A Publication of the UMass Extension Greenhouse Crops & Floriculture Program

Floral Notes NEWSLETTER

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In This Issue

New Address for UMass Diagnostic Lab

The UMass Plant Diagnostic Lab has a new address 101 University Drive, Suite A7 Amherst, MA 01002. Parking is FREE and easily accessible to the first floor lab.

An OPEN HOUSE will be held Wednesday March 9 3-5 PM

Phone and fax numbers are the same.

Bess Dicklow (413)545-3209 mbdicklo@umext.umass.edu
Dan Gillman (413)545-2826 dgillman@umext.umass.edu
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For sample submission forms go to www.umass.edu/agland/diagnostics

Recent Progress on the New UMass Greenhouses

Despite delays due to the weather, work continues on the new greenhouse. Most of the effort is now on focused on the enclosing and starting interior work on the headhouse. The green structures are spaces for electrical and mechanical equipment and the actual headhouse is behind. Structural steel for the greenhouses to be built in the foreground will be delivered by Stuppy in March.

Employee Training for Garden Retailers

March 29, 2011, 9:00-3:30
Publick House, Route 131, Sturbridge, MA

University of Massachusetts Extension Agriculture and Landscape Program

For garden center employees, horticulture retailers, roadside stands and others that work with retail customers in horticulture. Learn about helping customers to choose the right plant for the right place and answering questions about good soil preparation and management. The afternoon will focus on customer service and merchandising.

8:45-9:15 Registration and Coffee

9:15 -10:00 Choosing the Right Plant for the Right Place Ron Kujawski, Consulting Horticulturist, Berkshire County
You have limited time to educate your customers to help them choose the right plants. Ron will share details on matching plants with their ideal environments in the landscape. He will include site assessment and drought tolerant plants.

10:00-10:45 Top 10 Landscape Pests Bob Childs, UMass Extension

Break

11:00-12:00 Soil Preparation and Management Doug Cox, UMass Plant, Soil & Insect Sciences
Let Doug help you to sort through the basics of soil preparation and management. Learn about pH, nutrients and soil amendments to help you better answer questions from customers.

12:00-1:00 Lunch on your own. *Bring your own, fast food restaurants within a short drive, dine at the Publick House, or order a box lunch at registration.*

1:00-3:00 Sales and Customer Service Skills are the Keys to Better Sales Bruce Baker, Middlebury, VT
Bruce Baker has lead over 600 workshops throughout the US in the past 25 years on displays, sales and customer service. Those who try his suggestions say the results are like magic! Learn how to greet customers and sell more products in this lively and entertaining workshop. Bruce will cover all aspects of selling, from greeting customers to closing a sale. He will also provide merchandising tips for displaying products so that customers will purchase more every time they come to your business.

Cost is $50 per person; $45 per person for three or more registrations from the same company (10% discount). Morning coffee and handouts included in registrations. Send checks payable to UMass to: Garden Retailer Training, UMass Extension, French Hall, Amherst, MA 01003. On-line registration is available at www.UMassGreenInfo.org

Q & A: Water pH and Alkalinity

Douglas Cox
Plant, Soil, and Insect Sciences
University of Massachusetts
Amherst

Understanding irrigation water pH and alkalinity as it affects greenhouse crop fertility has become one of the most important and confusing topics in crop production today. Through "questions and answers" this article explains the difference between pH and alkalinity and discusses the potential problems and corrective actions a grower can take to manage these aspects of water quality.

What's the difference between pH and alkalinity?

pH and alkalinity are two important factors in determining the suitability of water for irrigating plants. *pH is a measure of the concentration of hydrogen ions (H^+) in water or other liquids.* In general, water for irrigation should have a pH between 5.0 and 7.0. Water with pH below 7.0 is termed "acidic" and water with pH above 7.0 is termed "basic"; pH 7.0 is "neutral".

Alkalinity is a measure of the water's ability to neutralize acidity. An alkalinity test measures the level of bicarbonates, carbonates, and hydroxides in water and test results are generally expressed as "ppm of calcium carbonate ($CaCO_3$)". The desirable range for irrigation water is 0 to 100 ppm $CaCO_3$. Levels between 30 and 60 ppm $CaCO_3$ are considered optimum for most plants.

Is a water test for pH alone enough?

