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The Magazine of the American Horticultural Society

November / December 2017

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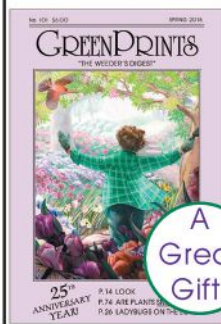
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NOTES FROM RIVER FARM

IT HAS BEEN an honor and a great pleasure to serve as interim executive director of the American Horticultural Society over the last several months. But now the entire Board, staff, and I are excited to welcome our new President and CEO Beth Tuttle. By the time this issue of *The American Gardener* reaches you, she'll have settled in at our River Farm headquarters in Alexandria, Virginia.

You may recall from our previous communications about Beth that her career has spanned the cultural, educational, philanthropic, and advocacy sectors of the nonprofit world. And she's a Master Gardener to boot! So it is with great anticipation that we look forward to what 2018 will bring to the AHS under her able leadership.

Now I have another piece of exciting news to share, this time about the Million Pollinator Garden Challenge (MPGC). In this column in the previous issue, I mentioned that about a third of the original goal of a million registered gardens had been achieved. After a tremendous effort on the part of all the partners in the National Pollinator Garden Network—including the AHS—I'm pleased to report that the number of registered gardens has more than doubled since then.

Bees, butterflies, bats, birds, and other pollinating creatures are vital to life as we know it, and gardens big and small help to support them. We applaud everyone who has planted for pollinators! If you haven't yet registered your garden with the MPGC, please do so. It's free, it's simple, and your information doesn't get shared, so you have nothing to lose. Just go to www.millionpollinatorgardens.org and add your garden to the count. Let's get to one million and beyond!

While all this wonderful creation of gardens has been going on, sadly many gardens suffered damage from widespread wildfires in California and the hurricanes that struck Puerto Rico, the Virgin Islands, Florida, and Texas in the last few months. Our hearts go out to everyone affected by these recent natural disasters. On page 44 of this issue, you'll find a list of gardens that participate in our Reciprocal Admissions Program (RAP) in need of extra assistance in the aftermath. Even small donations of time, supplies, or funds go a long way toward rebuilding these treasured horticultural institutions.

You can read about one of these RAP gardens, Masee Lane Gardens in Fort Valley, Georgia, on page 40. It is the home of the American Camellia Society, which fortunately suffered only minimal damage from Hurricane Irma in September. Because its extensive collection of camellias reaches peak bloom over the winter, the next few months are a perfect time to visit.

Living collections like these camellias provide a valuable resource for gardeners and scientists, but did you know that collections of dead plants kept in herbaria also can yield important insights into biodiversity? Find out more in our article about herbaria beginning on page 26. There's plenty more to discover in this issue, but before you read on, allow me to extend best wishes for a healthy and happy holiday season from all of us at the AHS.

Holly H. Shimizu
Interim Executive Director



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MEMBERS' FORUM

MORE REGIONAL PLANT SOURCES

I enjoyed the September/October issue, but in the otherwise informative article on native shrubs, I was surprised the list of mail-order sources included one from the West Coast and three from the South, but none for the Northeast, where I live. Since this magazine goes out to gardeners all over the United States, I was expecting to see suppliers from various regions, including mine.

*Lisa Brodlie
Weston, Connecticut*

Editor's note: While space in the article was limited, we agree we should have included more geographically diverse sources. For the Northeast, try Tripple Brook Farm in Massachusetts (www.tripplebrookfarm.com) and Rare Find Nursery in New Jersey (www.rarefindnursery.com).

CILANTRO SEED INACCURACY

In the cilantro article in the September/October issue, I had hoped to find tips to help with the low germination rate for the seeds, but this was not addressed. Instead, I came across confusing advice such as, "remove the seeds from the pod" and "invert the mature umbels in a paper bag to allow the seeds to fall as each pod dries and splits open."

In fact, there's nothing resembling a pod surrounding cilantro seeds. The photo with the article depicts the seeds, which are little balls at the ends of tiny stalks. Each ball is composed of two seeds. Sometimes they come apart by themselves, but usually they don't—and they are difficult to separate.

*Margo Lindener
Halifax, Nova Scotia*

Editor's note: In trying to simplify the botanical terminology, we unfortunately

ended up being inaccurate. The globular dry fruits of cilantro, termed schizocarps, are composed of two segments, each containing a seed, that don't always split without assistance. Germination is typically low—about 50 percent. In *The Encyclopedia of Herbs* (Timber Press, 2009), Arthur O. Tucker and Thomas DeBaggio write that germination can be improved slightly by rubbing the mature fruits to help separate the segments, and then soaking the seeds in water for up to four days before sowing. Optimal temperatures for germination are about 80 degrees Fahrenheit (F) during the day and between 65 to 70 degrees F at night. 🌱

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'Primo Vino' (Pierce-G, 2017)
— photo courtesy of the hybridizer

