Evaluating hydrangea performance©

M. Condon[a]

Heritage Museums & Gardens, 67 Grove Street Sandwich, Massachusetts 02563, USA.

HERITAGE MUSEUMS AND GARDENS—A QUICK HISTORY

Heritage is located in Sandwich, Massachusetts, the first significant town on Cape Cod at the northern end of the Cape Cod Canal where it joins Cape Cod Bay. Sandwich was an important seaport and shipbuilding site in the seventeenth and eighteenth centuries. Farming was well practiced too and the present bounds of Heritage were originally contained within Shawme Farm which Charles Dexter purchased in 1921.

Dexter was a successful textile manufacturer in New Bedford, Massachusetts and was active in civic affairs, photography, the violin, and was also a keen yachtsman. He initially just spent summers at the Farm where he first began hybridizing vegetables. Later, he expanded his activity to rhododendrons and kalmias. The rhododendron collection at Heritage is substantial; the kalmias make up a more modest group. Over the 20 plus years Dexter resided there, the farm was converted to a country estate. He remained an active hybridizer until near his death in 1943.

The Lilly family of the Eli Lilly Company succeeded Dexter. They were profound collectors and the expansive garden site was perfect for the establishment of museums to house their significant collections. The Lilly's were dedicated to creating buildings and facilities that were replicas of significant originals in American design. The extraordinary Looff Carousel was purchased in 1971 and integrated into a building complex containing rare American art. The substantial Lilly Antique Auto Collection contains only American-made automobiles and is housed in a superb replica of the Round Barn from the Shakers of Hancock Village in Pittsfield, Massachusetts.

Today, Heritage Museums & Gardens serves more than 130,000 visitors annually.

THE NORTH AMERICAN HYDRANGEA TEST GARDEN

The Test Garden got its start at the hydrangeas 2015 Conference that was held at Heritage in July of last year. This was the first major all hydrangea event in the USA since 2005 and featured a strong technical program with supportive participants and attendees, and it took place in a very favorable cultural location for hydrangeas. All positives! The idea of creating a "Test Garden" was conceived and initiated by Dr. Mike Dirr. The idea fell on very fertile soil too as Heritage was already committed to expanding their hydrangea presence.

So let's fast forward to July 2016. Great ideas move quickly and Heritage Museums & Gardens is now home to a national hydrangea test garden where new hybrid cultivars of hydrangeas will be planted, grown, and studied by professional growing experts from across the country. Phase 1 of this 5-year development program was completed early in July. This initial project phase was extensive in content and totally supports the Heritage goal of the North American Hydrangea Test Garden becoming the most comprehensive collection of the genus in the United States. The Test Garden was dedicated and opened on 12 July 2016.

Designed by Horticulture Director Les Lutz, the Test Garden covers a very favorable planting site in terms of topography and sun/shade conditions. Significant hardscape has already been included—a major water feature (Figure 1), and stone steps and shell walkways that allow visitors to stroll among an unprecedented range of hydrangeas and complimentary perennials. Strategically located across the main road from The Cape Cod Hydrangea Society's existing All Hydrangea Display Garden, the total hydrangea area showcases the depth and breadth of these iconic plants for Heritage visitors.

[a]E-mail: mcondon@heritagemuseums.org

Figure 1. Major water feature in garden.

Plant-wise, the Test Garden will predominantly contain the newest hydrangea releases introduced to the retail market each year. Additionally, several significant "old standards" will be included to provide direct and immediate performance comparisons. And, unlike the more widely spaced, hydrangeas-only planting format of the Display Garden, perennials have been incorporated into the total Test Garden layout to simulate a more conventional home landscape planting arrangement. This approach was chosen to offer home gardeners examples of which plants might pair well together.

Operationally, Heritage horticultural staff will monitor many hydrangea plant performance criteria and gauge how these cultivars perform in coastal New England, one of our country's major markets for hydrangeas. Documentation will be an important function—photographing, collecting data, and reporting this information in a concise fashion that will assist participating hybridizers and growers in their analysis of significant attributes necessary to perfect new hydrangea cultivars.

The Test Garden continues Heritage's collaboration with the Cape Cod Hydrangea Society. Begun in 2008 with a modest initial planting of the species *Hydrangea macrophylla*, this Display Garden now boasts 8 species and more than 160 cultivars. The older, long established hydrangea cultivars dominate this collection and will surely stimulate some interesting comparative assessments.

