

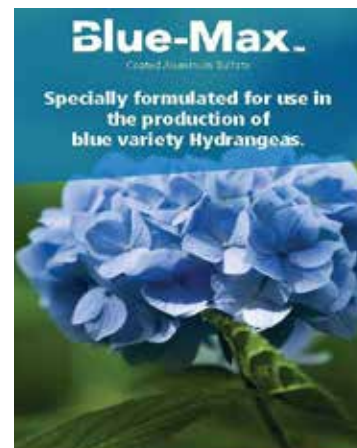
Tech Shares

Optimize Bluing of Hydrangea using Blue-Max™ Coated Aluminum Sulfate

Fred Hulme, Ph.D., ICL SF Technical Service Dept.

ICL Specialty Fertilizer developed Blue-Max™ coated aluminum sulfate to make hydrangea production safer, easier and more profitable. Now with Blue-Max™ coated aluminum sulfate, a grower can deliver a sustained Aluminum (Al) supply with a single application that will persist for many months. Blue-Max™ is 100% coated and will deliver a slow and steady supply of (Al) to the root system over the course of 2-3 months at 70 deg. F. This gives a grower more flexibility during shipping season on when to apply product to trigger bluing and because product is coated it is much safer and less wasteful to apply compared to traditional methods.

Many hydrangeas cultivars have the unusual ability of changing inflorescence color. If the right amount of (Al) is available to the flower bud when it is developing, blue pigment will form in the bloom. Soluble Al is promoted by acidic growing. But at higher growing media pH's, (Al) is less available resulting in purple to pink color blooms. This is where Blue-Max™-coated aluminum sulfate can help you out.



Plant Biology

- Most Hydrangeas will bloom in the spring. Florets are actually initiated the previous growing season by 6 to 8 weeks of late summer conditions short days (critical photoperiod is 14 to 16 hours) and cool temperatures - Buds remain dormant with continued short days in fall and winter. Dormancy is broken by a cold period (36 to 48° F or 2 to 9°C for at least 6 weeks) and flowers then develop from dormancy in spring as temperatures warm up (60° F night/ 75° F day or 15.5° C night/ 24° C day temperatures) in 88 to 103 degree days.
- Other varieties (e.g. H. macrophylla 'Endless Summer') have remontant flowering potential - i.e. these will bloom in the spring, but they can also flower repeatedly from lateral buds during a growing season as days get longer.
- Key to success for bluing is to raise Al in plant tissue just as the flower buds begin to break dormancy and as blooms develop.

Traditional Soluble Aluminum Sulfate Treatments

Since many consumers prefer at least some blue color at point of sale, growers have long used a variety of programs (incorporations/ top-dresses/ multiple drenches of soluble aluminum sulfate) during forcing period and flower development to program blue bloom color. These applications can be time consuming and labor intensive. If (Al) treatments are misapplied or not timed correctly they can:

- be ineffective leading to pink blooms
- result in significant leaching of (Al) into the environment
- even cause crop injury by burning roots and leaves due to high soluble salts (EC) and (Al) toxicity

How does Blue-Max™ work? Once applied to the plant, soil water/ water vapor passes through the polymer coating solubilizing the aluminum sulfate core, Blue-Max™ then begins to release soluble Al directly to roots without raising soluble salts levels excessively. Blue-Max™ also can depress media pH at this point further maintaining available Al for bluing.