Some growers perform their own water pH tests using various types of meters available from greenhouse supply companies. *A pH test by itself is useful but it is not an indication of alkalinity.* Irrigation water tests should always include **both** pH and alkalinity tests. Water with high *alkalinity* (i.e., high levels of bicarbonates or carbonates) always has a pH value 7 or above, but water with high *pH* doesn't necessarily have high alkalinity.

In Massachusetts it's quite common for irrigation water to have a high pH (7-8) and low alkalinity (less than 100 ppm $CaCO_3$), however in a few cases, especially in Berkshire county, both pH and alkalinity may be high. What management steps to take depend on which type of water you have and what crops you are growing.

My water test says that I have high pH and low alkalinity, what should I do?

Water with high pH (7-8) and low alkalinity (less than 100 ppm $CaCO_3$) has three potential effects and required actions. One potential effect is no effect! Most plants grown in the greenhouse today can be irrigated with this water with no adverse effects on growth or quality. The only required action would be to test the water several times a year to make sure there are no large or sudden changes in pH or alkalinity.

A second effect might be the appearance of chlorosis on plug seedlings or liners of some species like annual vinca, petunia, or calibrachoa which prefer low growing medium pH. The mix in the very small cell volumes is poorly buffered to pH change and pH may increase with the high pH water. Normally this problem can be solved by using a fertilizer like 20-10-20 or other acidic fertilizer that is about 50% nitrate-nitrogen. If a large part of your business is growing plugs and liners for sale to other growers you might consider water acidification if chlorosis has been a regular occurrence on some species. Only the species showing chlorosis should be irrigated with acidified water.

A third effect might be deficiencies of calcium (Ca) and/or magnesium (Mg). Water with high alkalinity can be an important source of these two elements, so if your water tests "low" for alkalinity, as in this example, you also need to check the Ca and Mg levels. If Ca and Mg are low, the corrective action would be to fertilize with a "Cal-Mag" fertilizer. The best example of a sensitive crop would be poinsettia which develops edge burn on the bracts or interveinal chlorosis on the leaves if Ca or Mg, respectively, are deficient.

My water test says that I have high pH and high alkalinity, what should I do?

High pH and high alkalinity (well above 100 ppm $CaCO_3$, say 150 or more) has the greatest effect on species that require low growing medium pH and are prone to iron chlorosis. Important greenhouse crops sharing these two characteristics include petunia, calibrachoa, scaveola, bacopa, and snapdragon. Irrigating with high alkalinity water tends to increase growing medium pH because of the Aliming effect≅ caused by the carbonates and bicarbonates (sources of alkalinity) in the water. Corrective actions are meant to lower growing medium pH by using acidic fertilizers, avoiding overliming, and in some cases by water acidification. Also, application of an iron chelate fertilizer solution to prevent or correct iron chlorosis is a very effective action.

The key is to remember that these corrective actions are meant for the very small group of species listed above. No action would be needed for most greenhouse crops because they are not susceptible to iron chlorosis. In fact, irrigating with this water might help prevent iron and manganese toxicity on marigolds and geraniums and provide supplemental Ca and Mg to crops with a special need for these elements.

I think I need to acidify my water to improve the quality of my plants. Is water acidification a good idea?

Water acidification is a very effective means of preventing iron chlorosis on plug seedlings and liners and petunia, calibrachoa, scaveola, bacopa, and snapdragon. It is not a good a good idea to water all crops with acidified water. Acid water should not be applied to crops on which iron chlorosis is rare, especially marigold and geranium which are injured by too much iron and manganese when growing medium pH is low. So if you produce crops in large numbers which are prone to iron chlorosis, water acidification is worth considering especially if your water consistently tests "high" for **both** pH and alkalinity. See the references section for some good Ahow-to≅ fact sheets on water acidification.

The insecticide I'm currently using is not doing a good job of controlling the target insects. I've heard that water pH is a critical factor in the effectiveness of some greenhouse chemicals, is this true?

Water pH is a critical factor in the effectiveness a number of common greenhouse chemicals including Azatin, Avid, Cleary's 3336, A-Rest, Florel/Pistill, and others. Of course, poor performance of greenhouse chemicals might also be explained by pest resistance, application method, rate, or development stage of the pest (pesticides) or the plant (PGRs). You can find an article on the subject of pH and greenhouse chemicals on the UMass Extension Floriculture website (see reference section).

