Research Report to the Florida Nursery, Growers and Landscape Association FNGLA:

Optimum Nitrogen Rates for the Establishment of Three Woody Ornamental Shrubs in the Landscape

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Protocol:

Objective:

To determine the optimal N rates for the establishment of three field-grown woody landscape plants (*Viburnum odoratissimum, Rhaphiolepis indica,* and *Ligustrum japonicum*).

Materials:

35 (1-gallon) of each of the following plants: (*Viburnum odoratissimum, Rhaphiolepis indica,* and *Ligustrum japonicum*).

Fertilizers (provided by Dr. Tim Broschat)

Experimental design:

Plants will be planted in a randomized complete block design at the University of Florida Tree Unit in Gainesville Florida (see Plot Map).
3 plants × 5 treatments (0 + 4) × 7 reps = 105 plants
[We need to purchase 40 of each (5 for baseline sampling)].

Treatments:

Plants will receive 3 applications of N at 0, 1.5, 3, 4.5, or 6 pounds of N per 1000 feet square. Fertilizer is 39-0-0 sulfur coated urea (Lesco). Application will be calculated for and made to an area around each shrub with a 2 foot diameter.

Methods:

Plants will be installed on 1 March 2005. Plants will be drip irrigated throughout the experiment with single spray stakes at each plant. At planting, the entire experiment will be fertilized with a slow release K, Mg, Mn, and Fe fertilizer to minimize deficiencies. N treatments will be applied 1 March, 1 June and 1 September.

Data collection:

YEAR 1

At planting, plants will be measured and a growth index will be used to determine relative size. Growth index will be determined monthly throughout the experiment. On 1 December, 2005, 10 third-from-terminal leaves will be collected from each plant, dried at 65 °C for at least 96 h, weighed, ground to pass a 0.85 mm sieve, and analyzed for total N by the Kjeldahl procedure. In addition, root spread will be determined according to the protocol developed by Paz and Gilman.

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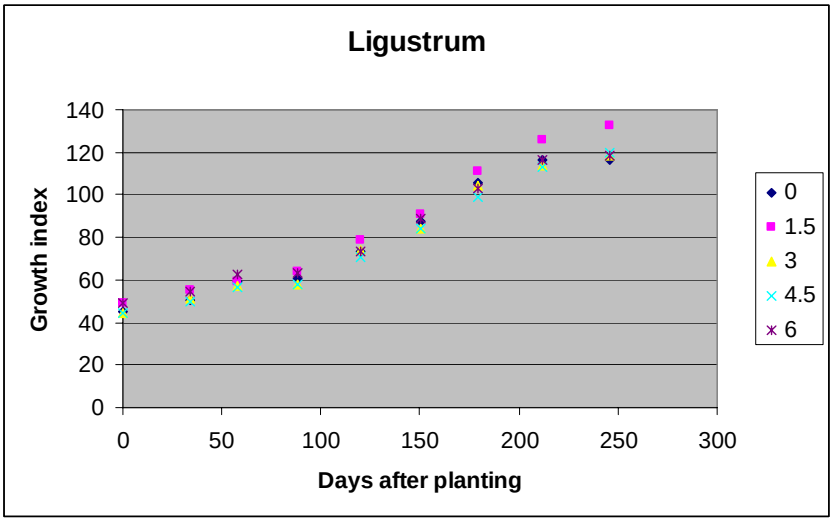
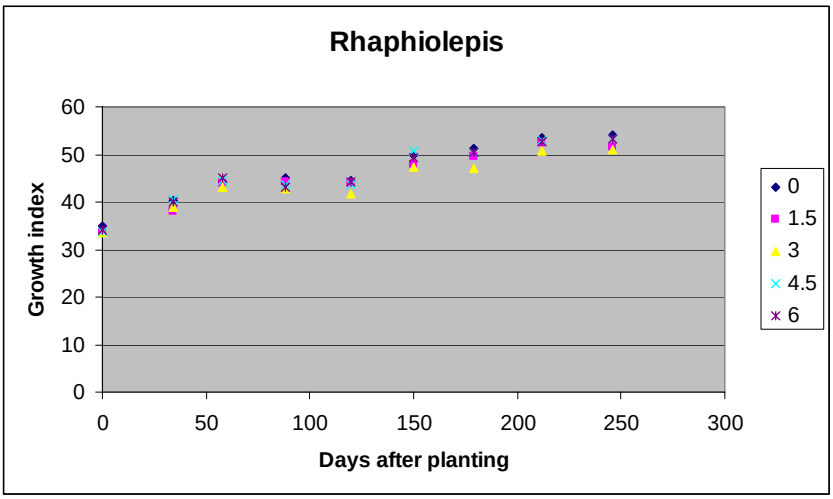
YEAR 2
Plants will be destructively harvested during the summer/fall of 2006. Plants will be partitioned into leaves, roots, and shoots, and all tissues will be dried at 65 °C for at least 96 h, weighed, ground to pass a 0.85 mm sieve, and analyzed for total N by the Kjeldahl procedure.

