Mt. Cuba Center

GARDENING ON A HIGHER LEVEL

RESEARCH REPORT

Wild Hydrangea

FOR THE MID-ATLANTIC REGION

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HYDRANGEAS HAVE A LONG TRADITION OF HORTICULTURAL USE and are a familiar sight in gardens throughout the United States, evoking images of summer weddings and trips to the New England coast. Many popular hydrangeas originate from Asia, but several species call the eastern United States home. Mt. Cuba Center's native hydrangea trial evaluated *Hydrangea arborescens* and its relatives *Hydrangea cinerea* and *Hydrangea radiata*. These three species bloom on new wood, which means that flower buds are produced when the plants are actively growing in the spring and early summer. As a result, they can be pruned from fall to early spring or even killed to the ground in extreme cold, and flowers will still be reliably produced in June and July. In contrast, hydrangeas that bloom on old wood, such as the non-native *Hydrangea macrophylla*, produce flower buds in late summer and fall that overwinter on the plant. Untimely pruning or a cold snap in spring can remove or kill the flower buds on this group of hydrangeas, resulting in a poor floral display.

The inflorescences of *Hydrangea arborescens* and its close allies fall into two categories: lacecaps and mopheads. Lacecap inflorescences are the predominant flower form in wild *H. arborescens* and contain hundreds of fertile flowers which are usually surrounded by a ring of showy sterile flowers. Mopheads, on the other hand, contain masses of sterile flowers in large, often dome-shaped flower heads with relatively few fertile flowers hidden within. The combined effect of the sterile flowers results in a spectacular ornamental display which contributes to the popularity of mophead hydrangeas in gardens. Most hydrangeas in this trial bloom for just a few weeks in early summer, but the flower heads remain attractive through late summer and fall and add ornamental interest to winter landscapes. *H. arborescens* flowers are primarily white with several pink blooming cultivars that have been released in recent years. Unlike the color-changing inflorescences of non-native *H. macrophylla* and *H. serrata*, the flower color of the native species does not change depending on the acidity, or pH, of the soil in which they are grown.

The commercialization of *Hydrangea arborescens* began in the early 20th century with the discovery of two distinct plants that exhibited a mophead floral mutation. The first of these to make its debut on the horticultural stage was distributed by Burpee® as *H. arborescens* 'Hills of Snow'. Now known as *H. arborescens* 'Grandiflora', this was the most popular cultivar for several decades. The second plant was found around the same time but was initially passed over by the nursery industry. In the 1960s, this plant's garden potential was recognized by Dr. Joseph McDaniel, a University of Illinois professor. McDaniel introduced the plant and named it *H. arborescens* 'Annabelle' in a nod to the town of Anna, Illinois where this plant had been informally shared amongst gardeners for half a century. *H. arborescens* 'Grandiflora' and *H. arborescens* 'Annabelle' are still commonly found in gardens today. However, both cultivars have earned a reputation for weak stems and floppy habits due to the large size and increased weight of their mophead inflorescences.

While early cultivars such as *Hydrangea arborescens* 'Grandiflora' and *H. arborescens* 'Annabelle' were simple selections of unique naturally occurring plants, many newer cultivars are the result of selective breeding aimed at producing plants with desirable garden traits such as compact habits, sturdy stems, and new flower forms and colors. Thanks to these ornamental breakthroughs, the variety of *H. arborescens* cultivars continues to grow and enables use in more horticultural niches. However, the introduction of hydrangea cultivars selected or bred for ornamental purposes raises questions about their ability to support pollinators and other wildlife. Mt. Cuba Center's trial aimed to answer this question by studying pollinator visits. We also evaluated maintenance strategies and the impact of cultivating hydrangeas in sun and shade.

Lacecap inflorescence of *Hydrangea arborescens* 'Haas' Halo'

Fertile flowers of *Hydrangea arborescens* 'Haas' Halo'

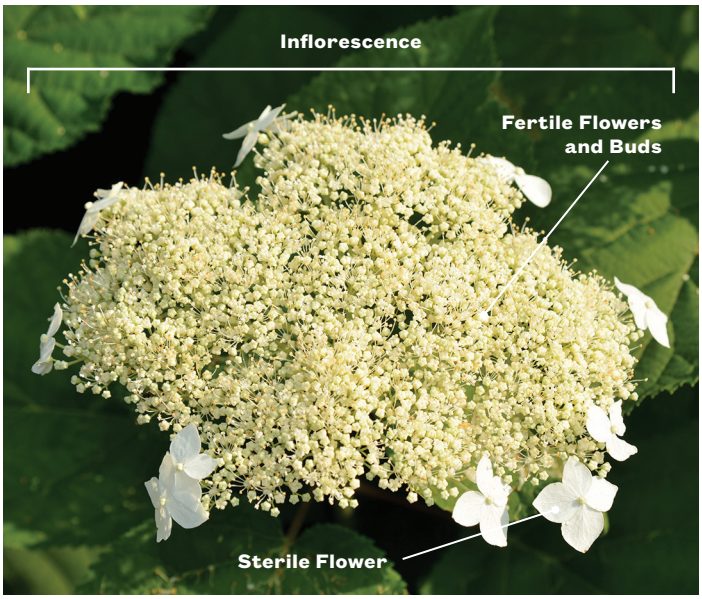
Hydrangea arborescens inflorescences are categorized botanically as corymbs, forming relatively flat to dome-shaped flower heads that contain hundreds of individual flowers, some fertile and some sterile. Wild hydrangeas ordinarily produce lacecap flowers, although hydrangeas with mophead inflorescences, such as *H. arborescens* 'Annabelle', are occasionally found in the wild. Lacecap and mophead flower forms are also found in non-native species of hydrangea. Information on other hydrangea species and their identification can be found on page 7.

