Improving Long Term Availability of Calcium & Magnesium in Container Production

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Nature of Work: Container plants held over for a second year exhaust the supply of calcium and magnesium in the original potting substrate. Plants become deficient, develop chlorosis and fail to grow. They loose quality if not top-dressed with dolomitic lime. This top-dressing adds an extra step and expense to the production cycle. The objective of this project is to incorporate an initial charge of dolomitic lime with different sized particles in an attempt to extend the rate of release of calcium and magnesium over 18 months.

A single incorporation of dolomitic lime at potting could buffer pH while supplying calcium and magnesium for 18 months. It is well known that smaller particles of lime rapidly release and change pH. Large particles release slowly causing little pH change. In agronomic soils, lime particles in the 100 mesh size release in about 2 weeks, in the 40-50 mesh size, release takes place over 24 months. The agronomic research is focused on reducing particle size for maximum release in one year. No work has taking place with container media where a blending of particle sizes of lime could be used to attempt to extend the calcium and magnesium release over 18 months or more.

Screened particle sizes of dolomitic lime would be incorporated into a nursery production substrate to determine the longevity and quantity of the calcium and magnesium over 18 months. The treatments were applied to the substrate prior to planting the *Ilex crenata* 'Green Luster' into three gallon pots on April 1, 2003. Osmocote Pro, 20-4-8 with minors, was incorporated at 15#/cubic yard. The fertilizer contained 0.2% magnesium. The treatments are 1) no lime, 2) 10# dolomitic lime /yd^3 - 50 mesh, 3) 10# dolomitic lime /yd^3 - 60 mesh, 4) 10# dolomitic lime /yd^3 - 70 mesh, 5) 10# dolomitic lime /yd^3 - 80 mesh, and 6) 10# dolomitic lime /yd^3 - 100 mesh. The pH changes, soluble calcium and magnesium levels in the substrate would be monitored for 18 months. Results from this initial study should allow the development of a model for the blending of different sized particles to provide a product that would provide 18 months of adequate calcium and magnesium without over liming the production media.

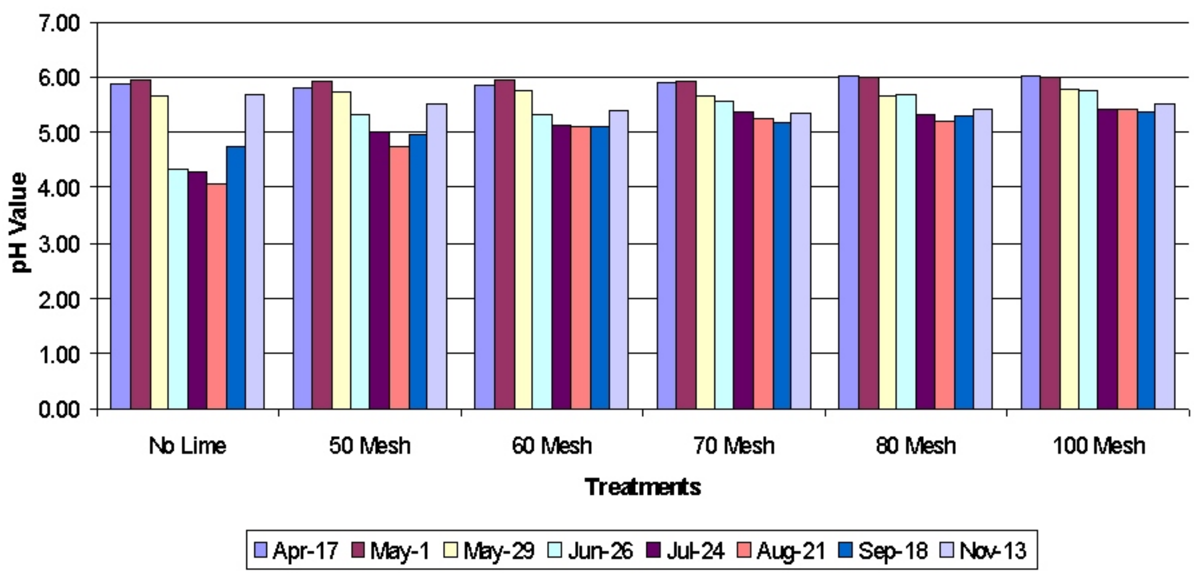
The four substrate samples from three treatment pots were combined into a composite sample and sent to the UGA Soils Laboratory for the Nursery/Greenhouse Artificial Substrate Analysis. Samples are to be taken on April 1, 2003; April 17, May 1, May 29, June 26, July 24, August 21, September 18, November 13, January 8, 2004; March 4, June 24 and August 19.

