Understanding Plant Nutrient Uptake, a Preliminary Report

Tom Yeager and Gisele Martins
Environmental Horticulture Department - Gainesville
University of Florida

Nature of Work: Fertilizers and fertilization schedules used in the nursery industry were developed to maintain high levels of constant nutrition in containers. This strategy can lead to excessive use of fertilizer and leaching of nutrients. The following research is being conducted to determine when the plant absorbs the greatest quantities of nutrients. For example, the flower stage may suppress uptake while the greatest nutrient uptake may occur while roots are growing just prior to rapid shoot growth. For many nursery plants, roots and shoots do not grow simultaneously, but grow in cycles or phases, i.e. root growth is followed by a shoot growth phase that may precede flowering. Nutrient uptake data will be used to match fertilizer application schedules with time of maximum nutrient absorption by plants in order to minimize nutrients lost in runoff without sacrificing growth.

Procedure: Liners of *Viburnum odoratissimum* Ker-Gawl. were greenhouse-grown in containers with a common nursery substrate. Substrate was placed in containers constructed of clear plastic (6 inches high x 6 inches diameter) and darkened with removable fabric. Containers were tilted 45 degrees so roots contacted container sidewall. Each container received water as needed and was fertilized every other watering with solution containing 100N-50P-100K (ppm) applied to substrate surface.

Results and Discussion: Root and shoot elongations or root elongation and leaf expansion were measured. Preliminary data indicates that maximum shoot elongation rate follows minimal root elongation by about 6-12 days. Additionally, the appearance of red apical leaves corresponded to time of minimal root elongation. This phenomenon could be used to properly time fertilizer applications. Future data will be used to show how fertilization rate influences growth flushes and how timing of fertilization during flushes influences nutrient uptake.

Significance to Industry: Results of this research will be used to develop fertility recommendations for maximum plant nutrient absorption, and develop fertilization schedules that are based on plant nutrient absorption rather than time schedules or laboratory models. This will result in crop production with minimal environmental impacts caused by nutrients leaving the nursery site. Additionally, this information will enable nursery operators to make environmentally conscious nutrient management decisions.