Lacecap inflorescence of *Hydrangea arborescens* 'Eco Pink Puff'

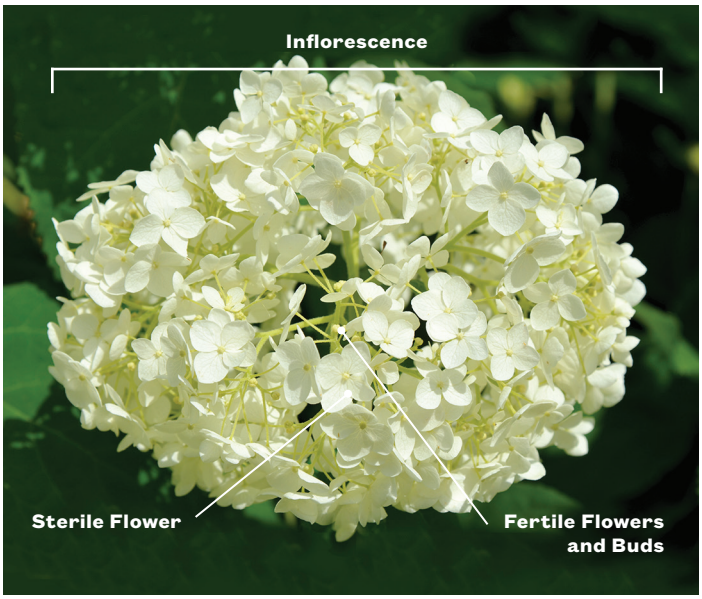
Lacecap inflorescence of *Hydrangea arborescens* 'Mary Nell'

Nearly half of the hydrangeas in this trial are lacecaps. Lacecap hydrangeas produce large numbers of fertile flowers, often between 800 and 900 per inflorescence, with some cultivars nearing almost 2,000 fertile flowers per inflorescence. Sterile flowers are produced in much smaller quantities and are located around the perimeter of the flower head. Only one hydrangea in the trial, *H. arborescens* 'Eco Pink Puff', produced no sterile flowers, and this cultivar had one of the highest counts of fertile flowers of any plant in the evaluation. Cultivars such as *H. arborescens* 'Mary Nell' and *H. arborescens* 'Haas' Halo' are lacecap hydrangeas with exceptionally large inflorescences and more sterile flowers than the average lacecap. Both are considered to be of higher ornamental value than their wild-type counterparts.

DID YOU KNOW? The genus name *Hydrangea* comes from the Greek word for water vessel, a reference to the shape of the seed capsules that form after fertile flowers are pollinated. These capsules ripen in fall and release copious amounts of minute seed. Each capsule is approximately 3mm in length.



Lacecap inflorescence, *Hydrangea arborescens* 'Total Eclipse'



Mophead inflorescence, *Hydrangea arborescens* 'Annabelle'

Many recent *Hydrangea arborescens* introductions are categorized as mopheads. Mophead hydrangeas produce primarily sterile flowers, although fertile flowers are still present in most cases. The fertile flowers of mophead hydrangeas are often obscured by the large quantities of sterile flowers, which makes it difficult to determine when these plants are functionally in bloom. Mopheads have significant ornamental qualities, but pollinator studies have shown that they lack the ability to attract the large numbers of insect pollinators that lacecaps do. See pages 14–16 for more details.

Hydrangea arborescens 'Total Eclipse' in spring

Hydrangea arborescens foliage

Hydrangea arborescens is a large shrub that reaches 7' tall and 7.5' wide over five years. The pith-filled stems, or canes, can be somewhat short-lived but are supplemented by new stems that originate from the crown of the shrub. New stems are linear, with little to no branching, and produce the largest flower heads during their first year of growth. In subsequent growing seasons, the stems become more heavily branched, and inflorescences become smaller and more numerous. The leaves of *H. arborescens* are dark green and thin with few to no hairs present.

HYDRANGEA SPECIES

This trial evaluated three closely related species of hydrangea that are native to the eastern United States: *Hydrangea arborescens*, *Hydrangea cinerea*, and *Hydrangea radiata*. While they differ slightly in habit and appearance, each plant flowers on new wood and produces lacecap inflorescences.

Hydrangea arborescens (wild hydrangea)

Hydrangea arborescens, or wild hydrangea, was the primary species evaluated and is the wild version of most of the cultivars included in this trial. Wild hydrangea has a large native range in the eastern and central United States where it is typically found on shady, moist woodland slopes. *H. arborescens* is the largest of the three species in the trial, reaching 7' tall and 7.5' wide over five years. The species' relatively small lacecap flower heads attracted the second most pollinators of any hydrangea in the trial, far more than the mophead cultivars that have been selected or bred for their large and showy inflorescences.

Hydrangea cinerea (ashy hydrangea)

Hydrangea cinerea, or ashy hydrangea, is closely related to *H. arborescens* and was formerly classified as *H. arborescens* subsp. *discolor*. This species is more compact than *H. arborescens*, reaching a height and width of just over 5' in five years. Additionally, the stems and the backs of the leaves of this species are covered in small hairs that give the plant a grayish cast, inspiring the common name ashy hydrangea. *H. cinerea* is primarily found in the central and southeastern United States. Ashy hydrangea starts to bloom in mid-July, slightly later than many other hydrangeas in the trial, and produces lacecap inflorescences that attract numerous pollinators. This species is rarely encountered in the horticultural trade.

Hydrangea radiata (silver-leaf hydrangea)

Previously known as *Hydrangea arborescens* subsp. *radiata*, *Hydrangea radiata* is readily identified by the bright white undersides of the leaves, hence its common name, silver-leaf hydrangea. *H. radiata* has the smallest native range when compared to the other two species; it is found only in a handful of states in the southern Appalachian Mountains. In this evaluation, *H. radiata* was smaller than *H. arborescens*, reaching a height of 5.5' and a width of 6.5'. While none of the hydrangeas in the trial were drought tolerant, *H. radiata* was the first to show signs of stress in hot or dry conditions. This species is best grown in partial sun to shade. Although *H. radiata* typically forms lacecap flowers, two mophead cultivars, *H. radiata* 'Samantha' and *H. radiata* 'Terry Greer', were included in the trial.

Other *Hydrangea* Species

It is sometimes difficult to distinguish between various species of hydrangeas found in cultivation. Information about bloom time, inflorescence shape, and color for some of the most popular species is included below to help differentiate these common garden plants from the species and cultivars included in Mt. Cuba Center's trial.

- ***Hydrangea macrophylla* (bigleaf hydrangea), *Hydrangea serrata* (mountain hydrangea), and cultivars**
  Native to Asia; blooms on old wood in June–August; white, pink, and blue lacecap or mophead flowers (color pH-dependent); 4–6' tall; 5–8' wide; compact cultivars available.
- ***Hydrangea paniculata* (panicle hydrangea) and cultivars**
  Native to Asia; blooms on new wood in August; white to pink panicles (color not pH-dependent); up to 15' tall and wide; compact cultivars available.
- ***Hydrangea quercifolia* (oakleaf hydrangea) and cultivars**
  Native to southeastern United States; blooms on old wood in June–July; white to pink panicles (color not pH-dependent); up to 10' tall and wide; compact cultivars available.