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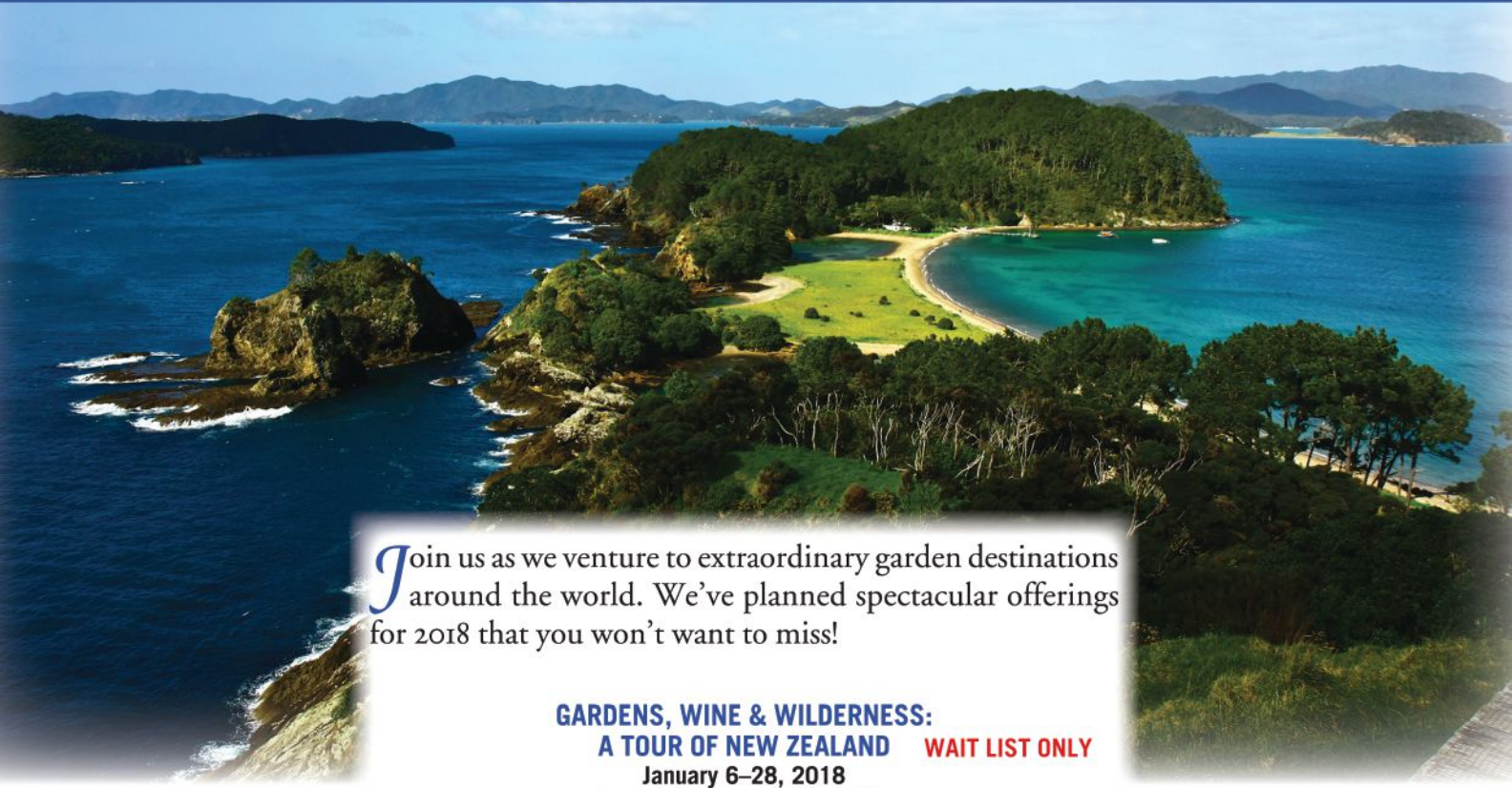
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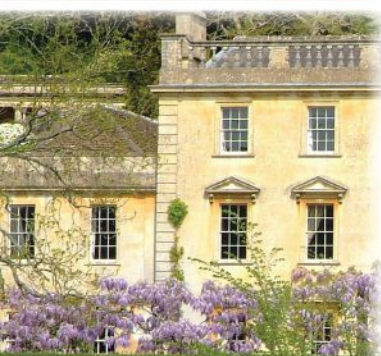
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NATIONAL CHILDREN & YOUTH GARDEN SYMPOSIUM For information about the Society's annual National Children & Youth Garden Symposium, e-mail education@ahsgardening.org, or visit www.ahsgardening.org/ncygs.

RECIPROCAL ADMISSIONS PROGRAM The AHS Reciprocal Admissions Program offers members free admission and other discounts to 300 botanical gardens and other horticultural destinations throughout North America. A list of participating gardens can be found on www.ahsgardening.org/rap. For more information, call (703) 768-5700 ext. 119.

RIVER FARM The AHS headquarters at River Farm is open 9 a.m. to 5 p.m. weekdays year-round (except Federal holidays), and 9 a.m. to 1 p.m. Saturdays from April through September. For information about events, rentals, and directions, visit the About River Farm section of www.ahsgardening.org.

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WEBSITE: www.ahsgardening.org The AHS website is a valuable source of information about the Society's programs and activities. Users must set up a username and password to access the member's-only sections.

News from the AHS

November / December 2017

PROGRAMS • EVENTS • ANNOUNCEMENTS



RIVER FARM HOSTS POLLINATOR GROUP MEETING

IN OCTOBER, the National Pollinator Garden Network (NPGN) held its third annual meeting at River Farm, the headquarters of the American Horticultural Society (AHS) in Alexandria, Virginia. Nearly 60 attendees representing more than 30 national organizations and trade groups gathered to discuss the NPGN's ongoing efforts to increase the number of pollinator-friendly gardens, raise public awareness about the importance of pollinators and sustainable gardening practices, and help stem the national decline of pollinating insects.

"Helping individual gardeners understand they can make a difference is one of the most important things we can do," says **Holly H. Shimizu**, the AHS's Interim Executive Director, who delivered an opening address welcoming the attendees from all over the country.

Collin O'Mara, president and CEO of the National Wildlife Federation, echoed this, saying, "There is nothing more important to the overall health of our ecosystems than pollinators." O'Mara applauded the news that nearly 700,000 pollinator gardens had been registered as part of the group's Million Pollinator Garden Challenge, but reminded attendees that this goal was merely a first step. He spoke about the need for the NPGN to broaden the scope of its outreach "beyond the traditional gardening audience."



Top: Collin O'Mara, president and CEO of the National Wildlife Federation, addresses attendees at a meeting of the National Pollinator Garden Network in October at River Farm. Above: Helpers hold up pollinator-themed artwork by nine-year-old Kedar Narayan, right.



AHS NATIONAL EVENTS CALENDAR

Mark your calendar for these upcoming events that are sponsored or co-sponsored by the AHS. Visit www.ahsgardening.org or call (703) 768-5700 for more information.

DEC. 9. **Holiday Open House.** River Farm, Alexandria, VA.

2018

APR. 13 & 14. **Spring Garden Market.** River Farm, Alexandria, VA.

APR. 14–16. **Colonial Williamsburg Garden Symposium,** Williamsburg, VA. (AHS partner event.)

APR. 21. **Great Gardens and Landscaping Symposium,** Woodstock, VT. (AHS partner event.)

APR. 21–28. **Historic Garden Week in Virginia.** (AHS partner event.)

APR. 23–MAY 4. **Greece: Antiquity, Culture & Gardens.** AHS Travel Study Program Tour.

MAY 14–18. **AHS President's Council Trip to St. Petersburg, FL.**

JUNE 7. **AHS Great American Gardeners and Book Awards Ceremony,** River Farm, Alexandria, VA.



JUNE 10–18. **England, Gardens of the West Country: Cornwall, Devon, Somerset & Wiltshire.** AHS Travel Study Program.

JULY 11–14. **AHS National Children & Youth Garden Symposium,** Ithaca, NY.

SEPT. 5–15. **Castles & Gardens of the Czech Republic: Prague, Bohemia & Moravia.** AHS Travel Study Program.

SEPT. 22. **AHS Annual Gala,** River Farm, Alexandria, VA.

Several attendees shared information about successful pollinator garden programs or campaigns going on around the country. One especially inspiring speaker was **Kedar Narayan**, a nine-year-old programming whiz who developed a pollinator gardening app based on his personal experience creating a pollinator-friendly garden at his home in Pennsylvania. The app earned Narayan a trip to Los Angeles earlier this year as an age-group finalist in a national competition called the Paradigm Challenge, created by Project Paradigm, a private foundation.

To learn more about the NPGN and the Million Pollinator Garden Challenge, visit www.millionpollinatorgardens.org.

Gifts of Note

In addition to vital support through membership dues, the American Horticultural Society relies on grants, bequests, and other gifts to support its programs. We would like to thank the following donors for gifts received between September 1 and October 31, 2017.

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2018 PRESIDENT'S COUNCIL TRIP TO FLORIDA

ONE OF the benefits for AHS members at the President's Council level is a special trip to a different area of the country each year. Itineraries include visits to outstanding private and public gardens, behind-the-scenes tours of nurseries and other horticultural landmarks, and memorable dining experiences. The 2018 President's Council trip is slated for May 14 to 18 in the St. Petersburg, Florida, area. Look for further details in the January/February issue of this magazine.

