Variations in pH from Different Bark Sources

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Management of medium pH is an important consideration in commercial production of nursery crops. Bark source, fertilizer source, and dolomitic lime application rate are significant factors in pH management, while dolomitic lime source is not significant. Plant growth is influenced depending upon timing of fertilization and optimum pH for the species being grown.

INTRODUCTION

Growers in the southeastern United States are currently producing container-grown ornamental plants in a wide range of medium components. Pine bark has been the primary media component. In Louisiana, pine bark is widely used, but for the last several years limited availability of "high quality" pine bark has led several bark suppliers to initiate delivery of hardwood bark or bark sources having a combination of pine and hardwood. Wide pH fluctuations in bark that is currently being utilized has created problems with proper adjustment of dolomitic lime rates and selection of slow-release fertilizers. It is very important to recognize not only the influence of bark source on medium pH but also the role of fertilizer source (Table 1), fertilizer rate, fertilization frequency, water quality, and bark age in pH management. With these considerations, a study was conducted to determine the role of bark sources, fertilizer sources, dolomitic lime application rates, and dolomitic lime sources on leachate pH from container medium over a 12-month production period. Treatment effects on shoot growth of *Liriope muscari* 'Variegata' and *Juniperus horizontalis* 'Wiltoni' (syn. 'Blue Rug') were recorded.

MATERIALS AND METHODS

One 17 June 1994, a 3 (bark source) × 2 (fertilizer source) × 4 (dolomitic lime application rate) × 2 (dolomitic lime source) × 2 (plant species) factorial experiment was initiated. Each treatment was replicated four times in a randomized complete block design. Bark sources used were pine bark, blended hardwood bark, and a combination (1:1, v/v) of these two bark sources. Fertilizer sources were Nutricote 17-7-8 (Type 270) and SierraBlen 18-7-10 applied at experiment initiation at an incorporated rate of 1.2 kg m^{-3} (2 lb yd^{-3}). Plant species were *L. muscari* 'Variegata' and *J. horizontalis* 'Wiltoni'. All medium treatments contained an incorporated application of Micromax at 0.9 kg m^{-3} (1.5 lb yd^{-3}) applied at planting. Plants were grown in the gallon-container production area at Adams Nursery, Forest Hill, LA. Overhead irrigation and weed control were provided under the cultural practices typically employed by the nursery.

Leachate pH was determined at 3-month intervals for one year (18 June 1994, 10 Sept. 1994, 9 Dec 1994, 3 Mar. 1995, and 23 June 1995). These dates corresponded to 0, 3, 6, 9, and 12 months after initiation. Shoot dry weight of liriope and juniper

was determined on 23 June 1995 by harvesting the plant at the medium level and drying the resultant plant material at 70C (158F) for 72 h.

Table 1. Reaction and influence on pH of commonly used nutrient sources in container nursery crop production.

Nutrient source	Reaction speed	pH response
Dolomitic lime	medium	alkaline
Gypsum	medium	neutral
Epsom salt	rapid	neutral
Aluminum sulfate	rapid	acid
Elemental sulfur	slow	acid
Urea formaldehyde	slow	acid
Ammonium sulfate	rapid	acid
Sodium nitrate	rapid	alkaline
Calcium nitrate	rapid	alkaline
Potassium nitrate	rapid	acid
Urea	rapid	slightly acid
Superphosphate	medium	neutral

RESULTS AND DISCUSSION

Leachate pH. Leachate pH was influenced over the 1-year evaluation period by fertilizer source, bark source, and dolomitic lime application rate (Table 2). Dolomitic lime source was not a significant factor in adjustment of leachate pH.

Blended hardwood bark had an initial pH of 6.7 and remained stable for most of the evaluation period before gradually increasing to 7.0 by the end of the study. The largest change in leachate pH for the pine bark medium occurred during the first 3 months. SierraBlen 18-7-10 and Nutricote 17-7-8 had similar leachate pH until after the second fertilizer application in March 1995, 9 months after initiation. Sierra Blen has been shown to be more acid forming than other slow-release fertilizer sources.