Hydrangea quercifolia

Hydrangea serrata 'Preziosa'

HYDRANGEA TOP PERFORMERS

Mt. Cuba Center's five-year trial aimed to evaluate the horticultural merit, adaptability, and ecological value of 29 native hydrangea species and cultivars. The evaluation was conducted in full sun, and 19 taxa were also grown in 60 percent shade for comparison. Once established, one example of each hydrangea species and cultivar was cut back to 6" in late March to determine the effects of pruning on habit, bloom time, and flower size. Finally, pollinator visits were studied to determine which hydrangeas have the greatest potential to support pollinators in home landscapes. Many hydrangeas in the trial, particularly those that produce lacecap flowers, attracted numerous pollinators, adding ecological value to their portfolio of desirable features. The following hydrangeas represent the top performers from the five-year evaluation of *Hydrangea arborescens*.

Hydrangea arborescens 'Haas' Halo' ★★★★★

Style meets substance. *Hydrangea arborescens* 'Haas' Halo' is a knockout that offers the perfect combination of horticultural excellence and pollinator value. *H. arborescens* 'Haas' Halo' was a seedling selected by Frederick Ray, plantsman and horticulture professor, from the Pennsylvania garden of Joan Haas. It was chosen for its upright growth and oversized lacecap flower heads. In the trial, plants in full sun displayed flower heads that were consistently among the largest in the entire evaluation. Cutting back in spring magnified the already substantial floral display and reduced the height of the plant from 7' to 4'. *H. arborescens* 'Haas' Halo' also had a nearly flawless performance when grown in shade, where it displayed uniform growth, dark green foliage, and flower heads that remained attractive for months after their midsummer bloom.

Hydrangea 'SMNHALR' (Lime Rickey®) ★★★★½

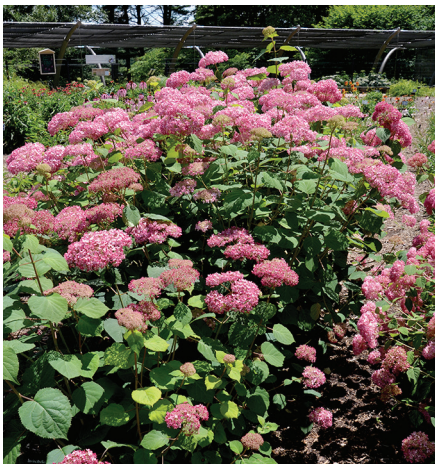
Lime Rickey® hydrangea is a superb introduction from the Proven Winners® breeding program at Spring Meadow Nursery in Grand Haven, Michigan. The result of crossing *Hydrangea radiata* and *Hydrangea arborescens* 'Pink Pincushion', Lime Rickey® is highly ornamental and performed well in both full sun and shade. The most striking feature of this cultivar is the beautiful, ever-changing mophead inflorescences. The plant displays attractive, lime green sterile flowers in early June and raspberry-colored fertile flowers later in the month. The sterile flowers fade to alabaster as they mature and then revert to their former green color. The flower clusters are flatter than some of the billowy forms of other mopheads, such as *H. arborescens* 'Annabelle'. Lime Rickey® was one of the largest plants in the trial, reaching nearly 6' tall and 8' wide. These dimensions were somewhat reduced by cutting the plant back in late March.

Hydrangea arborescens 'NCHA4' (Incrediball® Blush) ★★★★½

Hydrangea arborescens 'NCHA4' is an outstanding result of Dr. Thomas Ranney's cutting-edge plant breeding at North Carolina State University. As with many pink-flowered cultivars, the coloration of the inflorescences is most intense before the fertile flowers bloom. When the flowers mature, the inflorescence takes on lighter shades of rose, but retains some dark coloration on the backs of the sterile flowers. Selected for its compact nature, Incrediball® Blush wild hydrangea formed a 4' tall by 5' wide mound, making this hydrangea an excellent choice for gardens with limited space. Cutting back Incrediball® Blush resulted in significantly larger flowers; however, this is not recommended because it led to weaker stems that flopped and broke under their own weight. This trial revealed that, when grown in the mid-Atlantic region, this cultivar performs best in full sun.

Hydrangea arborescens 'NCHA2' (Invincibelle® Spirit II) ★★★★½

Another product of the plant breeding program at North Carolina State University, Invincibelle® Spirit II wild hydrangea tied with Incrediball® Blush wild hydrangea as the highest-rated pink hydrangea in the trial. Proving that sequels can sometimes be better than the original, Invincibelle® Spirit II is a marked improvement over Invincibelle® Spirit and has a more robust habit, darker pink flower coloration, and more pollinator visits than its predecessor. In fact, this cultivar received the most pollinator visits of any mophead hydrangea in the trial, although still fewer than the average lacecap hydrangea. Therefore, Invincibelle® Spirit II is an excellent choice for gardeners who want a hydrangea with a typical mophead look that also supports pollinators. Invincibelle® Spirit II was one of the larger plants in the trial, however, cutting the plant back in spring reduced the height from 6' to 4' and the width from 8' to 7', making this a good option for smaller gardens.



Hydrangea arborescens 'Abetwo' (Incrediball®) ★★★★½

Selected at Spring Meadow Nursery as a seedling of *Hydrangea arborescens* 'Annabelle', Incrediball® wild hydrangea improves on its parent in nearly every way. Its most notable feature is huge mophead inflorescences that are supported by sturdy stems that resist flopping. Otherwise, Incrediball® delivers the same iconic look as similar large, white-flowered mophead cultivars, such as *H. arborescens* 'Annabelle' and *H. arborescens* 'Grandiflora'. The cutback version of Incrediball® also proved resistant to flopping, which was a common problem with the cutbacks of similar cultivars. Cutting back also increased the floral diameter from 7" to 9", adding an extra punch to an already spectacular floral display. This cultivar performs best with some shade which preserves the fading, lime-colored inflorescences.

Hydrangea arborescens 'Bounty' ★★★★½

Hydrangea arborescens 'Bounty' provides the same ornamental qualities as the mainstay mopheads *H. arborescens* 'Annabelle' and *H. arborescens* 'Grandiflora' but with sturdy, upright stems. Without labels, many of the large, white-flowering mopheads are difficult to differentiate; however, *H. arborescens* 'Bounty' is easily recognizable due to telltale details in its inflorescences. *H. arborescens* 'Bounty' produces distinct, multi-layered flower heads that are evocative of cauliflower or cumulus clouds unlike the more evenly domed inflorescences typical of many mophead cultivars of *H. arborescens*. In addition to this unique form, the individual sterile flowers were small compared to other mophead flowers in the trial. This resulted in a fine, lacy appearance to the inflorescence. *H. arborescens* 'Bounty' had minor issues with flopping when grown in the shade. However, the shaded plants had higher-rated flowers due to decreased burning. The shaded plants produced attractive olive-green flowers that persisted long after the blooming period ended.

