Evaluating *Hydrangea* Production With Improved Substrates

James T. Midcap and Theodore E. Bilderback
Department of Horticulture - Athens & Raleigh
The University of Georgia & North Carolina State University

Nature of Work: Production problems arise with *Hydrangea* in midsummer. These plants often loose their root systems and exhibit yellow chlorosis. Plants fail to make satisfactory growth and become unsalable. Yellow *Hydrangea* are widely seen throughout nurseries in the southeast. The objective of this trial is to evaluate a variety of potting substrates under normal production practices to overcome summer root losses and unproductive plants.

Cuttings of *Hydrangea macrophylla* 'Charm Red' were stuck into trade and three gallon containers in late April. After four weeks containers of rooted cuttings were moved to the production sites. The substrate treatments for the one gallons were 1) 100% Bark, 2) 6:1 Bark:Sand, 3) 9:1 Bark:Sand, 4) 1:1 Bark:Mini Nuggets and 5) 9:1 Bark:Kaolin Clay. The treatments for the three gallons were 3) 9:1 Bark:Sand, 4) 1:1 Bark:Mini Nuggets and 5) 9:1 Bark:Kaolin Clay. Treatments 1) and 2) were discontinued due to a mixing error. The treatments were placed in partial shade at the CANR location and at the McCorkle nursery location.

Twenty replicates were used for each treatment. Treatments were surrounded by two border rows. Treatments were randomized within pot sizes at both locations. Osmocote 20-4-8 at 15#/yd^3 and dolomitic lime at 4#/yd^3 were incorporated into the substrates. Plants were maintained under normal nursery conditions.

One gallon plants were harvested on November 6, 2002. Plant top growth was cut at soil level, bagged and dried. Treatments were weighed and top dry weight was recorded. Data recorded from the three gallon plants included height (from the top of the pot) and average width (measured in two perpendicular directions). A growth index was calculated by adding the height and the average width and dividing by two. Data analysis was done with ANOV and Student-Newnan-Keuls test to separate means.

The physical properties were determined at NCSU Substrates Laboratory. Treatment samples were taken from pots that had been maintained under nursery conditions.

Results and Discussion: The one gallon *Hydrangea macrophylla* 'Charm Red' responded significantly to the substrate treatments. The greatest top dry weight was produced by the 1:1 Bark:Nugget substrate (Figure 1) followed by the 9:1 and 6:1 Bark:Sand substrates. The least top dry weight was produced by the 100% Bark and 9:1 Bark:Clay substrates. The Bark: Mini Nugget substrate produced larger and better quality plants. The one gallon Hydrangeas produced significantly greater top dry weight at the CANR location (Figure 2) over the nursery location.

The three gallon Hydrangeas responded to the treatments. The greatest height, average width and growth index were produced by the 1:1 Bark:Nugget substrate (Figure 3). The next largest height, width and growth index were produced by 9:1 Bark:Sand while the lowest were produced by the 9:1 Bark:Clay treatment. The three gallon Hydrangea produced significantly greater height and growth index at the CANR location (Figure 2) than the nursery location. There were no differences between the plant widths at the locations.

Analysis of the physical properties (Table 1) showed that the 1:1 Bark:Nugget substrate had high total pore space, good air space and container capacity, while providing an adequate percent available water. The cation exchange capacity was the highest of all the substrates tested. The 100% Bark and the 9:1 Bark:Clay produced the poorest growth, had the greatest air space and the lowest available water. This suggests under the irrigation schedule at both locations, these substrates failed to supply the necessary water to promote exceptional growth. The combined 92% total air space, 21% available water and 8.1 meq./100cm. cation exchange capacity would seem to be responsible for the improved growth of the Bark:Mini Nugget substrate.

Significance to the Industry: Hydrangea container production can benefit from substrates with good aeration, available water and nutrient retention. The composted bark:mini nugget substrate from Sun Grow Horticulture produced the largest and best quality container hydrangea of all the substrates tested in 2002.

Table 1. Physical properties of Hydrangea production substrates.

*Sub-strates	Total Pore Space	Air Space	Container Capacity	Available Water	Unavailable Water	†Bulk Density	††Cation Exchange
PB 100%	88%	42%	46%	16%	30%	0.2	7.6
BS 6:1	82%	34%	49%	21%	27%	0.4	4.9
BS 9:1	83%	35%	48%	18%	30%	0.3	5.2
BN 1:1	92%	39%	53%	21%	32%	0.2	8.1
BC 9:1	85%	44%	41%	12%	29%	0.2	7.2

* Substrates: PB=Pine Bark, BS=Bark:Sand, BN=Bark:Mini Nuggets, and BC=Bark:Clay.
†Bulk Density in g/cc.
††Cation Exchange Capacity in Meq/100 cm.

Figure 1. Response of Charm Red Hyd in one gallon containers to five product substrates.