News written by AHS staff.

AHS NEWS SPECIAL: America In Bloom Community Involvement Award

by Aaron Dorman

ABOUT 15 years ago, the city of Logan, Ohio, had a problem common to many other communities across the country: a high vacancy rate in its central business district. One way it tackled this issue was to become involved with America in Bloom (AIB), a nonprofit organization that coordinates an annual nationwide competition to motivate communities to use plants and gardens to address a variety of urban challenges. The AIB awards program includes professional evaluations from judges, assistance and advice from other communities, and an annual symposium to celebrate participants' achievements and share ideas.

Logan first entered the AIB contest in 2004 and the town became so enthusiastically involved that it won the Community Involvement Award in 2005 and 2006. Then it won the Community Champion Award in 2009, and a Population Category Award (5,000–10,000) last year. Now, it is once again the proud recipient of the 2017 Community Involvement Award, which is sponsored by the American Horticultural Society. According to **Rick Webb**, chairman of the “Logan in Bloom” committee, this honor highlights the immense effort put forth by the whole town over the years to make their beautification efforts so effective.

A BLOOMING SUCCESS

Several years ago, the visiting AIB judges told Webb that Logan's main street issues reminded them of another AIB contestant: Ottawa, Illinois. Ottawa used streetscaping to turn a derelict city center with a 60 percent vacancy rate into a commercial and community hot spot. The effort earned Ottawa a Community Involvement Award in 2015, in addition to a population category award in 2014 and two more awards this past year. “The mayor of Ottawa came to Logan to talk, and we probably had 150 people engage in discussion, taking ideas,” recalls Webb. Through this dialogue, along with AIB's



Above: Volunteers help maintain plantings along Main Street in Logan, Ohio. Left: Adding colorful flowers and trees to Logan's downtown area has helped attract more businesses.

there is currently a waiting list for businesses to rent there.

ADDITIONAL EFFORTS

Along with the downtown area, Logan has focused on increasing its urban tree canopy. The entirely volunteer-run Logan Tree Commission, founded in 2005, has planted hundreds of trees around town, and even established a four-acre educational park called the Small Woodland Demonstration Site. In the years to come, Logan plans to continue to add trees and focus on Main Street, working on sidewalk planting at the rate of at least half a block a year.

To learn more about the AIB competition and how to become involved, visit www.americainbloom.org. The registration deadline is February 28, 2018.

Aaron Dorman is an editorial intern for The American Gardener.

2017 America In Bloom Award Winners

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AHS MEMBERS MAKING A DIFFERENCE: Mary Legoria

by Aaron Dorman

ONE OF Mary Legoria's earliest memories is exploring the woods with her mother in search of fungi for her big sister's science fair project. "My mom taught me to love nature, especially plants," says Legoria. "She would wake me up in the morning to get ready for school, saying, 'Come see my iris, it's blooming.'"



Mary Legoria

In large part because of early experiences like these, gardens and plants fill Legoria's life today, both at home and at Westdale Heights

Elementary School in Baton Rouge, Louisiana, where she teaches science. But in an increasingly technology-driven world, many kids are growing up without such experiences to spark their own interest in nature. So, as her mother once did for her, Legoria nurtures her students' connection to the natural world through gardening.

HANDS-ON LESSONS

Westdale Heights is "surrounded by gardens," which Legoria helped to create over several years. These spaces provide endless experiential learning opportunities for her Kindergarten through fifth-grade students. The kids get to grow all kinds of plants, but especially enjoy raising produce that they then get to cook and eat. Many of Legoria's designs for educational gardens have been inspired by ideas she picked up at the American Horticultural Society's annual National Children & Youth Garden Symposium, which she began attending in 2010. At these collaborative events, she has in turn shared with other educators her own success stories for how to incorporate lessons in science, engineering, math, and other subjects into the garden projects.

Sometimes, Legoria's students get inspired to take their own initiative. "Two years ago, my fifth-grade students wanted to start a compost program," says Legoria.



Mary Legoria fascinates her young science students with a demonstration of static electricity.

"They were very bothered by the amount of compostable waste that was thrown in the cafeteria garbage daily." The students wanted to use the waste to benefit the school's gardens. She helped them set up a few collection bins, and now this has expanded into a school-wide composting effort.

REAL-WORLD SCIENCE

Legoria also engages her classes in projects that go beyond school walls, such as Louisiana State University's Coastal Roots Seedling Nursery Program. Legoria's students raise native tree seedlings at their school, then plant them at a site along a Mississippi River tributary. This program is an "opportunity for my students to learn about their environmental responsibilities and be a part of a solution to Louisiana's growing problem of wetland loss," she says.

Another program Legoria has her students participate in every year is the University of Kansas's Monarch Watch, which tracks migrating monarch butterflies. Students collect caterpillars from the milkweed in the school gardens and watch their metamorphosis into butterflies. The insects are then tagged and released.

"Working in gardens and participating in citizen science projects like Monarch Watch and Coastal Roots give students opportunities for real world applications of the knowledge and skills that they learn in classrooms," says Legoria. These activities help students "see themselves as scientists doing real science," she adds, which makes them much more motivated to learn.

In addition to the satisfaction Legoria receives from providing her students with innovative learning experiences, her commitment to teaching has brought some well-deserved recognition. In both 2013 and 2014, she was honored as the Louisiana Outstanding Science Teacher of the Year. And in 2016, she received a Presidential Award for Excellence in Mathematics and Science Teaching (PAEMST), which she considers one of her greatest professional achievements. "This award validated my teaching methodology," Legoria says. "I knew my students were learning and engaged, but it is nice for the PAEMST committee to recognize this, too."

Aaron Dorman is an editorial intern for The American Gardener.

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Orchids

the high art of pretending



These beguiling flowers have evolved a variety of ploys to lure pollinators.

TEXT AND PHOTOS BY JUDYWHITE



ORCHIDS ARE among the best liars on earth. They have developed an arsenal of seduction mechanisms aimed at attracting—and often hoodwinking—pollinators. These devices include incredibly accurate imitative fragrances and rank odors, flamboyant landing platforms, mimicry of sexual partners, mimicry of enemies, flower forgeries, prey imposters, phony nesting sites, and Rube Goldberglike traps, to name just a few. Remarkably, these deceptions frequently are one-way streets when it comes to reward: the pretense of sex, nectars, or other sham encounters serve to do just one thing—get the orchid fertilized, while the duped pollinator gets nothing in return for its trouble.

These spectacular evolutionary adaptations for pollination purposes so enthralled Charles Darwin that, in 1862, he published a whole book on the subject: *On the Various Contrivances By Which British And Foreign Orchids Are Fertilised By Insects*. Despite the cumbersome title, it was a bestseller, coming directly after his controversial but wildly popular book, *On the Origin of Species*.

