Field Production

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Soil Test Phosphorus Levels in Middle Tennessee Nurseries

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Index Words: Soil Test, Phosphorus

Nature of Work: A request from a nurseryman to help with soil testing of his farms prompted the study of soil test phosphorus (P) levels in Middle Tennessee Nurseries and its significance to fertilization of field-grown nursery stock. Thirty separate field blocks in production or intended to be planted with nursery stock were sampled on four separate farms across the Middle Tennessee Region. This included farms located on the Cumberland Plateau, Highland Rim, and Nashville Basin Major Land Resource Areas (MLRA). A summary report of soil samples submitted to the University of Tennessee Soil Testing Laboratory from January 1, 1999, through December 7, 2001, indicating nursery trees as the intended crop, was obtained from Ms. Debbie Joines, Soil Testing Laboratory Manager, and summarized for soil test P levels in Coffee, Franklin, Grundy, Warren, and Williamson counties. Coffee, Franklin, Grundy, Warren, and Williamson counties accounted for 90% of the 632 samples submitted for analysis.

Results and Discussion: The summary of the results of samples collected from four Middle Tennessee nurseries is shown in Table 1. All of the samples collected from the Cumberland Plateau tested very low or low in soil test P. Sixty-eight % of the samples collected on the Highland Rim tested very low or low in soil test P. All of the samples taken from the farm in the Nashville Basin, which is located in Williamson County, tested high or very high in soil test P. The data in Table 1 compares favorably with the data in Table 2, which shows the summary of results from a much larger group of samples.

Table 2 shows the summary of result ratings of soil samples submitted to University of Tennessee Soil Testing Laboratory from January 1, 1999, through December 7, 2001, indicating nursery trees as the intended crop. Forty-three % of the samples submitted during the study period tested low in soil test phosphorus, and 64% tested low or medium. Eighty-seven % of the samples that were submitted and tested very high in soil test P were from Williamson County. Most of the land devoted to nursery tree crops in Williamson County is located in the Nashville Basin where the soils are developed out of high P-containing Ordivician age limestone.

Table 1. Summary of soil test phosphorus result ratings from four separate nurseries in Middle Tennessee.

MLRA	Soil Test Phosphorus (P) Levels*				
	Very Low	Low	Medium	High	Very High
	- - - - - - - - - - Number of Samples - - - - - - - -
Cumberland Plateau	4	1	0	0	0
Highland Rim	4	7	3	2	0
Nashville Basin	0	0	0	2	7

*VL = 0-9 lbs P/A, L = 9-18 lbs P/A, M = 19-30 lbs P/A, H = 31-120 lbs P/A, VH = 120+ lbs P/A

Table 2. Summary of result ratings of soil samples submitted to University of Tennessee Soil Testing Laboratory from January 1, 1999 thru December 2001 indicating nursery trees and the intended crop.

County	Soil Test Phosphorus (P) Levels*			
	Low	Medium	High	Very High
	---------- Number of Samples ----------			
Coffee	8	27	42	3
Franklin	21	6	13	2
Grundy	7	1	19	3
Warren	211	86	36	1
Williamson	0	0	24	61
Total	247	120	134	70

*L = 9-18 lbs P/A, M = 19-30 lbs P/A, H = 31-120 lbs P/A, VH = 120+ lbs P/A

The results of the study are a somewhat surprising. It was anticipated that a profitable crop like nursery trees would most commonly receive excess fertilization, resulting in high soil test P levels. Unlike most crops, producers are not given fertilizer recommendations when they receive their soil test results from land used for nursery tree production. Instead, a copy of the results is sent to a University of Tennessee Nursery Crops Extension Specialist who visits with the nursery before making fertilizer recommendations.