The North American Hydrangea Test Garden initiative is being led by Dr. Michael Dirr, horticulture professor emeritus at the University of Georgia and author of over 300 scientific and popular publications. Additional on-site direction and support comes from Heritage's Curator of Hydrangeas, Mal Condon, and Director of Horticulture, Les Lutz.

Test Garden partners include leading professional growers; Bailey Nurseries (creators of the Endless Summer® Series of hydrangeas), Star Roses & Plants (Ball Hort), renowned plant expert Dr. Dirr and his wife Bonnie, The Cape Cod Hydrangea Society, and the American Hydrangea Society (Figure 2).

Figure 2. Test garden partners.

Figure 3 shows the 2016 through 2018 design and planting plan for the total Test Garden. The planting areas combine interesting topographical planes with good mixes of sun and shade conditions, thus enabling more complex evaluation assessments.

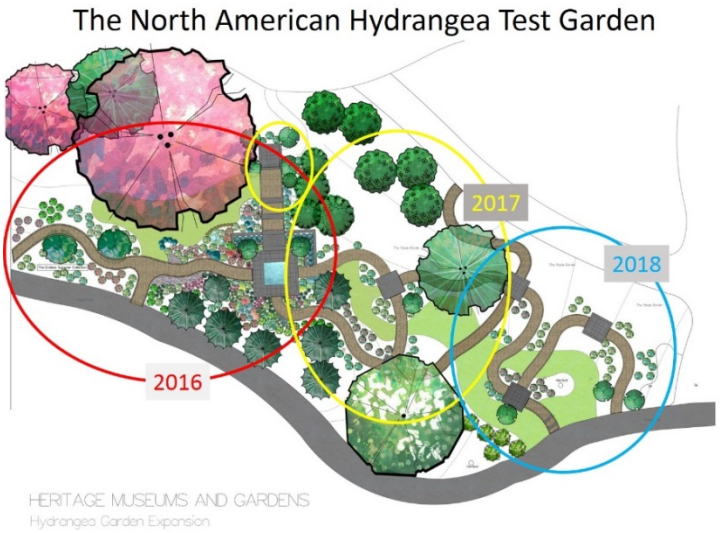

Figure 3. The Test Garden development plan, 2016, 2017, 2018.

PLANT PERFORMANCE EVALUATION, *BIGLEAF HYDRANGEAS*

Why will *H. macrophylla* be the major species of study? They are by far the most significant commercial species with their great bloom forms, color, character, and likeability. But, they're the least cold hardy of the six species commercially offered in the country. And, they are especially popular here on Cape Cod with our typically moderate maritime coastal climate. Cold hardiness is normally Zone 7 and our Heat Zone Index is just 1—totally reflective of our cool summertime temperatures.

But the last three winters have been quite different and we've had unhappy summers without *H. macrophylla* blooms. Let's examine this past winter of 2016. Overall weather temperatures were much milder than the previous 2 years. December through early February was unseasonably mild with average daily temps often being well above freezing. But suddenly, from February 12th through 15th, the first of our two significant freeze events occurred. That bitter cold blast during that short 4-day period effectively "flash-froze" all above ground *H. macrophylla* tissue. Note the low readings on the graph below—minus 7 on the 14th and minus 4 on the 15th (Figures 4 and 5).

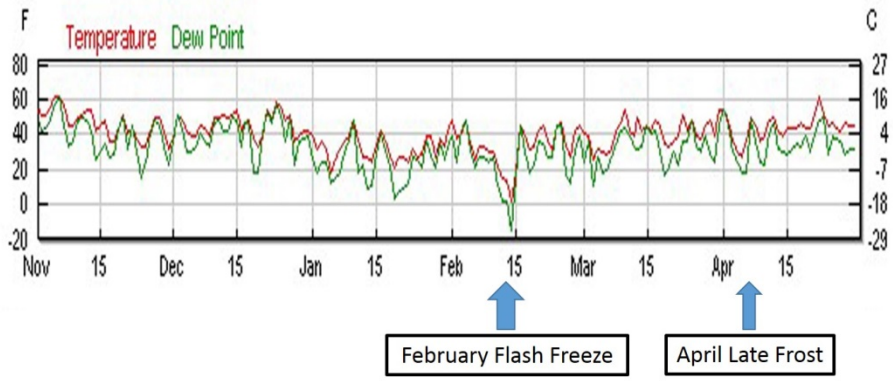

Figure 4. Temperature and dew point graph from November through April.