And no wonder Darwin and his readers were bewitched, along with countless others who have been captivated by these alluring plants. Orchids display a panorama of color and form across the globe, even inside the Arctic Circle. There are more orchid species—somewhere between 26,000 and 30,000, depending on which taxonomist you consult—on the planet than species of mammals, reptiles, and birds combined. The orchid family (Orchidaceae) is also one of the two largest flowering plant families (the other is Asteraceae). That's a masterpiece of come-hither performances.

Unsurpassed in their successful advertisements of real or faked reward, many orchids lure pollinators in order to laden them with sticky packets of pollen, called pollinia. Fossil evidence suggests that orchid pollinia existed around 70 million years ago, a long time for this process to become absurdly sophisticated. Bees and wasps do the majority of the work, along with flies, moths, butterflies, and birds. More rarely, other insects such as mosquitoes, beetles, ants—or even the occasional small mammal, get involved. Some orchids require a very specific pollinator, such the males of a particular species of insect. Others are more promiscuous, accepting the services of multiple visitors.

Whether or not these pollinators receive any rewards, we certainly do, albeit inadvertently. We can enjoy the wonderful, wild whimsy of orchids. Looking at these flowers can be like finding shapes in the clouds. But whatever their masquerade, science is at work, hiding in plain sight. Here are a few great pretenders that give us a small glimpse into the incredible evolutionary diversity in this plant family. 🍷

Author and photographer of the encyclopedic Taylor's Guide to Orchids (Houghton Mifflin) and Bloom-Again Orchids (Timber Press), judywhite is a past American Orchid Society Trustee and recipient of its highest award for orchid writing.

PANSY ORCHIDS

(Miltoniopsis spp.)

Look fast and you're immediately fooled into thinking you've caught sight of garden pansies—the biggest, most gorgeous ones ever. Nope. They're orchids, and not specifically imitating pansies at all. *Miltoniopsis* species are native to tropical regions of Central and South America. Pansies (*Viola* spp.), on the other hand, are mostly from the temperate Northern Hemisphere, many thousands of miles away.

These vibrant, generally fragrant orchids often sport “waterfall” markings and neon tones. Switch on an ultraviolet (UV) light and many of the lip colors and patterns even glow. Why? Because to some bees, UV colors are like airport runway lights. Bees also favor landing platforms, patterned flowers, and perfume, all of which signal actual nectar rewards in typical non-orchid plants. Inherently dishonest, *Miltoniopsis* employs these traits to guide bees toward their nectarless flower centers, where there's nothing but pollinia.

PILE OF ROTTING MEAT ORCHID

(*Bulbophyllum phalaenopsis*)

Not only does this orchid come with “maggots,” it also smells really terrible. Native to New Guinea, the hairy putridness and fetid dead-thing odor of *Bulbophyllum phalaenopsis* evolved to attract carrion flies that pollinate its fake decay.

The size of a pinky, each bloom sits in meaty bunches on a plant whose leaves reach five feet in length. This epiphyte (a plant that grows on another plant—in this case, trees) makes an interesting greenhouse specimen—that is, if you can stand the stink.

While a few non-orchid flowers also imitate the look and odor of rotting flesh—notably Brazilian Dutchman’s pipe (*Aristolochia gigantea*) and corpse flowers (*Amorphophallus* spp.)—none raise the bar like *Bulbophyllum*. This genus—the largest among orchids—contains more than 2,000 species.



BEE ORCHID

(*Ophrys* spp.)

If it looks like a bee, feels like a bee, maybe it’s a bee. Or maybe it’s an *Ophrys* flower. This terrestrial European/Mediterranean genus represents sexual mimicry at its finest. These orchids are capable of bewitching male bees or wasps by sight, texture, and, most importantly, pheromone scent to “mate” with the flower. It’s called pseudo-copulation, because all the deceived insect gets is frenzy rather than progeny. Apparently, no flowers other than orchids use this swindle, but members of *Ophrys* have been mastering it for about 10 million years.

Curiously, one species (*O. apifera*) also displays this fantastic beelike floral adaptation but it simply pollinates itself. Why it looks like a bee for no apparent reason baffled Darwin, who noted, “No single point in natural history interests and perplexes me so much as the self-fertilization of the Bee orchids.” Scientists have since theorized that its European pollinators died out, so the orchid evolved to self-pollinate without altering its bee resemblance. But no one knows for sure. [The orchid shown here is *O. speculum*, which is pollinated by a single wasp species.]





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SPIDER ORCHIDS

(*Brassia* spp.)

When a female spider-hunter wasp spies a *Brassia* flower, she perceives it as an actual spider. “Aha,” she thinks, “I’ll sting that spider, paralyze it, lay my egg in it, and my baby can eat it alive!” But however much this orchid seems like an enormous spider, with long arachnid “legs” and colorful markings, when the wasp tries to sting and grab it, all she ends up with is pollen on her head. Then she’s off to fall for this same trick again and again, spreading pollen around for the orchids.

These spectacular Central and South American epiphytes are scented, probably mimicking the “alarm” pheromones spiders emit when a predator pounces—a ploy that has been identified in other orchids that also pretend to be prey.



SWADDLED BABY ORCHID

(*Anguloa uniflora*)

The pink or yellowish flower of South American *Anguloa uniflora* looks strangely like an infant cocooned in a blanket and nestled in a flowery crib. Add a strong sweet, minty fragrance, and you may be even more inclined to notice the endearing babylike resemblance.

This waxy, spring-blooming orchid has a hinged lip—the top middle part of the “swaddle”—that shoves a visiting bee backwards against its sticky pollinia. Male bees seem especially attracted to the scent, possibly in hopes of collecting volatile cologne chemicals on their legs to enhance courtship rituals. The flowers of the swaddled baby orchid are extremely long-lasting, an evolutionary adaptation to increase chances of pollination in environments where pollinators are scarce and/or competition is high.



VAMPIRE ORCHID

(Dracula vampira)

Whether you are a Bela Lugosi fan or prefer Frank Langella, Dracula is an iconic figure with his black cape and chalky face etched with dripping blood. Orchids being the fantastic things they are, there's one that looks like it belongs in Transylvania, too. Though *Dracula vampira* instead hails from a cool Ecuadorian cloudforest, it has the blackness, the rivulets of "blood," and even a musty-coffin scent.

Dracula means "little dragon," and the specific epithet *vampira* was irresistible to botanist Carl Luer, who described this species in 1978. Triangular 10-inch flowers end in long fanglike tips. But it is the flower's cupped lip and mushroomy odor that attract gnats, which mistake it for the sort of fungal fruiting body they regard as a prime egg-laying site.

GROWING GREAT PRETENDERS

Orchid culture varies as much as the plants themselves. Some species are very easy to grow at home, while others sulk and languish if temperature, humidity, moisture, and light are not strictly managed to their liking. Of the ones discussed in this article, the least particular are the spider orchids (*Brassia* spp.) Most of these do well in free-draining pots of bark chips on bright windowsills where night temperatures stay around 55 degrees Fahrenheit. The swaddled-baby orchids (*Anguloa* spp.) and pansy orchids (*Miltoniopsis* spp.) will grow in similar conditions, but prefer higher humidity levels that require growing them on humidity trays or in a greenhouse. A general tip: orchid hybrids tend to be more free-flowering and easier to grow than many species. Whichever orchids you'd like to grow—and hopefully you do try at least one or two—there are plenty of authoritative references that spell out exactly how to please individual types.