References

UMass Extension Floriculture. Adjusting alkalinity with acids. www.umass.edu/umext/floriculture/fact_sheets/greenhouse_management/adjalkal.html

UMass Extension Floriculture. Effects of pH on pesticides and growth regulators. www.umass.edu/umext/floriculture/fact_sheets/greenhouse_management/ph_pesticides.htm

North Carolina State University. Alkalinity control for irrigation water used in nurseries and greenhouses. www.ces.ncsu.edu/depts/hort/hil/hil-558.html

Get Growing Media Storage Savvy[z]

Growing mixes can morph when they are stored, but these changes can be manageable if growers know what to expect.

Growers who use commercial mixes prefer fresh materials, straight from the mixer, if possible. But this isn't always realistic, because the mix is usually stored before it is used. Some buy truckloads of mix and use it for several months - sometimes as long as 1 year. Mix that is shipped to a distributor's warehouse might sit for several months before a customer receives it. Baled growing mixes can be 1 year old before a customer ever gets them. Growers need to be aware that some properties of the mix change during storage.

Storage will affect starting point pH

The pH of mix tested right from the bag will not necessarily be the same 3 or 4 days after planting and watering in. The mix can test low in pH, sometimes as low as 4.5. This is most often seen in dry or freshly made mixes.

There is not enough moisture in these mixes to dissolve the lime and trigger the rapid pH increase that occurs after watering in. The drier the mix, the slower the pH rises during storage.

When testing the pH of unused mix, moisten the mix three times with tap water over the course of 2 to 3 days before testing. This results in a better indication of starting point pH.

Storage will affect soluble salts (EC)

The EC, or electrical conductivity, of a mix changes during storage. Most commercial mixes contain a starter fertilizer charge that provides nitrogen, phosphorus, potassium, and trace elements. These and other components contribute to the EC value of freshly manufactured mix.

Commercially prepared growing mixes are not sterilized and have a large popula1ion of nonpathogenic microorganisms. When a freshly made mix is stored, the population of microorganisms begins to slowly consume the nitrogen in the mix. As a result, a mix with an EC of 2.0 mmhos/cm at the manufacture date may test 1.0 mmhos/cm after 4 months in storage. This is particularly true with bark mixes, even when thoroughly composted bark is used.

Growers who rely on starter fertilizer for initial fertility might notice growth differences when part of a crop is planted in the last of an old batch of mix and the rest in freshly made material. In this situation, many mix manufacturers would recommend watering in with a dilute liquid fertilizer for balance.

Mixes that contain a controlled release fertilizer (CRF) increase in EC during storage. Not much moisture is needed to start softening or cause noticeable swel6ng of CRF prils. Most commercial bagged or bulk mixes contain 40-50% moisture, and even seemingly dry mix can have enough moisture to start the release process. To be safe, always check the soluble salt level of mix containing CRF before using it.

Storage will affect wettability

Although they are packaged in plastic bags, mixes dry out during storage. Depending on the circumstance and the product, dry mix can be hard to wet. This can be more of a problem with baled than bagged mixes, because bales are often manufactured dryer and stored longer. Prefilled pots and flats also can rapidly dry out.

With bulk mixes, the pile's surface will dry out while the interior stays moist. Using this mix, some containers will be dry, and there may be pot-to-pot wetting differences. If the mix seems unusually dry, fill a few containers and then water to test for wetting problems.

Storage will foster algae and mold growth

Occasionally, when a bag or bale of mix is opened, a greenish growth can be seen on the mix surface and the inside of the bag. This is simply the growth of harmless algae.

Less often, a brownish, yellowish, or reddish mold can be seen. This is the growth of saprophytic fungi. On occasion, one of these molds will continue to grow on the mix surface after potting. While this might be unsightly, the mold grows for about 10 days and then gradually disappears.

For growers who use commercial mixes, knowing how storage will affect them is vital to producing healthy, marketable plants. The key management tools are testing pH and soluble salt levels, knowing how to identify harmless and harmful algae and molds, and observing how storage affects the mix's water-holding capabilities.

Take control of your crop

Here's what you can do to ensure crop consistency

- Before changing growing mix, test the new product to determine if it's suitable.
- Handling mixes with potting machines, flat fillers, or other systems can alter aeration and water retention. Avoid excessive handling, which causes a grinding effect.
- Control weeds by storing bagged mix inside and always scouting crops.
- Figure usage needs in number of bags or cubic yards to do the job.

Jumpstart your storage smarts

There are several elements of a commercial mix that can change during storage. Get familiar with them before they surprise you. Long storage time means the mix will have a greater chance of drying out. When the mix is dried out, it will be more difficult to wet.

