in the study, plant

As part of the on-site grower demonstrations, Auburn University staff took growth data throughout the growing season. These boxwoods are being measured just after the initial pruning.

growth for all species, in all substrates, were similar to, or larger than, plants grown in 100 percent PB. By 365 days after planting, there were no differences in growth of 'Amaghasa' azalea, 'Rotundifolia' ligustrum, 'Gold Mound' spirea and tea olive in any substrate. For 'New Gold' lantana, growth of plants in all substrates was similar to growth of plants in 100 percent PB.

Root ratings allow us to subjectively determine differences with the overall rooting structure of the plant, which can give us the first indication of any growth problems. There were no differences in root ratings across substrates in any species. In general, root ratings were high (more than 94 percent rootball coverage for 'Amaghasa' azalea, 'New Gold' lantana, 'Rotundifolia' ligustrum and 'Gold Mound' spirea).

Substrate pH and EC, along with plant growth in substrates amended with up to 75 percent alternative substrate (either CCR or WT), was acceptable and comparable to that of the 100 percent PB standard for all species tested. During the past two years, we have provided milled CCR and WT to several nurseries in states across the southeast, including Alabama, Florida, Mississippi, Louisiana and Texas. These growers have reported positive results with their own trials. Some have even reported better plant and root growth with higher pH-requiring plants. This process has allowed nursery producers the opportunity to become comfortable using CCR or WT as amendments before switching completely to 100 percent alternative substrates. **NM**

Note: Results from the study in this article can be found in detail in the December 2010 issue of the Journal of Environmental Horticulture. The citation is as follows: Murphy, A.M., C.H. Gilliam, G.B. Fain, H.A. Torbert, T.V. Gallagher, J.L. Sibley, S.C. Marble, and A.L. Witcher. 2010. Extending Pine Bark Supplies with WholeTree and Clean Chip Residual Substrates. J. Environ. Hort. 28:217-223.

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