—jw



Dangerously Pretty

BY KRIS WETHERBEE

JANET LOUGHREY



Warnings about plant toxicity are sometimes overstated, but here are a few truly poisonous plants that you should know about, especially if you have children or pets.

YOU COULD say I first learned about poisonous plants at the tender age of six. A shrub bearing beautiful white berries caught my eye one day while I was playing in the front yard. I reached out to pick a few, but was stopped short of putting them in my mouth by my sharp-eyed mom. Although I've never been sure, the shrub was likely a native snowberry (*Symphoricarpos albus*), the berries of which can cause serious intestinal distress. Thankfully I didn't have to learn about poisonous plants the hard way.

The vast majority of plants are relatively harmless. Some are only mildly toxic, with exposure or ingestion producing symptoms ranging from skin rashes or mild diarrhea to slight stomach upset. But a small percentage are truly toxic if eaten, with symptoms ranging from severe digestive upset to convulsions—and in

some cases, even death. In the 2015 Annual Report by the National Poison Control Center, plants were implicated in over 28,000 cases of poison exposures.

ASSESSING TOXICITY

More than 700 plant species grown in the United States are known to be poisonous, but the degree of toxicity varies according to the type and quantity of toxic substances each species contains.

Poisonous plants are generally classified as being mildly, moderately, or high-

Top, left: Often grown as a striking summer annual, castor bean produces attractive beanlike seeds that can be deadly if ingested. **Top, right:** A common poisoning device in mystery novels, foxgloves are the source of a potent heart medication. **Opposite page:** Beloved for its fragrant, bell-shaped flowers, lily-of-the-valley contains toxins in all its parts.

ly toxic. Some plants contain allergenic or irritant compounds and produce skin irritation and/or rash after contact with the plant. For example, many of us are sensitive to poison oak or poison ivy to varying degrees, but some people also get mild dermatitis after contact with boxwoods (*Buxus* spp.) or chrysanthemums. And while poinsettias are not poisonous, if you have a sensitivity to latex, contact with them can result in a skin rash.

The potential for problems increases when a poisonous plant is ingested. At the "mild" end of the scale are plants that typically produce localized mouth or throat pain, or limited digestive distress. Calla lilies (*Zantedeschia* spp.), caladiums, and elephant's ear (*Colocasia esculenta*) contain calcium oxalate crystals that can pierce cell walls in the mouth and throat causing pain and swelling. Elephant's ear—also known as taro or dasheen—is a curious

TRULY TOXIC GARDEN PLANTS

Poisonous plants can vary in their toxicity and the type of reaction they produce. The truly toxic ones cause serious problems—even death—if ingested. Take special note of the following garden plants.



Daphne odora



Delphinium sp.

CASTOR BEAN (*Ricinus communis*)

Annual with large, attractive leaves growing six to 15 feet tall. Ornamental fruit capsule is large, prickly, and bright red, and contains beanlike seeds.

Poisonous parts: Seeds are highly toxic if chewed and ingested, leaves to a lesser extent.

Toxic principle: Contains ricin, a highly toxic protein, and ricinine, an alkaloid.

Symptoms: Nausea, vomiting, abdominal pain, bloody diarrhea, convulsions, coma; also gastrointestinal, kidney and liver damage; can be fatal. Contact with broken seeds may produce severe dermatitis in some individuals.

Comments: Carefully store seeds out of the reach of children and pets prior to planting; cut off flower stalks before they set seed.

DAPHNES (*Daphne* spp.)

Evergreen, semi-evergreen, or deciduous shrubs with clusters of typically fragrant flowers followed by red or yellow fruit.

Poisonous parts: All parts are poisonous, especially fruits.

Toxic principle: Mezerein, a diterpene ester

Symptoms: Swelling and ulceration of mucous membranes in mouth, throat, and stomach; nausea, vomiting, internal bleeding, kidney damage, coma, may be fatal; leaves contain irritant chemicals that may cause burning or blisters on exposed skin; ingesting berries can be fatal.

Comments: All daphne species are toxic, particularly *D. cneorum*, *D. genkwa*, *D. gnidium*, *D. laureola*, *D. mezereum*, and *D. odora*.

DATURA, COMMON THORNAPPLE (*Datura* spp.)

Annual nightshade family members with erect, funnel-shaped flowers followed by spiny fruit capsules containing many seeds. Angel's trumpet (*Brugmansia* spp.), a closely related and similarly toxic tropical species, has drooping flowers and fleshy fruit.

Poisonous parts: All parts are highly toxic.

Toxic principle: Tropane alkaloids.

Symptoms: Hallucinations, headache, delirium, rapid and weak pulse, convulsions, coma; can be fatal.

Comments: Cut off spent flowers to prevent formation of seed pods, because seeds are particularly toxic.

DELPHINIUMS, LARKSPUR (*Delphinium* spp.)

Annuals, biennials, or perennials with upright spikes of elongated flower clusters growing three to seven feet tall; smaller species grow to 12 inches tall.

Poisonous parts: All parts, especially young plants and seeds.

Toxic principle: Potent alkaloids, including delphinine and ajacine.

Symptoms: Burning and numbness of mouth and throat, intense vomiting and diarrhea, muscular weakness and spasms, respiratory system paralysis, convulsions; can be fatal.

Comments: Most species are also poisonous to cattle.

FOXGLOVES (*Digitalis* spp.)

Biennial or short-lived perennial with showy tubular flowers on elongated spikes growing two to eight feet in height.

Poisonous parts: All parts, including water from vases containing cut flowers.

Toxic principle: Cardiac or steroid glycosides.

Symptoms: Nausea, vomiting, diarrhea, stomach pain, severe headache, dangerously irregular heartbeat, mental confusion, tremors, convulsions; can be fatal.

Comments: Source of pharmaceutical digitalis, a potent heart medication.

LILY-OF-THE-VALLEY (*Convallaria majalis*)

Spreading perennial groundcover to nine inches tall, with white or pale pink sweet-scented, bell-shaped flowers, sometimes followed by bright red berries in fall.

Poisonous parts: All parts, including water from vases containing cut flowers.

Toxic principle: Cardiac glycosides and saponins.

Symptoms: Irregular heartbeat and pulse, abdominal pain, diarrhea, mental confusion.
Comments: Contains cardioactive toxins similar to those in foxglove; glycoside compounds are a source of pharmaceutical heart medications.

MONKSHOOD (*Aconitum* spp.)

Perennial or biennial with showy hooded blue, purple, or yellow flowers that rise above handsome clumps of lobed or deeply cut leaves; plants are two to six feet tall.

Poisonous parts: All parts.

Toxic principle: Potent alkaloids, including aconitine.

Symptoms: Burning of mouth and numbness of throat; paralysis of the respiratory system; nausea, vomiting; muscular weakness and spasms; convulsions; can be fatal.

Comments: Avoid planting near edible root crops to avoid accidental harvesting of the toxic tuberous root.