Hydrangea arborescens 'Dardom' (White Dome®) ★★★★

Although introduced to the American horticultural market by Proven Winners®, *Hydrangea arborescens* 'Dardom' was originally selected by Woulter Kromhout in Essen, Belgium. White Dome® wild hydrangea closely resembles the species *H. arborescens* but differs in several ways. *H. arborescens* 'Dardom' is a vigorous but slightly smaller hydrangea, with a height and width of 5.5' and 7', about 1.5' shorter than *H. arborescens*. Despite the cultivar's smaller overall size compared to the species, *H. arborescens* 'Dardom' produces larger flowers. The leaves of *H. arborescens* 'Dardom' are larger than the species' and have a small amount of silvering and pubescence on their undersides, suggesting the influence of *H. radiata* or *H. cinerea* in its genes. Everything about *H. arborescens* 'Dardom' is magnified when the plant is cut back, including leaves, which remained a deep emerald green throughout the season, and the inflorescences, which increased in size by 55 percent. While not as eye-catching to people as top-ranked *H. arborescens* 'Haas' Halo', pollinators flocked to *H. arborescens* 'Dardom' in droves. This cultivar received the most insect visits over two seasons of observation of any hydrangea in the trial.

Hydrangea arborescens 'Mary Nell' ★★★★

A somewhat obscure cultivar, *Hydrangea arborescens* 'Mary Nell' should be considered for wider cultivation and commercial availability. Named by Dr. Joseph McDaniel, who also introduced *H. arborescens* 'Annabelle', *H. arborescens* 'Mary Nell' is a lacecap hydrangea that stands out with a double ring of sterile flowers around the rim of the inflorescence. Often compared to *H. arborescens* 'Haas' Halo' due to the similar overall size and vigor of both cultivars, *H. arborescens* 'Mary Nell' produces smaller flower heads with more sterile flowers at the margin. *H. arborescens* 'Mary Nell' performed best in shade, retaining attractive foliage and sterile flowers for nearly the entire growing season. When cut back, *H. arborescens* 'Mary Nell' responded with extreme vigor, so much so that the new, fast-growing stems occasionally proved to be too weak to support the magnified flower heads.

Hydrangea arborescens 'Total Eclipse' ★★★★

Hydrangea arborescens 'Total Eclipse' is a selection of the species from Jim Pyler of Natural Landscapes Nursery in West Grove, PA. This cultivar performed in a very similar manner to *H. arborescens* but with minor ornamental differences. These included a marginally smaller habit, earlier bloom time, and less deadwood by the fifth year of the evaluation. From a floral perspective, *H. arborescens* 'Total Eclipse' was nearly identical to the species, both in its overall dimensions and in its ability to attract pollinators. As a result, *H. arborescens* and *H. arborescens* 'Total Eclipse' are both included in the top-five pollinator-preferred list because they attracted an annual average of 209 and 206 pollinators, respectively. When cut back, *H. arborescens* 'Total Eclipse' responded by producing a more compact habit, increased floral diameter, and enlarged dark green leaves.

HONORABLE MENTIONS

The following hydrangeas received slightly lower ratings than the top performers. However, they still deserve consideration for use in gardens in the mid-Atlantic region. In particular, the straight species *Hydrangea arborescens* was among the top five pollinator-preferred plants and would make an excellent addition to pollinator gardens in this region and beyond.

Hydrangea arborescens

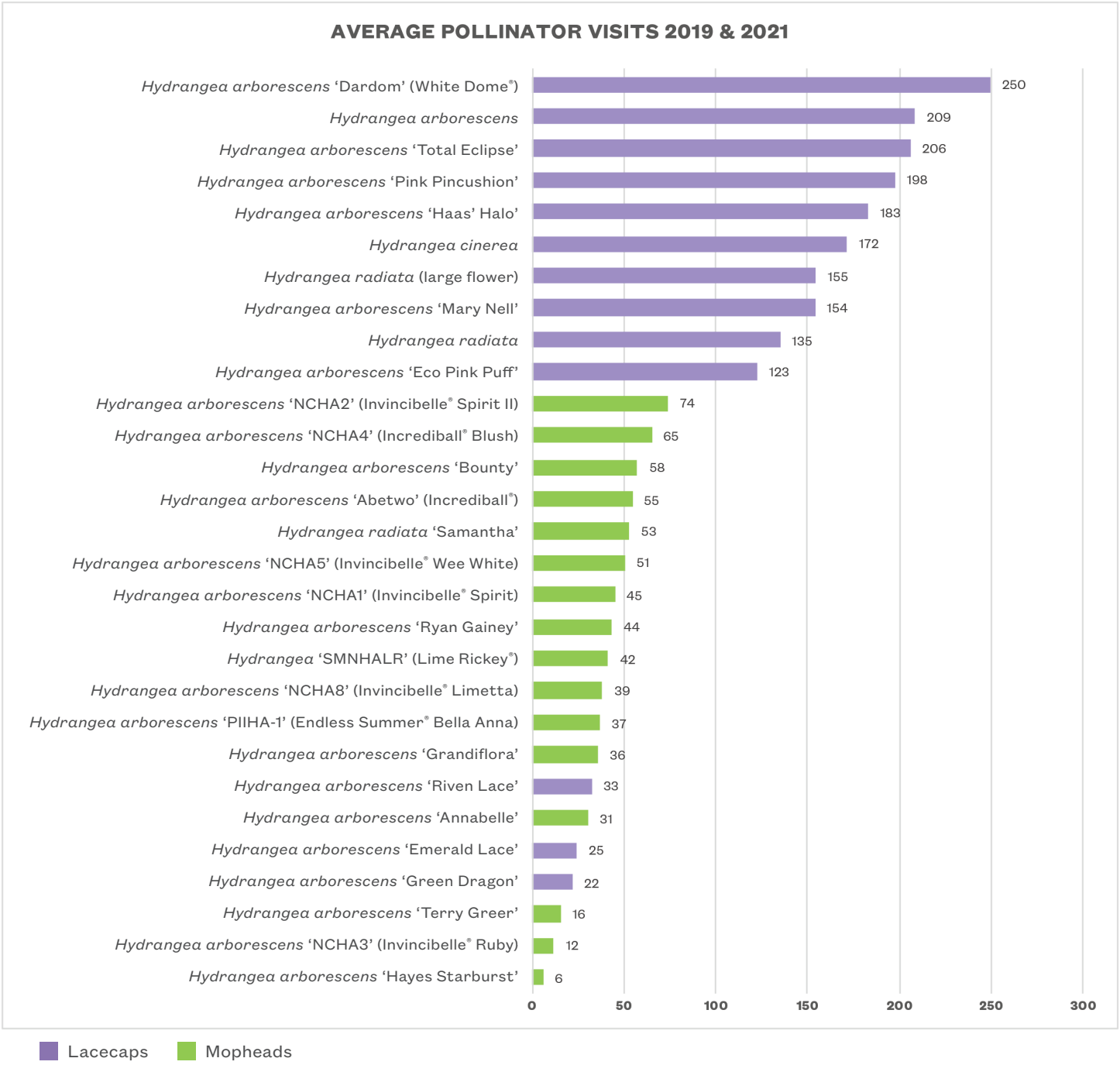
***Hydrangea arborescens* 'NCHA5' (Invincibelle® Wee White)**