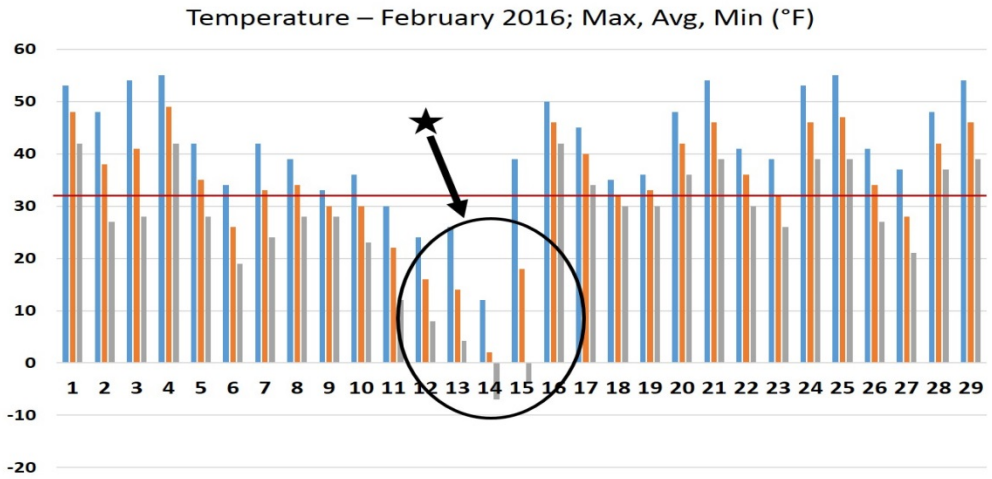

Figure 5. Temperature readings for February showing the minimum, average, and maximum.

Mild temps returned after the 15th and continued until April 5th and 6th when sub-freezing temps (mid 20's in most Cape locations) frosted the emerging new basal growth from the plants. Note in the photos below that new growth had redeveloped by mid-May but stem bud survival was very minimal (Figure 6).

Figure 6. New growth redeveloping by mid-May after April 5th and 6th sub-freezing temps frosted the emerging new basal growth. Endless Summer® hydranges shown are: top left, 'The Original'; top right, 'Blushing Bride; bottom left, Twist-n-Shout®; bottom right, BloomStruck®.

Although these photos show a very disappointing mid-spring growth condition, these cultivars did expand favorably as shown in the following photos taken just a couple of weeks later (Figure 7).

Figure 7. New growth 2 weeks after the results shown in Figure 6. Endless Summer® hydranges shown are: top left, BloomStruck®; bottom left, Twist-n-Shout®; bottom right, Twist-n-Shout®; top right, Lady in Red a non-Endless Summer® hydrangea.

Best "home garden" solutions for poor *Hydrangea macrophylla* blooming

Select the repeat blooming (remontant) cultivars—like the Endless Summer Series. Some of the older varieties exhibit good re-blooming capability too and are definitely worth considering—like 'Penny Mac', Lady in Red, 'Decatur Blue', and 'Nikko Blue'. Note the new late developing blooms on the 'Penny Mac' below (Figure 8). This photo was taken on 20 September. Although it is unlikely these late inflorescences will develop fully before a killing frost (typically around Thanksgiving on the Cape), it does illustrate the cultivar's propensity for reblooming.

Figure 8. New late developing blooms on *Hydrangea macrophylla* 'Penny Mac'.

You can also grow your most loved *H. macrophylla* in pots. Come late fall—after a killing frost—it's easy then to move them to an unheated location out of the weather for the winter. And you can plant additional *Hydrangea species including paniculata, arborescens, serrata,* and *quercifolia* also. I noticed a lot more cultivars of these species in Cape Cod gardens this summer.

PLANT PERFORMANCE EVALUATION, BIGLEAF HYDRANGEAS

The test garden plantings feature a mix of hydrangeas interspersed with perennials, a plan such as one might pursue in their own home garden. These new *H. macrophylla* introductions will be evaluated on several parameters: winter and bud hardiness, bloom count and quality, reblooming capability, sun tolerance, disease and pest attack, and general growth characteristics.

Winter and bud hardiness

Cold and wind are equal threats to bud survival. The desiccating effect of the often very dry winter winds can easily kill *H. macrophylla* buds. Exposed tip buds typically fail in the adversely cold and windy conditions so common to our winters in the Northeast. Stem bud survival is generally much better and those cultivars that bloom well off their lower lateral branches survive quite well with good blooming come the following summer. While *H. macrophylla* plants and buds prefer a mild, narrow temperature range, they can handle consistent cold, but not sudden or fluctuating cold as we experienced this past February.