OLEANDER (*Nerium oleander*)

Ornamental evergreen shrub or small tree with leathery leaves and funnel-shaped, typically fragrant flowers clustered at tip of twigs or branches.

Poisonous parts: All parts are extremely toxic, green or dry, including smoke from burning branches or water from vases containing cut flowers.

Toxic principle: Cardiac glycosides, saponins.

Symptoms: Nausea, vomiting, stomach pain, diarrhea, dizziness, irregular heartbeat; can be fatal.

Comments: Do not use the stems or branches as skewers for food; a single leaf may be highly toxic if ingested.

WATER HEMLOCK (*Cicuta maculata*)

Three- to six-foot-tall perennial wildflower with tuberous roots and purple mottled stems, pinnately compound leaves, and dome-shaped clusters of small white flowers in summer. Found along streams and in swamps, ditches, and wet meadows.

Poisonous parts: all parts are highly toxic

Toxic principle: ciutoxin and cicutol

Symptoms: muscle spasms, dizziness, diarrhea, stomach pain, convulsions, seizures; can be fatal.

Comments: Most toxic indigenous plant in North America, toxic to both humans and animals. Roots may be mistaken for wild parsnip.

WHITE SNAKEROOT (*Ageratina altissima*, syn. *Eupatorium rugosum*)

Clump-forming perennial wildflower with stiff stems one to five feet tall. Terminal clusters of white flowers appear in late summer to fall.

Poisonous parts: all parts

Toxic principle: tremetone

Symptoms: Weakness, nausea, abdominal pain, vomiting, delirium, coma; can be fatal.

Comments: Inhabits open forests, roadsides, disturbed areas, and fields. Early American settlers were sickened by drinking milk from cows that ingested white snakeroot.

YEWS (*Taxus* spp.)

Evergreen shrubs or trees are dioecious (male and female flowers on separate plants), with females producing red, fleshy berrylike fruits—each containing a single green seed.

Poisonous parts: Bark, leaves, seeds.

Toxic principle: Alkaloid taxine, a cardiac depressant.

Symptoms: Nervousness, trembling, slow heart rate and pulse, breathing difficulties, abdominal pain, vomiting, convulsions, cardiac failure; can cause sudden death.

Comments: The red, fleshy part surrounding the seed—called the aril—is sweet and edible, but the single seed it contains is highly toxic, along with the rest of the plant.



Aconitum 'Pink Sensation'



Nerium oleander



Taxus × *media* arils

case; its tuberous roots and young leaves are staple food items in many tropical regions. Apparently the cooking process breaks down the poisonous compounds.

Many other plants cause nausea, vomiting, and/or diarrhea if they are ingested. Common examples include hollies (*Ilex* spp.), four-o'clocks (*Mirabilis jalapa*), and soapwort (*Saponaria officinalis*). In many cases, the amount ingested influences the severity of symptoms. For instance, daffodils (*Narcissus* spp.) are toxic only if consumed in large quantities.

Highly toxic plants, however, cause a host of debilitating symptoms even in small doses. Azaleas and rhododendrons contain a toxic compound called andromedotoxin, a hydrocarbon pres-

Resources

Animal Poison Control Center, (888) 426-4435. www.aspca.org/apcc. (A consultation fee may be charged.)

Cornell University Poisonous Plants Database, www.ansci.cornell.edu/plants.

Handbook of Poisonous and Injurious Plants (2nd ed.) by Lewis S. Nelson, Richard D. Shih, and Michael J. Balick. Springer Publishing, New York, New York, 2007.

National Capital Poison Center, (800) 222-1222. www.poison.org.



ent in many conifers and plants in the heath family (Ericaceae) that can cause a variety of symptoms—the most extreme being paralysis or coma. Plants with berries containing certain glycosides or alkaloids—such as deadly nightshade (*Atropa belladonna*), privet (*Ligustrum* spp.) or daphnes—may even prove fatal if eaten.

“The true toxicity depends on what body tissue they impact,” says Sharon M. Douglas, emeritus plant pathologist with the Connecticut Agricultural Experiment Station. Different plant toxins may affect the spinal cord, brain, heart, liver, kidneys, or nervous system. “The level of a particular toxic compound may also be quite variable within a plant or plant family,” Douglas adds. Take the nightshade family (Solanaceae), for example. Tomato fruits and potato tubers are culinary staples, yet the leaves, vines, sprouts, as well as the potato’s



The tubers of elephant’s ear, above, are edible if cooked, but the plant contains calcium oxalate crystals that can cause mouth and throat irritation. All parts of evening-blooming daturas, left, are toxic.

green berries are highly toxic and may even be fatal. All parts of deadly nightshade are highly toxic.

Another plant with both edible and toxic parts is rhubarb—the stems are edible but the leaves are highly poisonous. The fruits of apricot, peach, nectarine, and cherry are delicious, but the seeds, twigs, and foliage contain cyanogenic glycoside, a highly toxic compound that can produce cyanide when plant cells are damaged. Be forewarned: don’t use branches or twigs of these trees as kebab skewers or roasting sticks.

The plant species, condition, stage of growth, and the environment all play a part

KEEPING PETS SAFE

Dogs, cats, and other pets are not immune to the toxins contained in certain plants. Pets like to nibble—sometimes on shoes and furniture, and other times on indoor and outdoor plants. Plants that are poisonous can cause reactions ranging from mild nausea to seizures, coma, or even death. Just as with humans, the effects can vary depending on the size, weight, and age of the animal, time of year, plant species, and plant parts consumed.

Plants that are poisonous to humans are also generally poisonous to pets, with castor bean, yew, oleander, mistletoe, rhododendron, rhubarb leaves, wild black cherry, daphne berries, water hemlock, and jasmine berries rating among the most toxic. Bulbs like tulips, daffodils, and autumn crocus can cause seizures and damage the heart. And when the bulbs smell like onions, which some do, they can be quite appealing to certain dogs. The bark, leaves, and flower buds of hydrangea contain hydrangin, a cyanide-type toxin that, when ingested, induces a very quick onset of symptoms that may even result in death. Other potentially poisonous plants include those grown indoors, such as cyclamen, kalanchoes, peace lilies (*Spathiphyllum* spp.), scheffleras, dracaenas, dieffenbachias, philodendrons, and pothos (*Epipremnum* spp., syn. *Scindapsus* spp.).

Plants that are non-toxic or only mildly toxic to humans can still be deadly to pets. For example, heavenly bamboo



(*Nandina domestica*) may cause seizures, respiratory failure and death in both dogs and cats. Be especially careful with lilies (*Lilium* spp.) even in cut flower arrangements, because all parts—from the stamens to the root—are highly toxic to cats, resulting in kidney failure and death. (Dogs only get stomach irritation.)

Mulch, too, can be just as poisonous as it is appealing—at least when it comes to cocoa bean shells and dogs. If large amounts are ingested, this by-product of chocolate production can cause symptoms similar to those seen with canine chocolate poisonings. The most common symptoms that occur following ingestion are hyperactivity, muscle tremors, and vomiting, although the cocoa bean shells may be lethal if consumed in large enough amounts. There is slightly less of the toxic principle, theobromine, in the

processed mulch (0.19 to 2.98 percent) than in unprocessed cocoa beans (one to four percent), but it's best to be on the safe side and avoid using this mulch if you have dogs with indiscriminate eating habits.