Significance to Industry: Low soil test P levels should not overly concern producers at ornamental tree nurseries of Middle Tennessee, unless the nursery is located in the Nashville Basin. Soils of the Nashville Basin, developed out of phosphatic limestone, would be expected to test high or very high in soil test P. It has been difficult to show large increases nursery tree growth due to even nitrogen fertilization (Yeager et al., 2001, Ingram et al., 1995). Total P removal the soil by 2-3 year old spruce, pine, beech, and oak nursery stock has been reported to be less than 10 lbs P/A (Baule and Fricker, 1970). Most of the soil samples collected in Middle Tennessee tested medium or low in soil test P. However, the art of nursery tree soil testing is generally not well developed (Ballard, R., 1980) and there is little or no evidence of ornamental tree nursery response to P fertilization. To improve soil test P levels in ornamental tree nurseries, a soil pH near 6.5 should be maintained, and soil organic matter content increased. Phosphorus fertilizer should be applied at a rate between 50 and 250 lb P/A at planting.

Literature Cited:

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Reblooming Bigleaf Hydrangeas

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Nature of Work: Most gardening texts state that bigleaf hydrangeas, *Hydrangea macrophylla* var. *macrophylla*, *H. macrophylla* var. *normalis, H. macrophylla* var. *serrata* and their hybrids form flower buds on old wood the year before flowering. If those buds are destroyed then plants will not flower because new flower buds will not be formed then develop and open during the current growing season.

Recent research has demonstrated that bigleaf hydrangea cultivars exist that are truly remontant as well as others that will flower in autumn even if they have already flowered earlier in the year. Speculation exists concerning whether the flowers arise from lateral buds that were not removed or freeze damaged or whether new flower buds form during favorable conditions in late summer and early fall then open during an extended period of short days and non-freezing autumn temperatures (1). To the landscape and gardening trade, it does not matter why these hydrangeas rebloom or continue to bloom into autumn. They want to know which ones will be both summer and fall flowering.

The bloom times of cultivars in an existing hydrangea collection (2) at MHCREC, Fletcher, NC, were recorded weekly during the 2001 growing season. Plants that were flowering in July as well as flowering on October 1, 2001 are listed as reblooming in Table 1. Those that flowered during the 2001 season but were not in bloom on October 1 are listed in Table 2. Those that did not flower at all have been reported previously (2).

Results and Discussion: Most plants were killed to the ground by cold weather during the 2000-2001 winter. First killing frost was on October 10, 2000 with the lowest winter temperature recorded at MHCREC, Fletcher being 8 F. on December 20,2000. However, much flower and vegetative bud damage occurred in spring due to variable temperatures. For example, temperatures in excess of 75 F. were recorded every day April 6-12, 2001 followed by 3 nights below freezing the next week, another three days above 75 F. then the last frost was on April 27, 2001. New growth stimulated by warm spring temperatures was killed by temperatures in the twenties.

Significance to the Industry: Twenty of the fifty-two cultivars flowered both in early summer and early fall.

Literature Cited:

1. Adkins, J. A. 2002. *Hydrangea macrophylla*: Travels, Trials and Some New Ideas. Proc. NC Nursery Short Course:18-19.

2. Bir, R. E. and J. L. Conner. 2000. Flowering of Hydrangea macrophylla and serrata Cultivars in USDA Zone 7 Landscapes. Proc. SNA Res. Conf. 45:445-446.

Table 1. Cultivars of *Hydrangea macrophylla* that were flowering in July as well as in October 2001 at MHCREC, Fletcher, NC.

CULTIVAR	
All Summer Beauty	Kluis Superba
Altona	LaMarne
Blue Boy	Lanarth White
Blue Danube	Lilacina
Blue Prince	Marechal Foch
Coerulea Lace	Nikko Blue
Decatur Blue	Revelation
Mme. Emile Mouillere	Souv. Pres. Doumier
Europa	Veitchii
Geisha Girl	White Wave

Table 2. Cultivars of *Hydrangea macrophylla* that flowered but did not flower in fall 2001 at MHCREC, Fletcher, NC.

CULTIVAR	
Ami Pasquier	Masja
Ansley	Mathilda Gutges
Ayesha	Mousseline
Beaute Vendomoise	Niedersachen
Blue Bird	Oregon Pride
Cardinal Red	Otaksa Monstrosa
Fasan	Paris
Gen. Vicomtesse de Vibraye	Presioza
Gertrude Glahn	Red Star
Goliath	Rose Supreme
Hadsbury	Seafoam
Hamburg	Shishiva
Heinrich Seidel	Teller Red
Holstein	Trophee
Kastlen	

First Year Evaluation of Winged Elm for Cut Branch Production

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Index words: Winged Elm, *Ulmus Alata*, Nitrogen, Cut Branch, Florist

Nature of Work: In most businesses, new and improved products are the sales and advertising departments' dream. This holds true in the green industry as well; from brighter colored annuals to more compact versions of old favorite shrubs and trees: NEW means sales.