***Hydrangea arborescens* 'NCHA3' (Invincibelle® Ruby)**

***Hydrangea arborescens* 'Annabelle'**

***Hydrangea arborescens* 'Grandiflora'**

THE CITIZEN SCIENTISTS OF MT. CUBA CENTER'S POLLINATOR WATCH TEAM recorded pollinator visits to each of the 29 taxa of hydrangea grown in full sun during 2019 and 2021. A member of the Pollinator Watch Team randomly selected one inflorescence and observed it for one minute, recording the number of insect visits to the flower. Observations were recorded near daily during the bloom season. Cutback plants were excluded from the observations since cutting back is known to influence flower size. The data below represent the average of yearly insect observations and illustrates the differences between lacecap and mophead hydrangeas in their ability to attract pollinators. The results show, with few exceptions, that lacecap hydrangeas are much more frequently visited by pollinators than mopheads.



Mopheads vs. Lacecaps

Lacecap hydrangeas produce hundreds of tightly grouped, readily accessible fertile flowers, each containing pollen and nectar rewards that attracted a tremendous variety of insect pollinators. Bumblebees were among the most noticeable insect visitors, but on closer inspection, a diverse collection of small wasps, bees, beetles, true bugs, and flies were observed as well. Butterflies were rarely seen visiting the hydrangeas and made up an extremely small percentage of the total insects recorded. Mophead hydrangeas were visited by fewer pollinators than their lacecap cousins. This is likely because mopheads have fewer fertile flowers than lacecaps, and these fertile flowers are often obscured by abundant sterile flowers. A few mopheads, including Invincibelle® Spirit II wild hydrangea and Incrediball® Blush wild hydrangea, produced more fertile flowers compared to other mopheads, and this correlated with greater pollinator visits to those cultivars. At the other end of the spectrum, the mophead *H. arborescens* 'Hayes Starburst' produced no fertile flowers and attracted an average of only six pollinator visits per year.

Hydrangea arborescens 'Hayes Starburst'

Hydrangea arborescens 'Haas' Halo'

Lacecap Outliers

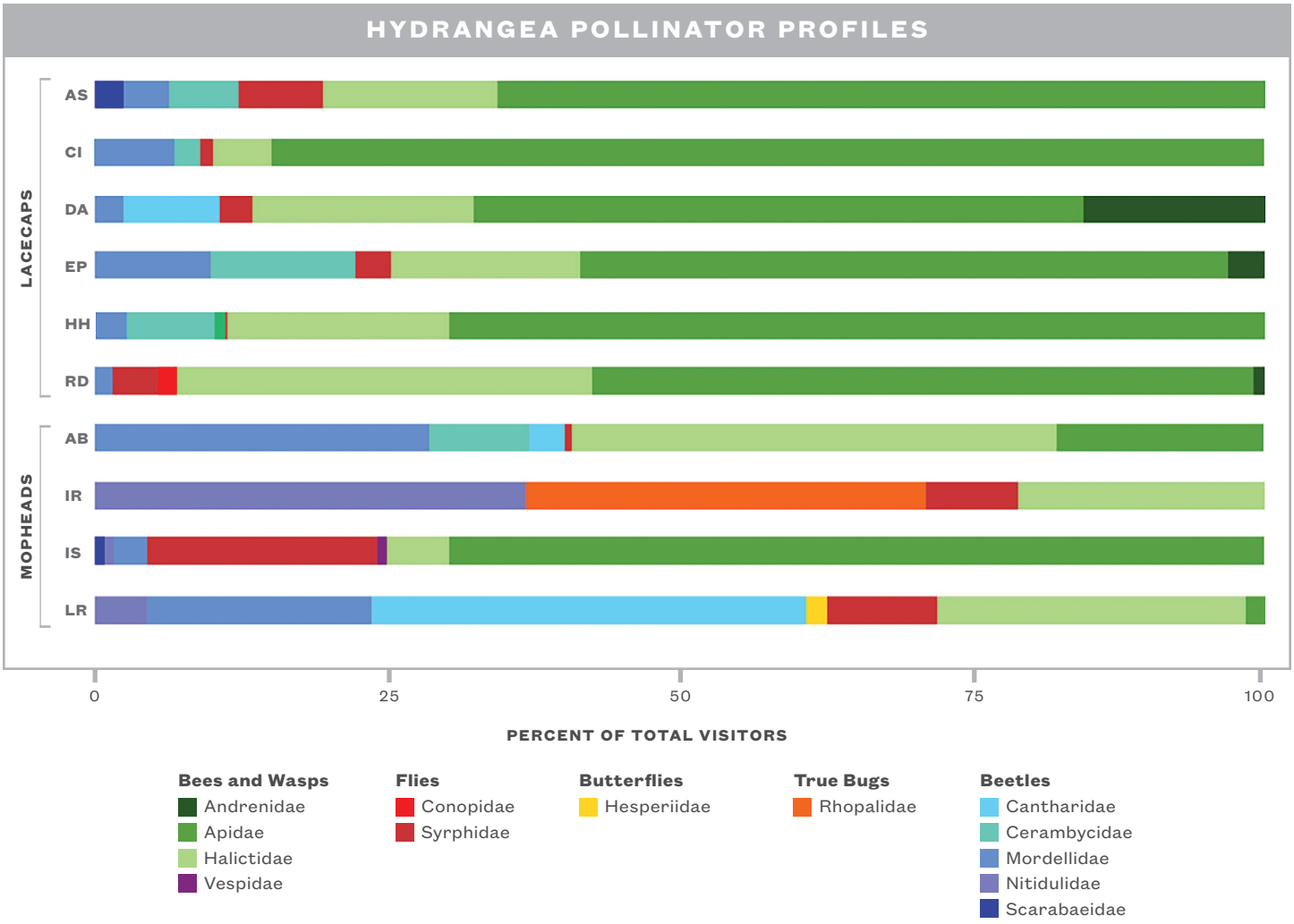
The pollinator observations showed a definite trend of pollinators preferring lacecaps, with three exceptions. The lacecap cultivars *Hydrangea arborescens* 'Riven Lace', *H. arborescens* 'Emerald Lace' and *H. arborescens* 'Green Dragon' attracted very low numbers of pollinators, although the reason for this is not known. It is widely accepted that these three cultivars, which are notable for their deeply serrated leaves, were originally selected from a wild hydrangea population in Illinois and are in fact the same plant. The low number of pollinator visits could be attributed to several factors including the possibility that these cultivars do not offer the same quality or abundance of nectar and pollen rewards as other lacecaps in the trial. Even with these three outliers, the 13 lacecap species and cultivars in the trial still averaged 143 pollinator visits per plant per year while the 16 mophead cultivars averaged only 42 visits per plant per year.

