Maintaining the Blue in Blue Hydrangea

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(slightly revised for southeastern Wisconsin gardeners
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The popularity of growing hydrangeas in northern climates has increased dramatically with the recent release of the winter hardy zone 4 cultivar 'Endless Summer'. Like most hydrangeas, the flower color is blue when soil conditions are acid and then converts to pink when soil conditions become slightly acid to alkaline. During this conversion the plant may have flowers of various shades of blue and pink.

The blue and pink color of hydrangea flower sepals is due to an anthocyanin (a plant pigment) called delphinidin 3-monoglucoside. In the presence of aluminum, a blue color will form due to the aluminum binding with the anthocyanin. The reason for the blue color under acid conditions is due in part to an increase in availability and uptake of aluminum from the soil. As soil pH decreases (becomes more acid), availability of aluminum increases. Conversely, as soil pH increases (becomes more alkaline) the availability of aluminum decreases. Ideally, the pH of your soil should be around 5.0 to ensure that adequate aluminum is available for blue flower color development in hydrangeas. Of interest is that aluminum is not considered to be an essential element for plant growth. In fact, for most plants, high levels of available soil aluminum are toxic causing stunting of root growth and eventual death if soil aluminum is high enough. Usually the soil pH has to be less than 4.5 for this to happen.

Gardeners in eastern U.S. have a difficult time maintaining pink flowers because their native soils tend to be acid and contain sufficient levels of available aluminum to maintain a blue flower color in hydrangea. In contrast, soils in the upper Midwest (including the Milwaukee area) tend to be more alkaline, making it difficult to maintain blue flowers. For soils that are highly calcareous (pH 7.8 and higher), it may not only be a problem to maintain blue flowers, but the plant itself may exhibit yellow leaves due to iron deficiency. In those cases, growing hydrangeas in raised beds with a more acid soil mix may be the only solution.

Hydrangeas sold in pots at garden centers are usually grown in artificial potting media. For blue flower color, the medium is maintained in the acid range by using sphagnum peat moss and various acidifying amendments as discussed below. When the plants are transplanted into high pH soils, the pH in the root zone will eventually increase and flower color will turn pink unless steps are taken to maintain acid soil conditions. The following procedures are suggested for maintaining the blue flower color in hydrangeas:

Before planting:

1) Have your soil tested for initial pH level. This can be done by sending your sample to the University of Wisconsin Soil & Plant Analysis Lab (see: http://uwlab.soils.wisc.edu for more information).
2) If your soil is loamy and the pH is greater than 5.5, incorporate elemental sulfur into the top 6 to 8 inches of soil using approximately ½ cup per 10 square feet or per plant (for clay soils add 1 cup per plant). After mixing in the elemental sulfur, mix in 1 to 2 cubic feet of sphagnum peat moss per plant.

After planting and for established plants:

1) Periodically retest your soil pH. Do not add any acidifying amendments if your soil pH is 5.0 or less.
2) To maintain good vegetative growth and acid soil conditions, use ammonium sulfate as the nitrogen source at the rate of 1 lb (or 2 cups) per 100 square feet (or a little less than a ¼ cup per 10 square feet). Ammonium sulfate is the best nitrogen source to help maintain soil acidity.
3) If your soil pH is greater than 5.5, use aluminum sulfate to help lower your pH and supply available aluminum at the same time. Note that aluminum sulfate is generally not recommended for lowering soil pH because high rates can injure most plants. Hydrangeas are the exception. Mix about 1 lb (2 cups) of aluminum sulfate per 5 gallons of water and then apply the solution around the drip line of the plant. Apply enough of the solution per plant to just saturate the soil. Repeat the application on a monthly basis as long as your soil pH is greater than 5.0. Caution - over application of aluminum sulfate can be toxic even to hydrangea. Monitor your soil pH periodically and only apply aluminum sulfate if your pH is greater than 5.0. Non-acid loving plants growing in the vicinity of hydrangeas may not grow well if the soil pH drops too low. It is recommended that you leave a 2-3 ft buffer zone between your hydrangeas and plants that prefer higher pH conditions or place other acid loving plants such as azaleas, rhododendrons, and blueberries next to the hydrangeas.