The florist trade welcomes "new" plants and also encourages using plants in new and creative ways. Cut foliage and branches, seeds and pods, in fresh or dried form, are replacing some of the more traditional flowers in arrangements. Sales of non-traditional products at the whole-sale level are increasing.

Winged elm, *Ulmus alata*, is a medium to large tree native to the south-eastern United States. Corky, flattened wings can form on either side of the stems. This corky growth makes dormant branches very attractive to floral designers. To our knowledge no attempt has been made to grow winged elm as a cut branch crop.

In February 2000, a study was initiated in Tifton, GA (USDA hardiness zone 8a) at the National Environmentally Sound Production Agriculture Laboratory (NESPAL) on the campus of the Coastal Plain Experiment Station to determine optimal conditions for field production. Rates of fertilizer application and pruning strategies are being evaluated to maximize the number of marketable branches that can be produced per unit area.

Trees grown in 1.9 liter containers were planted in December 2000 in a Tifton sandy loam soil. The study was arranged using a completely randomized design with two rates of fertilizer (50 and 100 pounds of nitrogen per acre using 16-4-8 + minors), five replications and ten samples per block. Trees were planted three feet on center with four rows of six plants per block; the inner ten trees being harvested for data collection. Blocks were separated by a 6' grass strip to prevent contamination between treatments. Fertilizer was applied in split applications on

March 14 and May 31. Plants were irrigated as needed using solid set overhead impact sprinklers at the rate of one inch of water per week.

In February 2002 the trees were pruned to a height of 18" above the soil line. The cut branches in each block were sorted by length (2' – 3'; 3' – 4'; and greater than 4'); number of branches per size category in each block was recorded. Assuming 1800 plants per acre, the value of marketable branches per acre was calculated.

Results & Discussion: Plants fertilized at 100 # N per acre had greater numbers of 4' branches than plants fertilized at the lower rate (50# N per acre). There was no difference in the number of 2' -3' branches produced. Branches are usually marketed as a bundle, 10 branches per bundle. Average wholesale price for a bundle of 10 branches is $4.00 - $5.00 for a bundle of 2' – 3' branches; $6.00 - $8.00 for a bundle of 3' – 4' branches; and $9.00 - $12.00 for a bundle of branches greater than 4' in length; prices will vary. Cut branches have been stored dry with no other post harvest treatments and quality has not diminished over several months.

Significance to the Industry: A new crop for the florist industry could generate sales at the wholesale and retail levels. The inclusion of the winged elm in the "dried and preserved" product line will mean year round sales opportunities with no special storage requirements: no cooler, no water, no preservatives. Four months after harvest, the durability and appearance of the stems has remained unchanged, unlike many other floral products that shatter, crumble and fade.

Due to the location of the research plots at NESPAL, more traditional row-crop growers have become interested in winged elm as an alternative crop for their operations. An alternative crop would mean more on-farm diversity and another source of income for those farmer/growers willing to experiment. Future research will include increasing the rates of fertilizer; evaluating the effect of severe pruning on the crop; and surveying florists' opinions of the product.

Table 1. Calculated gross $$ per acre for first season winged elm production with 50 or 100 pounds nitrogen per acre. Calculations are base on 1800 plants per acre planted 3' on center, allowing paths for access to the plants.

Stem length and wholesale price per bundle of 10 stems	**Gross $ per acre @ 50#N/acre**	**Gross $ per acre @ 100#N / acre**
2' - 3' @ $5.00	$5625.00	$5625.00
3' - 4' @ $7.00	$2835.00	$4879.00
Over 4' @ $9.00	$1134.00	$2430.00
Total gross $ per acre	**$9594.00**	**$12,934.00**