From left to right: *Hydrangea arborescens* 'Emerald lace', *H. arborescens* 'Green Dragon', and *H. arborescens* 'Riven Lace'

Lacecap inflorescences of *Hydrangea arborescens* 'Riven Lace'

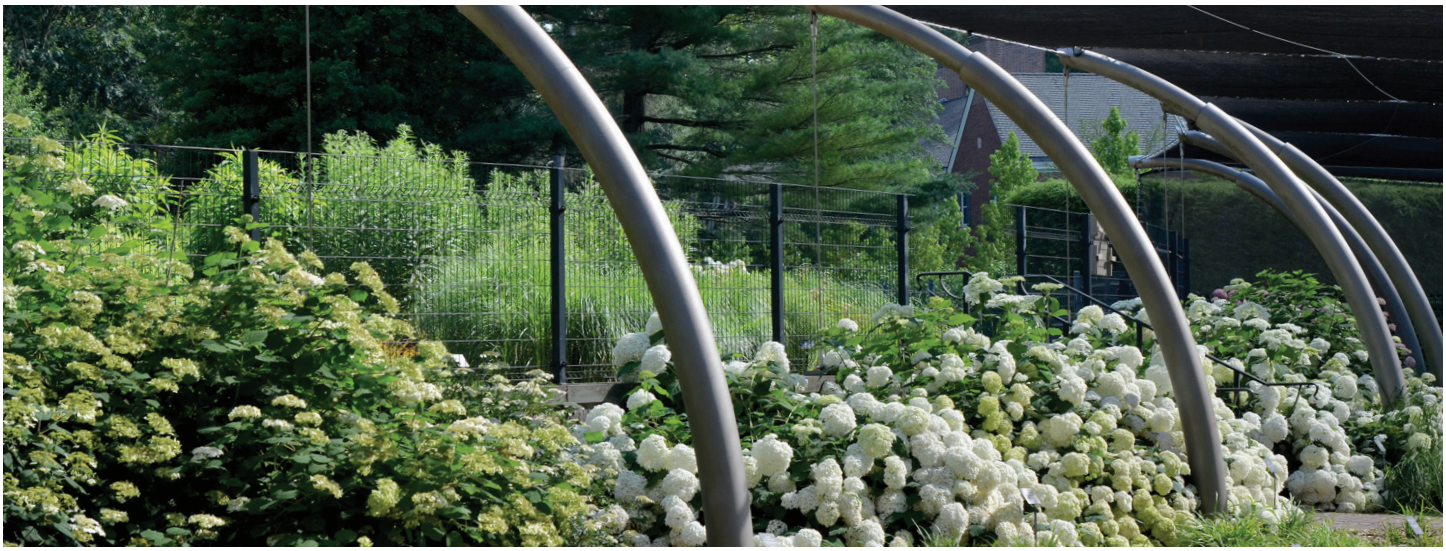
UNIVERSITY OF DELAWARE POLLINATOR STUDY

In 2018, Dr. Deborah Delaney and Lindsey Cathcart of The University of Delaware's Dare to Bee Research Team conducted a study of pollinators visiting 10 different Trial Garden hydrangeas, including six lacecaps and four mopheads. Researchers used cameras to film inflorescences for ten-minute intervals, then reviewed the footage to count and identify any insects that visited the flowers.



AS: *H. arborescens*, **CI**: *H. cinerea*, **DA**: *H. arborescens* 'Dardom' (White Dome®), **EP**: *H. arborescens* 'Eco Pink Puff', **HH**: *H. arborescens* 'Haas' Halo', **RD**: *H. radiata*, **AB**: *H. arborescens* 'Annabelle', **IR**: *H. arborescens* 'NCHA3' (Invincibelle® Ruby), **IS**: *H. arborescens* 'NCHA2' (Invincibelle® Spirit II), **LR**: *H.* 'SMNHALR' (Lime Rickey®)

THE RESULTS OF THE UNIVERSITY OF DELAWARE STUDY mirrored the findings of Mt. Cuba Center's Pollinator Watch Team: that pollinators visited lacecap hydrangeas more than mopheads. The identification of the insects provided valuable insight into the diversity of insects that were utilizing the various hydrangea inflorescences. Most of the insect visitors identified were bees, primarily the family Apidae which consists of bumblebees and the non-native honeybees. Insects other than bees, such as flies, butterflies, true bugs, and beetles, accounted for a relatively low percentage of visits to the lacecap hydrangeas. On the other hand, the mopheads in the trial attracted higher percentages of non-bee visitors. Lime Rickey® hydrangea and Invincibelle® Ruby wild hydrangea showed the most variation in their pollinator profiles, a trend that can possibly be explained by the unusual flower colors of these two cultivars. The different insect visitation patterns for lacecaps and mopheads in the UD study may be explained by differences in number and accessibility of fertile flowers, floral nutrient value, or other variables.