Bloom count and quality

Normal Cape Cod summer weather allows plants to be grown in more direct sun. Plants are somewhat reduced in size (less internode stretching) and flower-bud count increases resulting in higher bloom count. On the downside, the increased sun does tend to burn the blooms, particularly the paler colors. Bloom "firmness" is a desirable quality aspect. Some newer cultivars, originally developed for cut flower production, offer almost "rigid" blooms capable of lasting many days in a vase. Several of these cultivars have been introduced into landscape plant production, i.e., the "Everlasting" series of *H. macrophylla* cultivars (Figure 9). The challenge with these plants is their cold hardiness; are they capable of blooming reliably following winters colder than zone 7.

Figure 9. *Hydrangea macrophylla* 'Hokomathyst', Everlasting® Amethyst hydrangea.

Reblooming capability

This is totally about how well and how quickly a plant develops new flower buds. Endless Summer® Twist-n-Shout® hydrangea is a very strong rebloomer, perhaps the best we've observed to date. Endless Summer® 'The Original' generally does well too. Other newer introductions, advertised as "rebloomers," have shown mixed results to date. In our most critical "test," all stem tips are pinched in July to evaluate the number of new

inflorescences that develop by late August and into September (Figure 10). It is a very true test of reblooming. Some older cultivars are good rebloomers as well and this fact has been known for some time.

Figure 10. This picture shows rebloom developing in September on 'Twist N Shout'.

Sun tolerance

Plants having medium green, matte finish leaves commonly wilt in the afternoon sun. This group of *H. macrophyllas* includes 'Nikko Blue', 'Penny Mac', Endless Summer® 'The Original'. As we have previously noted, these are the same cultivars that possess the best reblooming characteristics. Watering does not cure the wilting problem; once the sun passes and the plants are in shade, wilting subsides fairly quickly. Siteing these cultivars in an afternoon shade location is much preferred. *Hydrangea macrophylla* plants having shiny dark green foliage —and dark bloom pigment—tolerate the same sun conditions much better. Shown in Figure 11 is 'L.A. Dreamin', a recent introduction offered by Star Roses & Plants that possesses these attributes. Other *H. macrophylla* cultivars showing good sun tolerance are 'Mathilda Gutges', 'Masja', 'Alpenglühen', and 'Merritt's Supreme'—all old time cultivars that do not rebloom—seems like a great breeding opportunity might be waiting with crosses of these old-timers with the newer rebloomers.

Figure 11. *Hydrangea macrophylla* 'L.A. Dreamin'.

Disease and pest attacks

Leaf spotting, mainly *Cercospera*, but also anthracnose, does develop under our cooler and sometime wetter weather conditions. Overhead watering worsens these conditions and

surface irrigation will be installed throughout the Test Garden in 2017. Spotting in general is cultivar specific also.

Powdery mildew is a lesser aliment in our climate but does develop later in the summer—August, early September. It also shows strong correlation with certain cultivars.

The leaf tier moth is a more recent pest found amongst the Heritage hydrangea plantings. This clever little beast glues the first set of leaves below a flower bud up and over the bud to enjoy his dining in complete privacy. We have observed this mostly on our *H. arborescens* but have also seen it to a minor extent on a few *H. macrophylla* cultivars as well.

Spider mites have become more of a problem on our *H. macrophylla plants* over the last several years owing to our warmer and dryer summers. The uppermost stem tips are sucked dry and in the most severe cases, become embrittled, easily crumbling in pieces. August is the peak attack month and again we see some cultivar sensitivity, particularly on the fleshier, shiny leaved cultivars.

General growth characteristics

Ultimate plant maturity—plant size—may take more growth seasons than were trialed initially by the breeders/developers. And plant size is important especially in current times as gardens are getting smaller and size does matter.

Stem count in a mature plant can be quite variable; modest stem density can make for a loose "open" plant. Dense stem development may appear favorable but often creates expansive basal crown growth, making for more difficult pruning, and poorer total plant form. Pruning is a true best practice for virtually all hydrangea species and *H. macrophylla* can definitely prosper from correct application of this task.

TRACKING OUR PROGRESS

Check the Heritage website www.heritagemuseumsandgardens.org for timely reports on our evaluations of the Test Garden hydrangeas. And if your travels bring you near Cape Cod, by all means do come and visit and see for yourself.