Storing bulk mix requires greater protection than packaged product to prevent contamination from weed seeds, insects, and diseases. Packaged mix should be stored on pallets off the ground. There should be good air circulation around the product on pallets.

Product stored in direct sun can develop a slime mold in the area between the mix and the bag where condensate forms. Mostly, the molds are harmless and will disappear within a couple weeks after planting.

Storage can cause chemical changes, such as a pH increase along with a decrease in soluble salt and nitrogen levels. Test any product that has been stored for 6 months or longer to determine what changes have occurred and compensate for any change.

Managing Media

Check out these tips on how to use commercially prepared media.

- Water in newly planted crops with an appropriate fertilizer.
- Do not buy mix too far in advance.
- Test the pH and EC of each batch before use. Follow up with a professional lab test after 2 weeks.
- Monitor pH and EC regularly. Conduct appropriate tests through a professional lab.

[z] Article reprinted from *Preparing for the Season,* a publication of Conrad Fafard, Inc., Agawam, MA.

Forcing Hydrangeas

Allow newly arrived pre-finished plants to recover from shipping stress and to initiate active root growth (about 1-2 weeks) prior to transplanting into the final-sized pot. Hydrangea blooms are formed on the previous year's growth, so the flowers are already in place in the dormant buds. The ideal starting temperature for hydrangeas is a 60 to 62°F soil temperature supplied with bottom heat, while maintaining slightly cooler air temperatures (about 58°F). This allows root activity prior to bud opening on the shoots. Grow plants slightly on the "dry side" prior to transplanting to prevent root rot and to encourage root development. Avoid fertilizing until root activity has occurred.

One of the main problems with hydrangeas is poor root establishment which leads to water stress during late stages of forcing. To prevent this, several sources recommend slitting the root ball to form an X, when transplanting, opening the sections and placing in direct contact with the growing media in the pot.

To ensure clear pink or blue inflorescences, order cultivars programmed for the desired color and continue the color program throughout forcing. Fertilization practices during the previous summer growth phase influences coloration during forcing, and changing the color program during the forcing phase can result in shades of mauve tones.

Whether a hydrangea (excluding white cultivars) develops a pink or blue inflorescence is dependent on the presence and availability of aluminum. The absence of aluminum assures pink flowers; high availability of aluminum leads to blue flowers. By regulating aluminum, flower color can be controlled.

Pink Flowers. Avoid supplying aluminum to plants and use fertilizers that do not contain aluminum. Use relatively high levels of phosphorus in the fertilizer program. Phosphorus antagonizes aluminum uptake and helps assure pink flowers. Rotating mono-ammonium phosphate (11-53-00) into the feed program will help raise phosphorus levels and help prevent aluminum uptake. An example feed program would be continuous feeding using 150 ppm nitrogen from 20-10-20 (10 oz/100 gal) rotated with 100 ppm nitrogen from 11-53-00 (18 oz/100 gal) every third feeding.

Try to maintain a substrate solution pH of 6.0 to 6.2; aluminum becomes more available at lower pHs. Be careful not to allow the pH to rise much above 6.4, or iron deficiency chlorosis will become a problem. Supply low to moderate levels of potassium. High levels of potassium tend to increase bluing of hydrangeas.

Blue Flowers. Although dormant plants purchased as blues will have received aluminum sulfate prior to shipment, aluminum must also be supplied during the forcing period. Start drenching with aluminum sulfate immediately after transplanting. Apply 8 fl oz of drench per 6 inch pot using 10 lb aluminum sulfate per 100 gallons of water. **Drenches should be applied to moist substrates only as drenching dry soil will result in damaged roots.** Make applications at 10 to 14 day intervals. About 10 days after each application, measure the pH of the substrate. If the pH is higher than 5.6, another application of aluminum sulfate should be made. Continue this procedure throughout forcing. The aluminum sulfate not only supplies aluminum, it also maintains a low (5.2 to 5.5) pH in the substrate solution, desirable during forcing of blue hydrangeas. Use a phosphorus-free substrate for transplanting and use a fertilizer lacking phosphorus. Apply high levels of potassium for increased bluing. For example, apply 150 -200 ppm 21-0-0 nitrogen and 300 - 350 ppm 13-0-44 potassium at each irrigation.

For more information

Commercial Hydrangea Forcing by Douglas A. Bailey, North Carolina State University.

FloriCAST (short video) on fertilizing florist hydrangeas by Kimberly Williams, Kansas State University

Tina Smith, University of Massachusetts, February 2009.