It's always best to play it safe when it comes to pets and potentially poisonous plants—especially if you have a pet that is curious or likes to nibble. The best options are to keep plants out of your pet's reach, put a barrier between plants and your pets, or simply remove potentially poisonous plants from the areas where pets play. —K.W.

in the levels of toxins present within plants. Other variables can influence the degree of reaction and severity of symptoms, such as a person's health status, age, and weight in relation to how much is ingested. Small children are particularly at risk because they have a lower body mass than adults and can be affected by smaller doses of toxins.

AVOIDING DANGER

One of the most effective ways to avoid the hazards of plant poisoning is to learn about the toxic potential of any plants in your garden before a poisoning occurs. And don't forget to include your houseplants. "In 2016 there were 861 patients with potential plant ingestions and 104 patients with potential mushroom ingestions" at the Central Ohio Poison Center, says director Henry Spiller. "Indoor plants [were implicated in] about 60 to 62 percent of the plant cases," he adds.

Be sure to educate everyone in your family about the potential dangers of plant poisonings and never use any plant parts for food or food preparation purposes unless you are absolutely sure they are safe. Young children especially should be taught never to eat any part of an outdoor or indoor plant without asking first. "Children are curious, they explore their environments and often ingest plants that are in their reach," says Julie A. Weber, director of the Missouri Poison Center. Indoor plants that are within reach of children can be particularly hazardous. "Most plants aren't anything to worry about, but a few can be a problem," she says and advises that if someone ingests a plant that may or may not be poisonous, play it safe and call your poison center for help.

Should a situation arise where someone has eaten a potentially poisonous plant, stay calm and act quickly. First, remove

any plant parts from the person's mouth. If it's a life-threatening emergency, immediately call 911. Otherwise, call the National Capital Poison Center (NCPC) at (800) 222-1222 and you will be connected to the poison control center nearest you.

While a plant may be toxic, it's important to keep things in perspective. Ripping out plants or avoiding new plantings because of potential toxicity is unrealistic. After all, part of the enjoyment of gardening is growing a diversity of plants, and the vast majority of plants are not poisonous. Just heed those that are.

Kris Wetherbee specializes in gardening, wild-life and environmental issues. She gardens and writes from her home in Oakland, Oregon. This is an updated version of her original article, which was published in the November/December 2006 issue of this magazine.

Herbarium Explorations



Much more than collections of dead plants and fungi, herbaria are irreplaceable repositories of historical plant information vital to a wide variety of scientific applications. BY MARCIA G. YERMAN

IT'S EASY to be amazed and inspired by the vibrant, living collections of plants at public gardens and universities. But there are 400,000 species of plants and possibly millions of species of fungi on the planet—far more than all the public gardens in the world can display. The job of maintaining historical records of all those plants and fungi goes on largely out of public view, in archives known as herbaria.

“Herbaria serve as an encyclopedia of the Earth’s flora,” says Vicki Funk, Senior Research Botanist & Curator at the Smithsonian National Museum of Natural History (NMNH) in Washington,

D.C. “They are really our only record of what’s been on the planet in the past, what’s here in the present, and what we predict into the future,” she adds. Yet many people don’t fully understand why herbaria are important. “There’s a misconception that the collections are just a bunch of boring dead plants, and that what we do is not science,” Funk says. “In reality, it’s not that at all. We collect specific things to answer specific questions.”

The specimens in herbaria are irreplaceable sources of information regarding the diversity of species and the habitats they come from. They play a critical role in taxonomy,

systematics, anatomy, morphology, ethnobiology, paleobiology, and conservation biology. They can be used to confirm the identity of a newly discovered species, and provide locality data for conservation assessments. Specimens can document the effects of climate change on flowering phenology and provide material for DNA analysis and conservation genetics.

INSIDE A HERBARIUM

According to the *Index Herbariorum*, an online catalog of herbaria maintained by the New York Botanical Garden (see “Resources,” page 31), there are 2,885 herbaria

Above: In the U.S. National Herbarium at the Smithsonian’s National Museum of Natural History, botany department staff examine pressed and jarred specimens of algae. **Opposite:** A preserved specimen of *Rosa palustris* from the New York Botanical Garden’s herbarium.



NEW YORK BOTANICAL GARDEN
02456474



The New York Botanical Garden

Rosaceae

Rosa palustris Marshall
det. D. Atha, 2015

United States of America, New York, New York Co., New York City,
Central Park, Harlem Meer, south side. Between 107th and 108th St and
between 5th and 6th Aves. 40.795649N, 73.951754W (WGS84, ±25m),
ca 6 m elev.

Herb; flowers very fragrant. Planted and spreading locally.
Sample preserved in silica gel at NY.

Daniel Atha & Regina Alvarez 14674

30 Jun 2014

THE PLANT DOCTOR

Carver was born into slavery in Missouri in the 1860s. As a child, he was fascinated with plants and the natural world. Local farmers called him the “Plant Doctor” for his ability to nurture sick plants. Carver grew up to become one of America’s greatest scientists and agriculturists.



Carver is best known for his promotion of peanuts in American agriculture. Peanuts still covered in dirt in this Herbarium specimen demonstrate how peanuts grows underground with the plant’s roots.



Visitors, below, enjoy browsing preserved specimens during a herbarium exhibit at the New York Botanical Garden earlier this year. The exhibit included a display on the work of American botanist George Washington Carver, left. A specimen, above, collected during Captain James Cook’s 18th-century voyage to the South Pacific, is part of the herbarium’s collection.



TOP LEFT: MARCIA G. YERMAN. TOP RIGHT AND BOTTOM: COURTESY OF NEW YORK BOTANICAL GARDEN

worldwide containing approximately 375 million specimens. Of these, the William and Lynda Steere Herbarium at the New York Botanical Garden (NYBG) is the second largest herbarium in the world (the largest is at the National Museum of Natural History in Paris, France). It houses the most extensive collection in North America with over 7.8 million preserved plant and fungal specimens, including samples from every continent.

This past summer, the NYBG hosted “What in the World is a Herbarium?” to showcase this lesser known side of its work. I toured the exhibit, which explored different aspects of the Steere Herbarium’s mission, from the collection of specimens and the process of preservation, to the history of the research of American botanist and inventor George Washington Carver, a former slave who spent much of his career researching alternative crops to cotton.

The theme of one wall, “Saving the Plants of the World,” outlined the efforts of NYBG’s staff to collect plant species in geographic areas from Myanmar (formerly Burma) to the Brazilian Amazon. From a diversity standpoint, Myanmar’s northern forest is exceptional; of the 6,000 plant species found there, 25 percent don’t exist anywhere else in the world. Specimens in the herbarium from places like these may represent the last bit of evidence that a species existed on Earth.

I also went behind the scenes with Matthew Pace, the assistant curator and an expert on orchids of the New World. In the climate-controlled herbarium stacks, I viewed with amazement historic specimens that included a plant collected on Captain James Cook’s first voyage, when he led an expedition to the South Seas beginning in 1768; a moss collected and documented by English naturalist Charles Darwin; and plants gathered by artist and explorer John J. Audubon, who used them to ensure the accuracy of the habitats depicted in his paintings of birds.