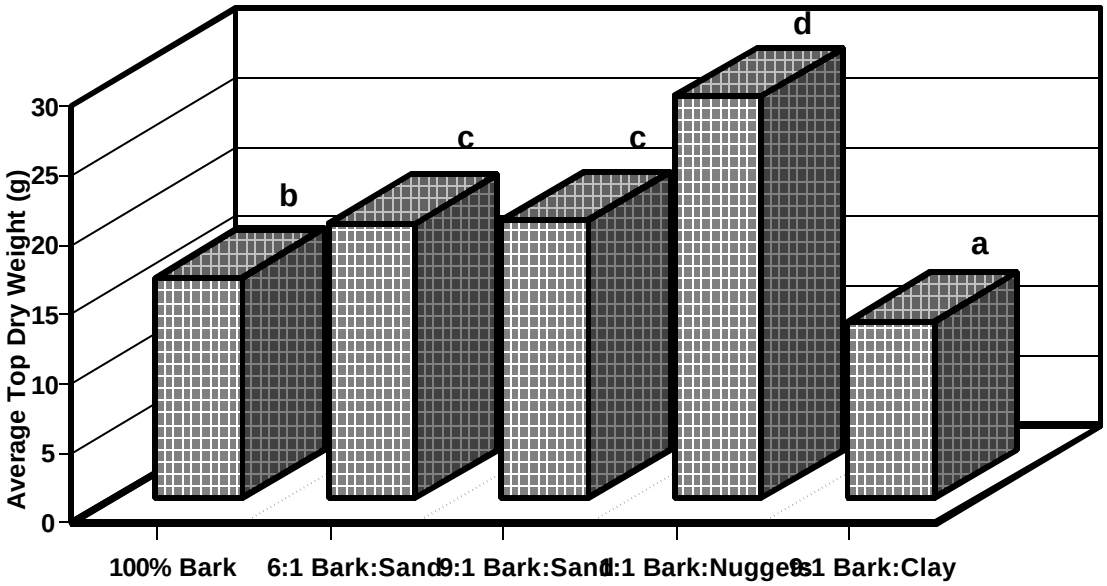

Figure 2. Response of Charm Red Hydra in one gallon containers produced at tw locations.

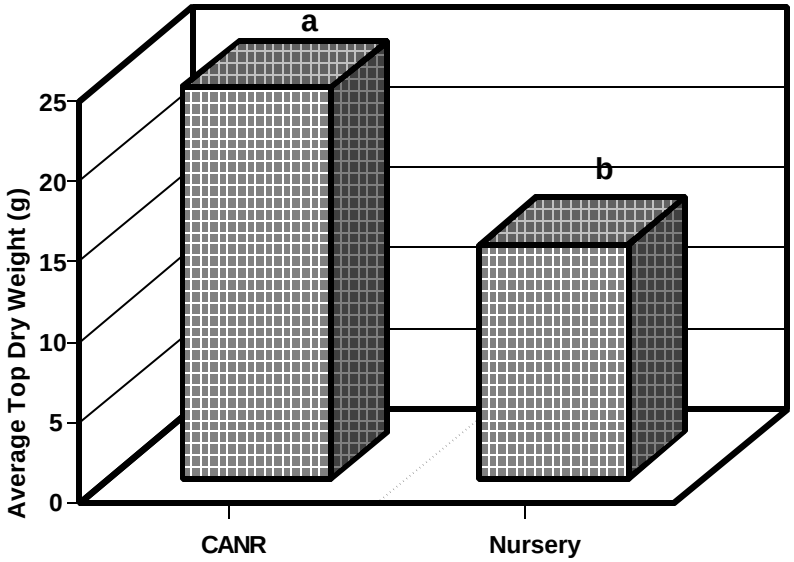

Figure 3. Response of Charm Red Hydr in three gallon containers to three produ substrates.

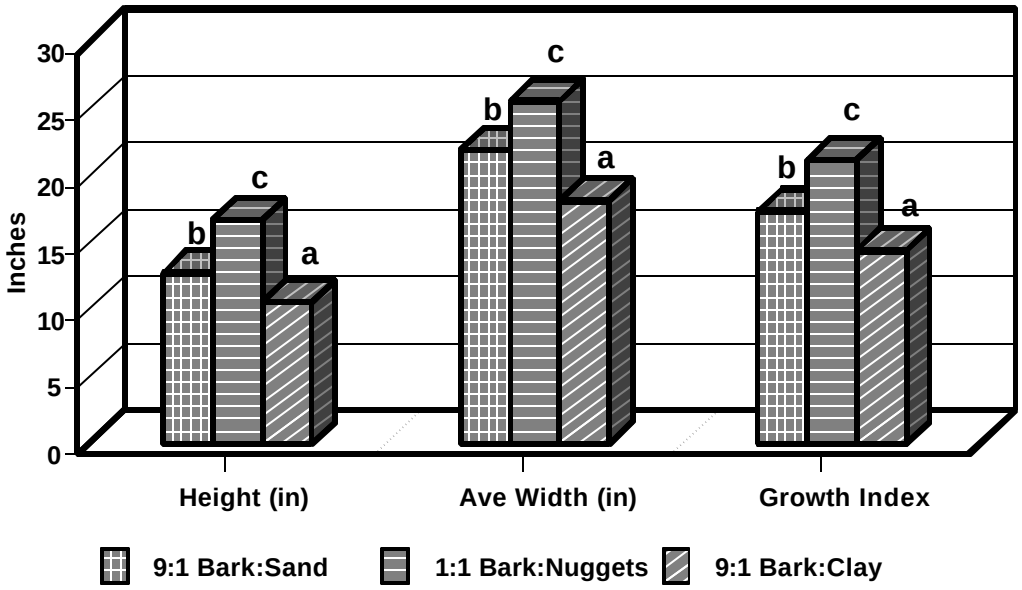

Figure 4. Response of Charm Red Hydrangea in three gallon containers produced at two locations.