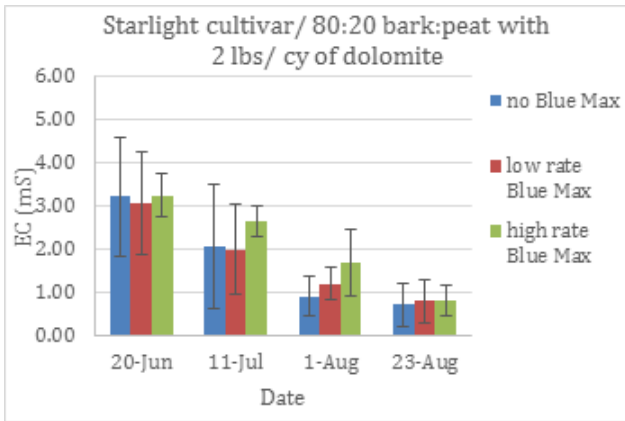
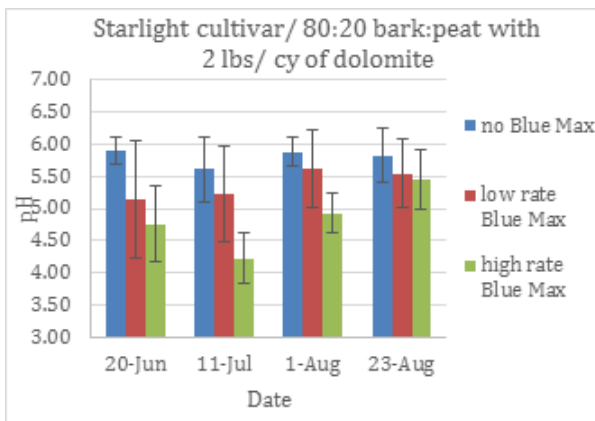
Effect of Blue-Max™ on hydrangeas

In a 2016 ICL sponsored trial in the Netherlands, Blue-Max™ at label rates promoted blue blooms and did not inhibit shoot or root growth.



Additionally leachate was analyzed comparing 3 liquid aluminum sulfate drenches in a growing season to one application of Blue-Max™ (15 lbs. per cu. yard). There was a 50% reduction in (Al) leaching from the Blue-Max™ treatment even at this higher than label rate.

In a recent ICL sponsored trial (2016, Ingram, Univ. of KY) 'Starlight' hydrangeas were planted in early June and treated with Blue-Max™ several weeks later. Blue-Max™ treatments resulted in lower root zone pH levels that persisted for several months after application without excessive EC levels (pH & EC readings are based on using a pour-through method). Note: growing media pH depression will be less at higher lime addition rates.



2016, Ingram, UK Trial

Best management practices for successful Bluing of hydrangeas with Blue-Max™

- Blue-Max™ is best applied as a top-dress treatment to well rooted, established plants. Broadcast product uniformly over soil surface. Avoid piling product against leaves and stems.
- Plants should be irrigated immediately after Blue-Max™ application and plants should not dry out excessively especially during the first month after treatment.
- The application rates listed on the label are intended as a guideline in developing a routine program to grow blue flowered hydrangeas.
 - The high label rate (equivalent of 12 lbs. per cu yard) typically will be an effective treatment on established nursery hydrangeas.
 - Florist hydrangeas that are typically dug from the field, potted in the late summer/ fall, induced in a cooler and forced in a greenhouse for spring market have a less established root system and suggested starting rates should be lower (equivalent of 8 lbs. per cu yard).
- Effective rates will depend on many factors including: crop condition, growing environment, cultivar type, timing of application, rate, root zone pH, fertilizer program and growing media.
 - Use lower rates for: freshly potted plants, high peat-based media, lower root zone pH's (< 6.0), low (P) fertilizer program, sub-irrigation, other (Al) treatments.
 - Use higher rates for: older established plants, high bark media, higher root zone pH's (> 6.0), higher (P) fertilizer program.
 - We advise growers to trial different rates before full adoption to determine the optimal rate for a specific growing operation.
- Key objective is supply critical (Al) concentrations to developing blooms at the right time. For nursery crops, optimal applications times are late winter/early spring just as buds are breaking dormancy or during any period of flower development.
 - Apply in plastic overwintering houses, just as end doors are being left open or sidewalls are beginning to be lifted.
 - Apply just as florist crops are removed from the cooler and placed in forcing greenhouse.
 - Some growers have successfully employed split applications, e.g. a fall application as plants are going into the overwintering phase and a follow up application in the late winter/ early spring to intensify blue color.
- Since root zone conditions impact the solubility of (Al), it is important to monitor pH & EC during bloom development.
- During the bloom forcing phase it is best to maintain root zone pH's below 5.5.
- Avoid excess phosphorus (P) applications during this time (including phosphoric acid) to prevent tie up of soluble aluminum by (P).



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