While application rate of dolomitic lime influenced leachate pH, the addition of this material, regardless of rate, does not appear to influence leachate pH after 6 months. The differences in leachate pH due to dolomitic lime application rates were nonsignificant 9 and 12 months after application.

Plant Growth. Shoot dry weight of *L. muscari* 'Variegata' was influenced by bark source, fertilizer source, and dolomitic lime application rates, while *J. horizontalis* 'Wiltoni' had shoot dry weight differences attributed to bark source and dolomitic lime application rates (Table 3). Liriope had the highest shoot dry weight when grown in the pine bark medium. SierraBlen 18-7-10 produced greater shoot dry weights in liriope than Nutricote 17-7-8 at 12 months after treatment initiation. This was probably due to the increased "up front" release of nutrients from SierraBlen following the second fertilizer application several months prior to harvest. Nutricote-fertilized liriope had greater visual quality ratings at 9 months after treatment when compared to SierraBlen-fertilized plants (date not shown). Dolomitic lime application increased shoot dry weight of the liriope.

Wiltoni juniper had the greatest shoot dry weight when grown in the blended hardwood bark. Increases in the application rate of dolomitic lime decreased shoot dry weight from 42 to 39 grams.

Table 2. Average leachate pH of nursery media at 3-month intervals as influenced by bark source, fertilizer source, dolomitic lime source, and dolomitic lime applicator rate.

	6/18/94	9/10/94	12/9/94	3/3/95	6/23/95
Bark source					
Blended hardwood	6.74	6.49	6.67	6.75	6.99
Pinebark	4.30	5.90	6.07	6.40	6.32
Hardwood + pinebark	5.68	6.32	6.52	6.56	6.70
Fertilizer source					
Nutricote 17-7-8	5.64	6.26	6.45	6.60	6.77
Sierrablen 18-7-10	5.50	6.20	6.39	6.60	6.57
Dolomitic lime source					
Micro-encapsulated	5.70	6.29	6.47	6.56	6.68
Pulverized	5.57	6.28	6.47	6.57	6.68
Dolomitic lime application rate					
0 kg m^{-3} (0 lb yd^{-3})	5.18	5.88	6.14	6.60	6.62
3 kg m^{-3} (5 lb yd^{-3})	5.51	6.15	6.37	6.59	6.60
6 kg m^{-3} (10 lb yd^{-3})	5.88	6.31	6.48	6.54	6.71
9 kg m^{-3} (15 lb yd^{-3})	5.72	6.39	6.55	6.57	6.73

Table 3. Shoot dry weight (grams) of *Liriope muscari* 'Variegata' and *Juniperus horizontalis* 'Wiltoni' as influenced by bark source, fertilizer source, dolomitic lime source, and dolomitic lime application rate.

	Liriope muscari ' Variegata'	*Juniperus horizontals* 'Wiltoni'
Bark source		
Blended hardwood	23.89	42.82
Pinebark	28.72	37.32
Hardwood + pinebark	24.87	39.22
Fertilizer source		
Nutricote 17-7-8	23.25	39.22
Sierrablen 18-7-10	28.40	40.35
Dolomitic lime source		
Micro-encapsulated	26.48	40.22
Pulverized	25.84	38.71
Dolomitic lime application rate		
0 kg m^{-3} (0 lb yd^{-3})	23.82	41.72
3 kg m^{-3} (5 lb yd^{-3})	27.03	41.65
6 kg m^{-3} (10 lb yd^{-3})	25.13	38.38
9 kg m^{-3} (15 lb yd^{-3})	26.33	38.35

CONCLUSION

Monitoring leachate pH in container production of nursery crops is an important factor that needs to be considered. Bark pH is very important in determining plant growth performance and nutrient management. Dolomitic lime plays an important role in nutrient management and bark pH during the first 3 to 6 months of production, but is not a significant factor after 6 months. Reapplication of dolomitic lime may need to be considered depending on the plant species being grown, water quality, fertilization practices, and other production factors.