SHADE

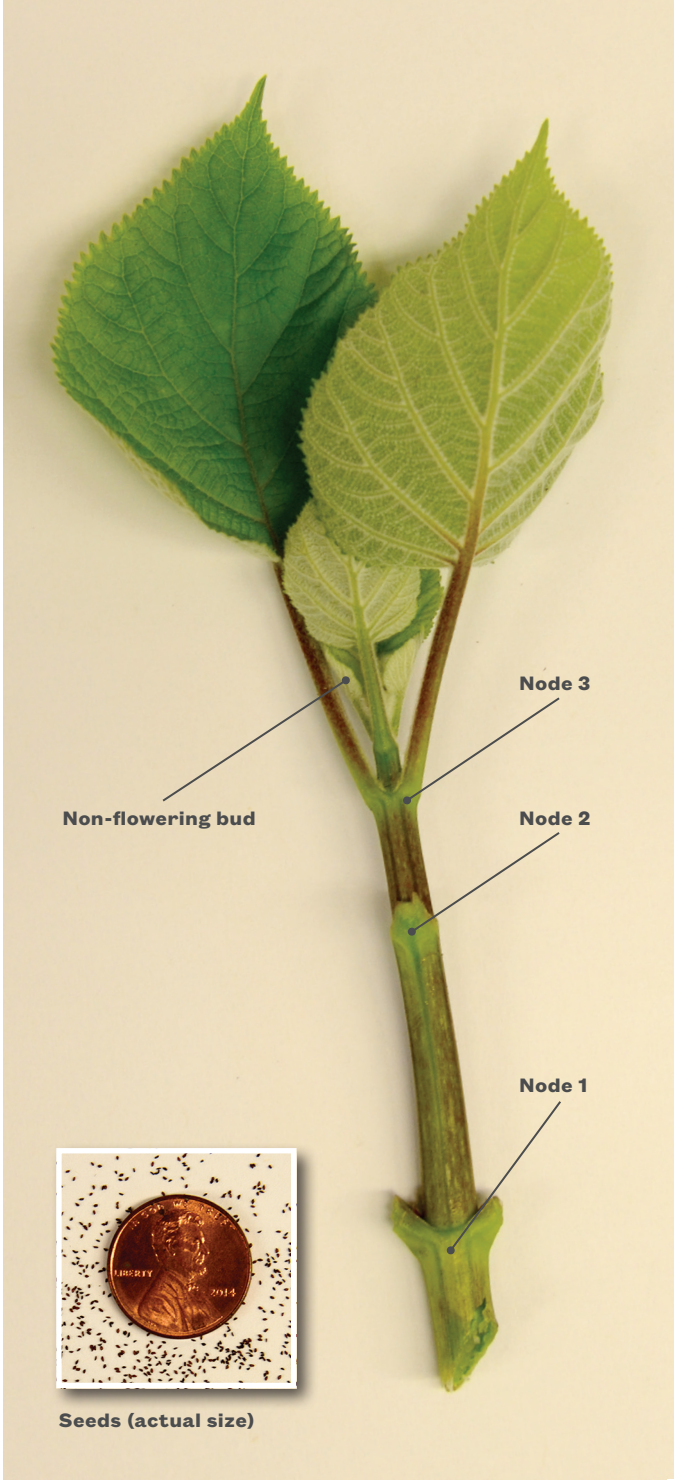
From an ornamental perspective most hydrangeas in the trial performed best in shade. Shade grown plants avoided issues with burning sterile flowers, leaf burn, and defoliation, all of which were observed during dry periods in full sun, particularly during late summer. *Hydrangea radiata* and its cultivars struggled the most in full sun and are best suited to part sun or shaded locations. Despite many hydrangeas in the trials performing better in the shade, the plants can be planted in full sun if they are grown in well-drained but moisture-retentive soil. In fact, a few of the pink-flowering cultivars, including Invincibelle® Spirit II wild hydrangea and Incrediball® Blush wild hydrangea, consistently scored better in sun than in shade. *H. arborescens* and allies in full sun would likely require supplemental irrigation when grown in warmer climates than the mid-Atlantic.

CUTBACKS AND PRUNING

In late March of 2019, 2020, and 2021, one example of each hydrangea in the evaluation was cut back to approximately 6–8" from the ground. This simulates common landscape practices and allowed comparison of cutback plants to unpruned control plants over the growing season. These cutbacks often resulted in a one or two week delay in bloom time, a moderate decrease in the overall size of the plant, and an increase in floral diameter. Cutbacks did not correct floppy habits and had little impact on the overall size of compact cultivars such as Incrediball® Wee White, Invincibelle® Ruby, and Incrediball® Blush. In general it is not necessary to cut back *Hydrangea arborescens* each year. Rather, we recommend taking a more reserved pruning approach and removing only a few of the oldest stems from the plant each spring.

ECOLOGICAL GARDENING TIP Pith-filled hydrangea stems in the Trial Garden were often colonized by native bees that excavated the pith and used the resulting cavity as a nesting site. This was frequently observed on stems that had been pruned or deadheaded. Stems that are removed in spring can be cut to a desired length and placed in bundles around the garden to provide supplemental habitat for these fascinating and ecologically valuable insects.

PROPAGATING NATIVE HYDRANGEAS can be an enjoyable and rewarding way to add specimens to a home landscape. In a commercial nursery, most hydrangeas are propagated by cuttings, resulting in exact copies, or clones, of the parent plant. While this practice is feasible at home with relatively limited materials and input, it is important to note that a license is required to legally propagate patented plants through cuttings or other asexual methods. The patent status of hydrangeas in this trial is found on page 19. Alternatively, propagation by seed is a great option to grow a more diverse population of plants since seedlings will not be genetically identical to the parent plant.



Cuttings

Cuttings for *Hydrangea arborescens* are best taken June through July, before the stems become too woody. An ideal cutting contains three nodes and a non-flowering, terminal bud. The bottom of the cutting can be treated with either liquid or powder rooting hormone before it is stuck into a rooting medium. These hormones are not necessary but do help improve the cutting's chances of rooting. A good substrate for rooting hydrangea cuttings is 50 percent all-purpose seedling soil and 50 percent perlite. Keep the cuttings in a humid environment by covering them with a clear plastic dome or bag. Roots should begin to grow in 3–4 weeks. These newly rooted plants require additional protection for their first winter and should be kept in a location that gets cold but does not freeze, such as a cold frame or an unheated attached garage. The following spring, the cuttings will be ready to be repotted into larger containers or planted outside in the garden.

Seeds

Growing *Hydrangea arborescens* from seed can be challenging due to the small and delicate nature of the newly emerged seedlings, but it is achievable in the correct conditions. Hydrangea seeds ripen in late summer through fall and can be easily collected in a paper bag. Store the seeds in a cool, dry place; they are best sown the following spring. Seeds are minuscule and require light to germinate, so they should be sown on the surface of an all-purpose seedling medium. If kept in a warm, humid location with indirect light, germination is expected in four weeks. Once germination occurs, apply dilute organic fertilizer to the seedlings to encourage growth. After an additional three weeks, the seedlings are typically large enough to be separated out into their own pots. Seedlings are ready to be planted in the garden in late summer to fall; or they can be kept in a cool place over winter (similar to first year cuttings). Expect the first blooms in the third year after sowing.

ABOUT THE *HYDRANGEA* TRIAL

This evaluation took place at Mt. Cuba Center, located near Wilmington, DE (USDA Hardiness Zone 7a/6b). The trial included 29 taxa, including three species and 26 cultivars, over a five-year period (2017–2021), with horticultural data collected in 2018, 2019, and 2021. Plants were evaluated to assess their habit, vigor, and floral display. Three plants of each taxon were placed linearly on 40" centers. They were grown in full sun, and 19 taxa were also grown in 60 percent shade. The soil is best described as clay-loam with a pH near 6.5. Throughout the trial, plants were given minimal care. No fungicides were used, and supplemental water was provided only during the first year to encourage establishment and during a handful of extremely dry periods. This strategy was designed to test the plants in a manner similar to typical landscape maintenance practices.

