Boron Distribution and the Effect of Lime on Boron Uptake by Pansy, Petunia, and Gerbera Plants

Incidences of boron (B) deficiency have been recently reported in pansy (*Viola* x*wittrockiana*), petunia (*Petunia* x*hybrida),* and gerbera (*Gerbera jamesonii*), though no pattern has been prevalent in the presence or severity of symptoms. Boron availability is pH dependent, and may be caused by rise in pH from irrigation water alkalinity, the addition of lime, or high concentrations of calcium (Ca). The objective of these experiments were to 1) determine how different liming rates, and in turn the substrate pH, can affect the plant availability of B, and 2) determine if Ca and B distribution was consistent throughout a plug flat in several different commercially available germination substrates.

In Experiment 1, pansy, petunia, and gerbera plants were grown in Berger peat moss/ perlite substrate amended with 3560, 4746, 5933, or 11,866 g/m^3 pulverized dolomitic limestone. A fifth treatment was amended with 11,866 g/m^3 limestone and weekly B foliar sprays at 0.25 mg L^{-1}. Electrical conductivity (EC) and pH were measured weekly, and plants were harvested for tissue analysis via ICP-OES. Experiment 2 consisted of five 288-plug trays from each of the following substrates: Berger BM2, Fafard Superfine GM (Fafard Anderson S.C.), Sun-GroRedi-earth, LG-3 and LP-5 (Sun-Gro Horticulture, Bellevue, Wash.), Premier Pro-Mix PGX (Premier Horticulture, Dorval, Quebec, Canada). Substrate was collected and nutrient concentration, pH, and EC were measured.

In Experiment 1, substrate pH increased as lime rate increased (Figure 1). Symptoms of B deficiency were not observed for any species or at any lime rate; however, B concentrations were lower for the 11,866 g/m^3 treatments for all three species (Figure 2). Dolomitic limestone is a source of Ca; consequently, Ca concentration increased as the rate of dolomitic limestone incorporated into the substrate increased (Figure 2). In other studies, increased Ca uptake has been shown to have an antagonistic effect on B. In Experiment 2, there were no significant differences in plant available B concentrations, substrate pH, or substrate EC among the six substrates. Hence, non-uniform distribution of B is not the cause of sporadic B deficiency symptoms.

Increasing the incorporation rate of lime caused an increase in pH and tissue Ca, and therefore, a decrease in B. Plug growers should only incorporate sufficient lime to raise the substrate pH to 5.5 to 6.0. Foliar applications of B or B drenches at sowing can used to ensure an adequate amount of B is available at germination.

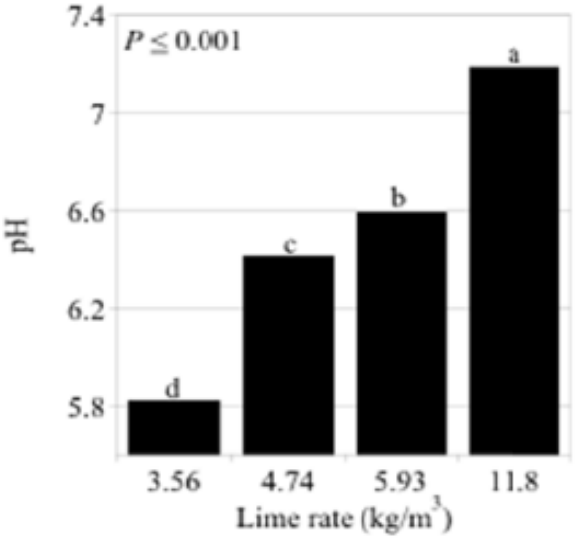

Figure 1. Substrate pH when 'Dynamite Yellow' pansy, 'White Storm' petunia and 'Festival Apricot' gerbera were grown in substrate amended with pulverized dolomitic limestone at a rate of 3560, 4746, 5933, or 11866 g/m^3. Values are pooled means across species (pansy, petunia, and gerbera), n=96.

For more information, contact: Brian Krug, brian.krug@unh.edu, University of New Hampshire, Cooperative Extension, Spaulding Hall, 38 Academic Way, Durham, NH 03824

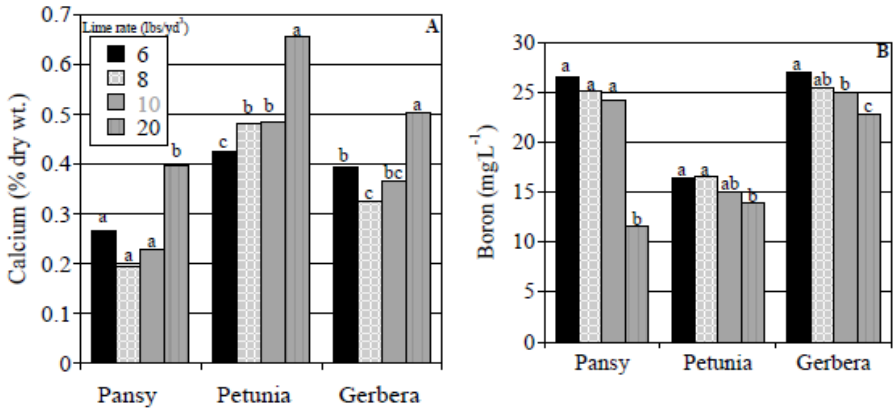

Figure 2. Calcium (A) and boron (B) tissue concentrations for 'Dynamite Yellow' pansy, 'White Storm' petunia and 'Festival Apricot' gerbera plants at 38 d after sowing grown in a peat-based substrate amended with pulverized dolomitic limestone at a rate of 3560, 4746, 5933, or 11866 g/m^3. Means separation conducted by LSD (P≤0.05) within plant species.

Krug, B.A., B.E. Whipker, I. McCall, and J. Frantz. 2011. Boron distribution and the effect of lime on boron uptake by pansy, petunia, and gerbera plants. Acta Hort. 891:135-140.