Results and Discussion: The results of the pH, calcium and magnesium levels are shown in Figures 1-3. The August 21 calcium and magnesium levels were highly elevated due to increased time in the sample bag before processing by the laboratory. They have been deleted in the figures. The initial potting mix pH was 6.35, the calcium was 1.49 ppm and the magnesium was 0.45 prior to the addition of any treatments or fertilization. The pH has declined gradually during the first 6 sample dates. Treatment 1) no lime has declined more quickly than the other treatments while the coarser mesh (lower mesh numbers) lime treatments has followed the same pattern. The pH has risen in the last one or two sample dates. The most dramatic increases have been in the no lime treatment.

Calcium levels above 70 ppm and magnesium above 30 ppm are considered acceptable. Both elements peaked on May 29 and levels are mostly below the recommended rates. Slight calcium and magnesium increases are seen in the 60, 70 and 80 mesh treatments for the November 13 sample date. The pH, calcium and magnesium will continue to be monitored until the end of the project.

Significance to the Industry: There is a need to be able to supply calcium and magnesium to container nursery stock for more than one season with a single application to the substrate. The use of different sized lime particles may provide a solution to this problem.

Figure 1. pH Change Over Time



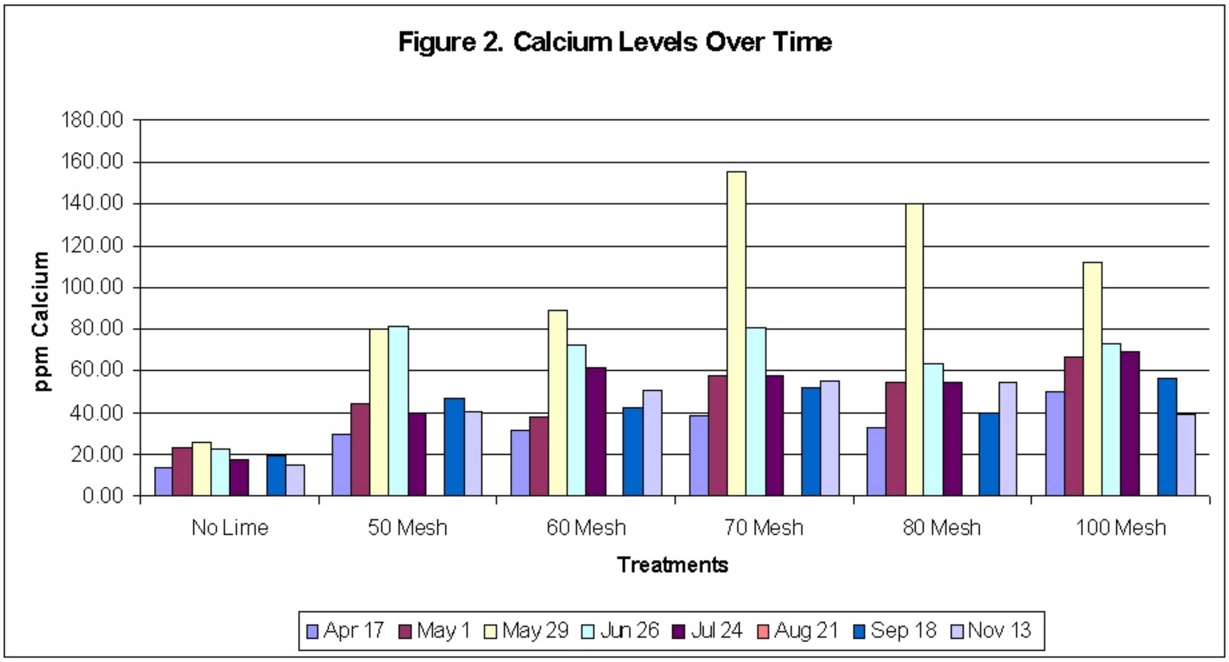


Figure 2. Calcium Levels Over Time
180.00
160.00
140.00
120.00
100.00
80.00
60.00
40.00
20.00
0.00
ppm Calcium
No Lime
50 Mesh
60 Mesh
70 Mesh
80 Mesh
100 Mesh
Treatments
Apr 17
May 1
May 29
Jun 26
Jul 24
Aug 21
Sep 18
Nov 13

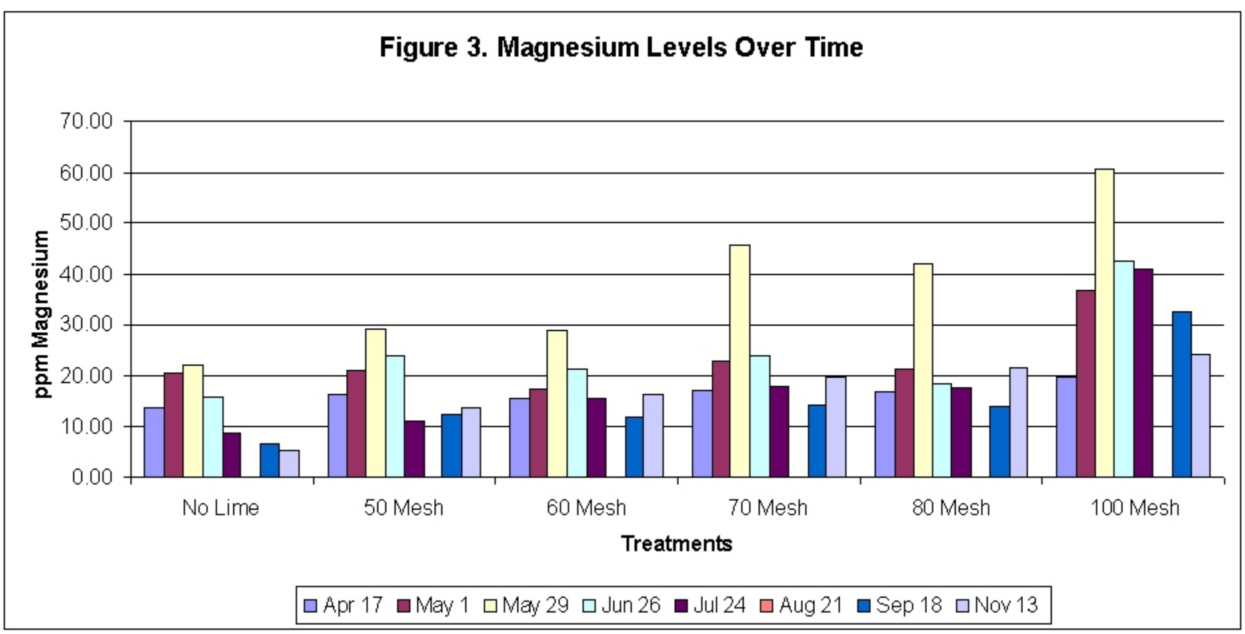


Figure 3. Magnesium Levels Over Time
70.00
60.00
50.00
40.00
30.00
20.00
10.00
0.00
ppm Magnesium
No Lime
50 Mesh
60 Mesh
70 Mesh
80 Mesh
100 Mesh
Treatments
Apr 17
May 1
May 29
Jun 26
Jul 24
Aug 21
Sep 18
Nov 13