

Hydrangea Flower Color

James T. Midcap, Extension Horticulture-Athens, UGA

Nature of Work: *Hydrangea macrophylla*, the big leaf hydrangea, is an important crop for many Georgia nurseries. The plants are easy to propagate and produce under nursery conditions. However, flower color can be rather unpredictable since it ranges from bright pink to a pale blue. Low pH's, below 5.5, with free aluminum is reported to produce blue flowers while higher pH's, above 6.5 are reported to produce pink flowers on various cultivars.

Retailers and consumers purchase hydrangea cultivars expecting a predictable flower color. Many times the plants produce flowers not matching our expectations disappointing customers and retailers. Wholesale growers would like to find a simple method to produce hydrangeas with the desired flower color.

Two cultivars, *Hydrangea macrophylla* 'Charm Red' and 'Glory Blue', were grown as three gallon plants in 1997. The potting mix was bark:sand (6:1) with 10# dolomitic lime, 2 # gypsum, and 2 # Micromax. In the spring of 1998 aluminum sulfate was applied at three rates, 0 ounces / pot, 1 ounce / pot (28.4 g) and 2 ounces / pot. Aluminum sulfate was applied as a topdress and as a drench. The topdress treatments were applied across the top of the pot on March 20, 1998 just as growth of the plants was beginning. The drench of 1 ounce / pot was applied as the flower buds became visible on April 6, 1998 and a second 1 ounce / pot application two weeks later on April 20, 1998 for the 2 ounce / pot rate.

Dolomitic lime was applied to half of all treatments at 80 grams / pot as a topdress prior to the aluminum sulfate treatments of March 20. The lime was broadcast across the top of the media forming a powder layer on the media surface.

Flower color, media pH and soluble salts, and leaf tissue nutrient analysis were all recorded. The flower color was ranked in early June from #1(pink) to #6 (blue). The intermediate colors were #2 - lavender pink, #3 - lavender, #4 - purple, #5 - grape. Plants with multiple colored flowers were given an average of the range in flower color. The pH and soluble salts were determined on leachate drained from the pots 20 - 30 minutes after irrigation or the addition of extra water. The leaf tissue was collected in mid June from the uppermost fully mature leaves and analyzed by the University of Georgia Soil Testing Laboratory to determine the nutrient levels.

Results and Discussion: *Hydrangea* 'Glory Blue' was pink (#1) with no aluminum and was purple (#4) to grape (#5) with 2 ounces / pot of aluminum sulfate (Figure 1). The 1 ounce / pot aluminum treatment produced intermediate color levels. The aluminum in the plants leaves followed the same pattern as the flower colors (Figure 2). The 0-ounce / pot aluminum resulted in the lowest aluminum levels, while the 1 ounce rate was significantly higher, and the 2 ounce rates were the highest. The media pH and soluble salt levels were not different among the aluminum treatments.

The high aluminum rates produced flowers with purple to blue flowers and the highest aluminum levels in the leaf tissue. The no lime treatment had higher aluminum in the tissue; more blue in the flowers; higher phosphorus, lower calcium, lower magnesium in the leaf tissue. The no aluminum treatment had higher phosphorous levels in the leaves. However, no treatment produced a clear blue flower color for the entire replication. The high rate of aluminum sulfate helped but did not reliable produce the desired blue flowers.

Figure 1
Hydrangea ‘Glory Blue’

Flower Color Means by Aluminum Treatment
1 = pink, 6 = blue

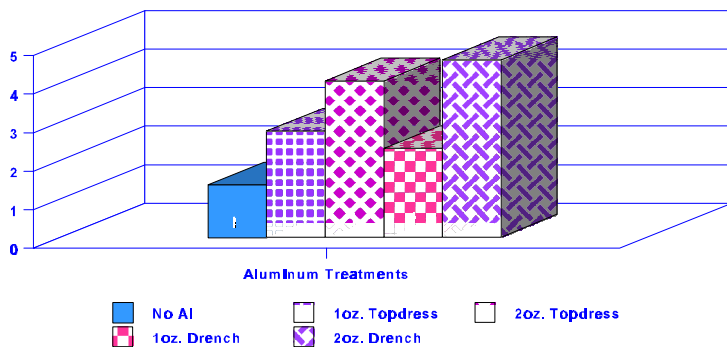
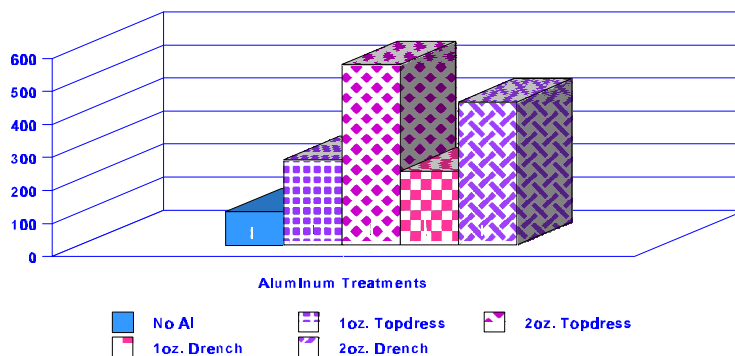