Each taxon was measured frequently through the growing season and assigned ratings on a scale of 1–5 (1 being very poor and 5 being excellent) for floral display and plant/foliage quality. The floral display rating was based on flower coverage and overall appeal and then adjusted for bloom periods that were longer or shorter than average. The rating for plant/foliage quality included attributes such as habit, vigor, and foliage retention. The plant and floral ratings were then averaged. Additional points were awarded to plants with high numbers of pollinator visits: 0.5 points were awarded to the pollinator-preferred hydrangeas ranked 1-5, 0.3 for plants ranked 6-10, and 0.1 for plants ranked 11-15.

Hydrangea	Rating		Avg HxW	Flower Type	Flower Color	Bloom time	Pollinator Rating
Hydrangea arborescens	4.0	★★★★	7' x 7.5'	lacecap	white	early July - mid July	
Hydrangea arborescens* 'Abetwo' (Incrediball®)	**4.5**	★★★★½	**5.5' x 7.5'**	**mophead**	**white**	**late June - mid July**	
Hydrangea arborescens 'Annabelle'	4.0	★★★★	4.5' x 6.5'	mophead	white	late June - mid July	
***Hydrangea arborescens* 'Bounty'**	**4.3**	★★★★½	**5' x 8'**	**mophead**	**white**	**late June - mid July**	
Hydrangea arborescens* 'Dardom' (White Dome®)	**4.2**	★★★★	**5.5' x 7'**	**lacecap**	**white**	**mid June - late July**	
Hydrangea arborescens 'Eco Pink Puff'	3.6	★★★½	5.5' x 7'	lacecap	pink	late June - mid July	
Hydrangea arborescens 'Emerald Lace'	3.2	★★★	4' x 4.5'	lacecap	white	late June - mid July	
Hydrangea arborescens 'Grandiflora'	4.1	★★★★	4.5' x 7.5'	mophead	white	mid June - mid July	
Hydrangea arborescens 'Green Dragon'	3.1	★★★	4' x 4.5'	lacecap	white	late June - mid July	
Hydrangea arborescens* 'Haas' Halo'	**5.0**	★★★★★	**7' x 7'**	**lacecap**	**white**	**mid June - early July**	
Hydrangea arborescens 'Hayes Starburst'	3.2	★★★	3.5' x 5'	mophead	white	early July - mid July	
***Hydrangea arborescens* 'Mary Nell'**	**4.2**	★★★★	**6.5' x 9'**	**lacecap**	**white**	**mid June - early July**	
Hydrangea arborescens 'NCHA1' (Invincibelle® Spirit)*	3.7	★★★½	5' x 7'	mophead	pink	early July	
Hydrangea arborescens* 'NCHA2' (Invincibelle® Spirit II)	**4.5**	★★★★½	**6' x 8'**	**mophead**	**pink**	**late June - early July**	
Hydrangea arborescens 'NCHA3' (Invincibelle® Ruby)*	4.0	★★★★	2.5' x 4'	mophead	pink	late June - early July	
Hydrangea arborescens* 'NCHA4' (Incrediball® Blush)	**4.5**	★★★★½	**4' x 5'**	**mophead**	**pink**	**late June - mid July**	
Hydrangea arborescens 'NCHA5' (Invincibelle® Wee White)*	4.0	★★★★	2' x 3'	mophead	white	mid June - early July	
Hydrangea arborescens 'NCHA8' (Invincibelle® Limetta)*	3.6	★★★½	3' x 3'	mophead	white	late June - early July	
Hydrangea arborescens 'PIIHA-1' (Endless Summer® Bella Anna)*	3.5	★★★½	4' x 5.5'	mophead	pink	early July - mid July	
Hydrangea arborescens 'Pink Pincushion'	3.6	★★★½	5' x 7.5'	lacecap	pink	mid June - mid July	
Hydrangea arborescens 'Riven Lace'	3.1	★★★	4' x 5'	lacecap	white	late June - early July	
Hydrangea arborescens 'Ryan Gainey'	2.9	★★★	6' x 8.5'	mophead	white	late June - early July	
***Hydrangea arborescens* 'Total Eclipse'**	**4.2**	★★★★	**6.5' x 8'**	**lacecap**	**white**	**late June - mid July**	
Hydrangea cinerea	3.8	★★★★	5.5' x 5.5'	lacecap	white	early July - mid July	
Hydrangea radiata	2.5	★★½	5.5' x 6.5'	lacecap	white	mid June - early July	
Hydrangea radiata (large flower)	3.6	★★★½	5' x 5'	lacecap	white	mid June - early July	
Hydrangea radiata 'Samantha'	3.1	★★★	4' x 5.5'	mophead	white	late June - mid July	
Hydrangea radiata 'Terry Greer'	3.3	★★★½	5' x 6.5'	mophead	white	late June - mid July	
Hydrangea* 'SMNHALR' (Lime Rickey®)	**4.6**	★★★★½	**6' x 8.5'**	**mophead**	**white**	**mid June - early July**	

Rating Key: 5=excellent, 4=good, 3=fair, 2=poor, 1=very poor. Plants in **bold** are top performers. Plants marked with (*) are patented.
Visit **mtcubacenter.org/trial** for detailed information.

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ABOUT MT. CUBA CENTER

Mt. Cuba Center is a botanic garden that highlights the beauty and value of native plants to inspire conservation. Once the private estate of Pamela and Lammot du Pont Copeland, the public garden opened for general admission in 2013 and now spans more than 1,000 acres. It features captivating blooms along garden pathways in formal and woodland settings, picturesque meadows and ponds with stunning vistas, and more than two miles of scenic trails throughout its natural lands.

Mt. Cuba is recognized as a leader in native plant research and open space preservation, having protected more than 13,000 acres in the mid-Atlantic region. In 2021, it was voted one of the top five best botanical gardens in North America by *USA Today* readers. Additionally, it was awarded *The News Journal*'s Top Workplaces 2021 and *Delaware Today*'s Best of Delaware for "Best Place to Experience Nature" and "Best Workshops" for its gardening, conservation, art, and wellness classes. Learn more at **mtcubacenter.org**.

ABOUT THE TRIAL GARDEN RESEARCH

Mt. Cuba Center's Trial Garden, managed by Sam Hoadley, evaluates native plants and their related cultivars for their horticultural and ecological value. This research aims to provide gardeners and the horticulture industry with information about superior plants for the mid-Atlantic region as well as highlight the important ecosystem services native plants provide. Mt. Cuba Center has conducted Trial Garden research since 2002, including previously completed evaluations of *Echinacea, Helenium, Phlox, Monarda, Baptisia, Coreopsis, Heuchera*, and asters.

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