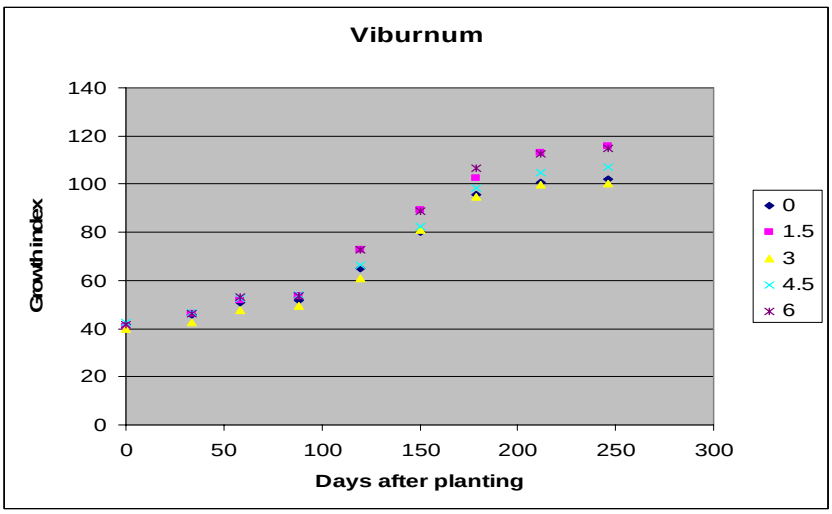
Work to date
One gallon plants of *Ligustrum japonicum*, *Rhaphiolepis indica*, *Viburnum odoratissimum* were installed in a randomized complete block design on February 28, 2005 at the University of Florida IFAS Environmental Landscape Horticultural Education Lab in Gainesville, Florida. Plants were arranged on 185 cm (5.5 foot centers) in 12 rows with 6-9 plants per row. Each 120 cm (3 foot) wide row was maintained weed free through the use of a post-emergent herbicide (Roundup) and hand pulling. The 70 cm (2 foot) area between rows had established Bahia grass (*Paspalum notatum*) at the time of planting and was maintained by mowing. During planting the roots of all plants were roughened by hand to break up the rootball unless they were not rootbound. Irrigation was applied using a spaghetti tube system with one black Robert's Tubing emitter (½ liter per min.) at each plant. Irrigation was applied every day for 1 hour from February 28 – March 11, 2005 and then set to irrigate 3 liters (6 min.) every other day. Fertilizer (Lesco Professional Landscape and Ornamental 39-0-0) was first applied March 2, 2005 at one of four different rates and then reapplied at three months (June 1, 2005) and 6 months (September 1, 2005). The rates included 0-control, 1.5 (1.83g), 3.0 (3.66g), 4.5 (5.46g) and 6 (7.31g) per application. The fertilizer was spread over a 2 foot diameter ring around each plant. At planting, the entire experiment was fertilized with a slow release K, Mg, Mn, and Fe fertilizer to minimize deficiencies. Growth measurements (height at tallest point, widest width and width perpendicular to the widest width) were taken monthly starting at planting. The formula used to calculate the growth index was ((widest width + perpendicular to the widest width)/2 + height at tallest point)/2.

Results to date
To date, all first-season growth data has been collected and analyzed (Figure 1). Two questions were asked during data analysis: 1) Were there differences between N application rates within a taxon? and 2) If so, when did the differences occur? At the ninth and final 2005 data collection (1 November, 2005) there were no significant differences in growth indexes between N treatments within a species (data not shown). Growth indexes over time were plotted (Figure 1) to observe growth patterns. *L. japonicum* and *V. odoratissimum* appear to grow continuously throughout the season whereas *R. indica* had two distinct growth phases (Figure 1). These results indicate that N fertilization during the same season as planting may not produce greater growth than if the plants were not fertilized.

Figure 1. Growth indexes of *Ligustrum japonicum*, *Rhaphiolepis indica*, *Viburnum odoratissimum* from 0 to 246 days after planting.







Work to be completed:
Per the protocol outlined above, in early December, 2005, 10 third-from-terminal leaves will be collected from each plant, dried, weighed, ground and analyzed for total N by the Kjeldahl procedure. This analysis will determine N amounts in the plant tissue regardless of growth recorded. In addition, root spread will be determined according to the protocol developed by Paz and Gilman. Root spread data will be added to the shoot data from 2005 to develop a more complete picture of growth and to determine if fertilization rates affected root growth.

In year two, no more fertilizer will be added, and plants will be destructively harvested during the summer/fall of 2006. Plants will be partitioned into leaves, roots, and shoots, and all tissues will be dried, weighed, ground, and analyzed for total N by the Kjeldahl procedure. This analysis will help researchers determine the affect of first year N applications on the following season of growth.