Figure 2
Hydrangea ‘Glory Blue’

Tissue Aluminum Means by Aluminum Treatment



Hydrangea ‘Charm Red’ flowers were pink (#1) with no aluminum and purple (#4) to grape (#5) with both the 1 ounce and 2 ounce treatments of aluminum sulfate no matter how applied (Figure 3). Broadcasting or drenching made no difference in the flower colors. Since the 1 ounce / pot and 2 ounces / pot rates produced similar results, the amount of aluminum needed for maximum

color expression was reached with the 1 ounce / pot rate. The aluminum in the leaf tissue increased from the 0 ounces of aluminum sulfate, up to the 1 ounce of aluminum, and higher up with the 2 ounce rate (Figure 4). The media pH, soluble salts, phosphorous and calcium levels were not affected by the aluminum treatments. The lime application did not affect flower color or media pH. The lime did reduce the amount of aluminum in the leaves and increase the calcium and magnesium levels. The pH of all the treatments never exceeded 5.0 even when 80 g / pot of lime was applied as a topdress in the spring.

Figure 3
Hydrangea ‘Charm Red’

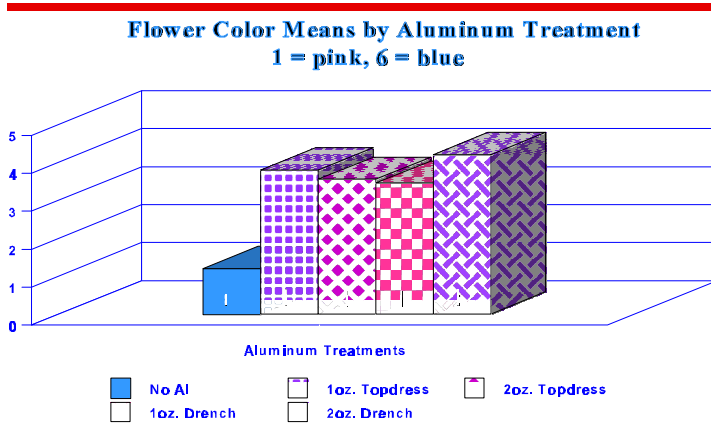
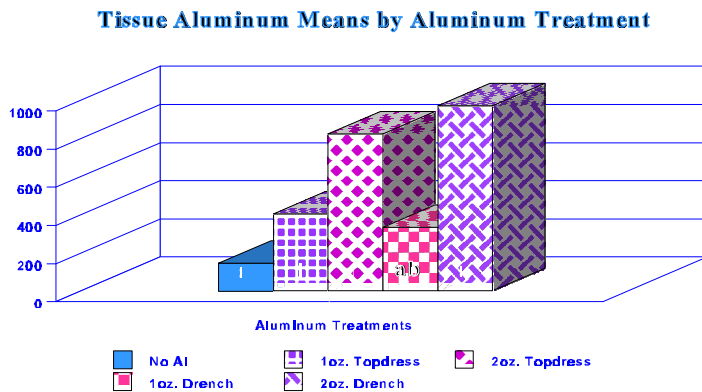


Figure 4
Hydrangea ‘Charm Red’



Significance to the Industry: The application of aluminum sulfate in pine bark-based nursery potting mixes does increase the purple flower colors on *Hydrangea macrophylla* ‘Glory Blue’ and ‘Charm Red’. The aluminum levels in the leaf tissue at the 2 ounce / 3 gallon pot was very high and did reduce plant growth slightly. The broadcast application as growth begins seems to be as effective as one or two drenches beginning when the flower buds are visible. The topdress of

powdered dolomitic lime had little effect on flower color, aluminum levels in the leaves and the pH of the potting mix. The lime treatment did increase the calcium and magnesium in the leaf tissue.

These treatments failed to produce plants of Glory Blue with true blue flowers. Charm red was a strong pink but not a true red under these conditions. The low pH would be expected to have an effect on the development of the red flower color. Further investigation is necessary to achieve the desired results.