Influence of Supplemental Magnesium on the Growth of Three Ornamental Species

John M. Ruter, Horticulture-Tifton, UGA

Nature of Work: Most growers I have talked with have no idea that dolomitic limestone only supplies Mg for a 4-5 month period under southern growing conditions. Magnesium deficiencies during the late summer and early fall are common in south Georgia nurseries. The reason behind the problem is high levels of calcium (60-70 ppm) and low levels of magnesium (>8 ppm) in the irrigation water. The difference between Ca and Mg creates an imbalance between the two ions which shows up late in the growing season. The ideal ratio of Ca:Mg in irrigation water is > 5:1. Add in the factor that the Mg in the dolomitic limestone is gone after four to five months and Mg deficiencies become commonplace.

North of the "fall line" in Georgia surface and well waters typically have low concentrations of Ca and Mg. Low levels of Mg in the irrigation water at McCorkle Nurseries may limit crop growth. The objective of this study was to determine if supplemental additions of $MgSO_4$ would be beneficial to the growth of three woody ornamentals that typically show poor foliage color late in the growing season.

The study was initiated on 25 March 1998 at the Center for Applied Nursery Research in Dearing, GA. Uniform liners of *Ilex crenata* 'Helleri', *Juniperus conferta* 'Blue Pacific' and *Rhododendron* 'Pink Ruffles' were planted into #1 containers. Potting substrate consisted of milled pine bark and sand (6:1 by vol) amended with the following (in lb/yd^3): 16# of High-N Southern Formula 23-4-8; 2# of Micromax; 2# of gypsum; and 10# of dolomitic limestone.

The experiment was a completely randomized design arranged by species with seven Mg treatments and eight replicate plants. Treatments were as follows:

	April	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*
Control							
1.5 g $MgSO_4$	x	x	x	x	x	x	x
1.5 g $MgSO_4$	x		x		x		x
1.5 g $MgSO_4$					x		x
3.0 g $MgSO_4$	x	x	x	x	x	x	x
3.0 g $MgSO_4$	x		x		x		x
3.0 g $MgSO_4$					x		x

All supplemental Mg treatments were applied at the beginning of the month. Irrigation was applied as needed using solid-set sprinklers. Final plant height and width measurements were taken in October 1998. Shoot and root dry weights were determined after removing the substrate from the roots and placing the samples in a forced-air oven to dry at 150F for 72 hrs. Calculated

parameters were growth index: (height + width)/2; root:shoot ratio: root dry wt./shoot dry wt.; and biomass: root dry wt. + shoot dry wt.

Results and Discussion:

'Helleri' Holly: Treatments had no influence on final plant size or dry weight accumulation. Shoot dry wt. ranged from a high of 89 g for Mg applied at the low rate on a monthly basis to a low of 68g for the high rate applied in August and October only. Root dry wt. followed a similar trend as Mg applied at the low rate monthly or bimonthly resulted in the greatest root weights with the least root dry wt. occurring when the high rate was applied in August and October only.

'Blue Pacific' Juniper: Treatments had no effect on height or width. Shoot dry wt. was greatest for the non-treated control with only the low rate of Mg applied monthly having less dry wt. (41% decrease). Biomass followed a similar trend to shoot dry wt. Treatment had no effect on root dry wt.

'Pink Ruffles' Azalea: Height and growth index were influenced by Mg treatment. Magnesium applied at the low rate bimonthly resulted in larger plants compared to Mg applied monthly or bimonthly at the high rate. The non-treated control was similar in size to the best Mg treatment. Treatments had no effect on final root or shoot dry weights.

Significance to Industry: Under the growing conditions at the Center for Applied Research the addition of supplemental Mg had little benefit on the growth and appearance of the plants. The high rate of application appeared to stunt growth based on the collected data. The 'Blue Pacific' juniper appeared to be particularly sensitive to supplemental Mg applications. Although not significant, 'Helleri' holly showed a trend for increasing shoot dry wt. when Mg was applied at the low rate of application monthly or bimonthly. Further insight may be provided once foliar analysis for plant nutrients is completed. As with most plants there appears to be a species dependant response to Mg with the possibility of applying too much Mg when there is not a Ca:Mg imbalance in the irrigation water. Different results may occur under south Georgia conditions where Mg deficiencies due to Ca:Mg imbalances are common.