In addition to the historical significance of specimens like these, Pace stressed their importance to current research. For example, ethnobotanists can consult herbarium collections to examine plant use by societies around the world, and scientists on the ground can apply this knowledge while interacting with local populations to develop sustainable practices.

One of the most important components of herbaria collections is what are known as type specimens. These are the original individual specimens from a population that serve as the reference point for naming a new species, so they are vital for determining the correct application of a botanical name.

“Our whole system of nomenclature is linked to these herbarium specimens,” says Funk. “Everything that has a name must have a type specimen as a record of it.” The U.S. National Herbarium, for instance, holds more than 120,000 type specimens.

REVELATIONS FROM PRESERVED PLANTS

I left the NYBG’s exhibit with a whole new level of appreciation for the scientists who study dead plants. It was particularly encouraging to learn about the work occurring, both in the United States and elsewhere, to protect plant life in the face of climate change and other threats. Unlike the situation with endangered animals—especially the so-called charismatic megafauna such as pandas and elephants—the narrative around threatened plants is often under the radar.



Research on herbarium specimens of goldenrod, such as this one, helped scientists learn about the relationship between levels of atmospheric carbon dioxide and the protein content of bee pollen.

CREATING A HERBARIUM SPECIMEN

Each week, the New York Botanical Garden (NYBG) receives 1,000 new specimens collected by its research staff to accession into the herbarium. During my visit, I watched Sheranza Alli, who has worked in the mounting room for 25 years, demonstrate how these plant samples become part of the collection. She has created 250,000 mounted specimens during her career, averaging about 50 per day.

Working with an already pressed specimen, Alli used tweezers and gloved hands to carefully arrange the plant parts to her satisfaction on special acid-free paper. Then she drizzled glue on the back surfaces and added weights on top of them to help them dry flat. The specimen was labeled with the name of the plant, the collector, date gathered, as well as key habitat data. Once dry, the new mount would move to the climate-controlled herbarium. The specimen would also get photographed with a barcode and “whole label data” for the digital database.

“The collection represents 350 years of what has been going on in nature,” says Nicole Tarnowsky, assistant director of NYBG’s herbarium. “This permanent preserving will help botanists hundreds of years from now.” —M.G.Y.



Sheranza Alli, left, an aide at the NYBG herbarium, prepares a herbarium specimen. A corpse flower (*Amorphophallus titanum*) that drew huge crowds when it bloomed at the NYBG conservatory, above, was displayed in its dried form during the herbarium exhibition, top.

Herbarium collections can reveal a lot about how climate change affects and will affect plants, explains Dennis Desjardin, director of the Harry D. Thiers Herbarium in San Francisco, California. “The presence or absence of a specific species in an area reflects environmental conditions at the time of collection, hence they can be used to evaluate climate change, competition, and other data pertinent to conservation efforts,” he says.

Gary Krupnick, a conservation biologist who is Head of the Smithsonian’s

Plant Conservation Unit in Washington, D.C., points out that new ways to glean climatic insights from herbarium collections continue to surface. “Today, we’re using specimens in ways the original collectors could never have imagined,” he says. “For instance, a recent study by a team of scientists examined the protein content of pollen from specimens of Canadian goldenrod dating from 1842 to 1998, that are housed at the U.S. National Herbarium. They found that as atmo-

spheric carbon dioxide levels increased, the protein content of the pollen decreased. Thus, an increase in carbon dioxide emissions over the last several decades has made a key food source for bees less nutritious than in the past.”

Desjardin is also particularly excited about what herbarium specimens can tell us on a molecular level. “Each specimen contains DNA that can potentially be sequenced, so they provide genetic information for understanding speciation

and evolutionary relationships,” he says. Genetic sequences for individual plant species are being logged into online databases such as GenBank, so that researchers everywhere can access and analyze the data. This information has widespread applications in fields such as medicine, pharmacology, and bioindustry.

COLLABORATIVE EFFORTS

Along with genetic sequences, technological innovations of the Digital Age have made it possible to digitize herbarium specimens and make them more widely accessible online. This has encouraged herbaria to “become more

Resources

Index Herbariorum: A global directory of public herbaria and associated staff, <http://sweetgum.nybg.org/science/ih>.

The C.V. Starr Virtual Herbarium: Gateway to the digitized specimens of the William and Lynda Steere Herbarium, <http://sweetgum.nybg.org/science/vh>.

collaborative,” says Funk, who has been working at the U.S. National Herbarium at the Smithsonian for more than 36 years.



A staffer at the U.S. National Herbarium, above, scans herbarium specimens. Digitization is allowing herbaria to share their collections with researchers around the world.

“It used to be that all the collected specimens went back to major herbaria,” she says. “Now the plant collections are shared with the country of origin. Also, many programs are digitizing the specimens and the literature so people in places other than major cities with big herbaria have access to resources they never had before.” Digitization also provides a cost-effective alternative to having to borrow a specimen across long distances or send a researcher to view it in person. And now that individual institutions and researchers are no longer the sole holders of specialized regional or plant family collections and data, there is greater participation and higher standards in academic research, Funk adds.

Among the many herbaria moving toward this free flow of information are the ones at NYBG and Smithsonian, which have uploaded their collections to a free searchable database (see “Resources,” this page). Full documentation accompanies the high-resolution images. Every month, thousands of records are uploaded. In 2013, the NYBG reached the milestone of its two-millionth specimen for digitization, which turned out to be the purple pitcher plant (*Sarracenia purpurea*), a carnivorous plant native to eastern North America. The U.S. National Herbarium hit the same digitization milestone in 2016.

While new technologies continue to advance our ability to tackle complex conservation issues and expand our scientific knowledge, herbaria provide an essential foundation for this critical work. “Though a third of the world’s plant species are in inexorable decline and headed to extinction, we have the skills and ability to save the majority if we work hard to do so,” says James S. Miller, Senior Vice President for Science and Conservation at the Missouri Botanical Garden in St. Louis, which holds the second largest collection of plant specimens in North America in its herbarium. “The herbarium is the catalog that we work against. We need the whole list of the world’s plant species before we can decide which need attention to ensure their future survival.”

Marcia G. Yerman is a freelance writer and artist based in New York City.

Explore



Your Roots

The versatile potato, shown here, is a familiar culinary favorite, but several ornamental plants also yield tasty tubers to try.

BY NIKI JABBOUR

THERE IS something special about crops that grow beneath the soil; the harvest always feels like a treasure hunt, and even digging a few handfuls of potatoes for dinner becomes a family activity. While potatoes are annuals, there are plenty of potatolike crops that are perennials and offer years of reliable cropping. They've become popular among foragers and permaculturists, who appreciate their resilience and ease of cultivation. Some plants we grow as ornamentals, such as daylilies and dahlias, also produce tasty, edible tubers. Now, I'm not saying you should forego potatoes completely, but at least consider trying out the following alternatives.



DAYLILY

(*Hemerocallis fulva*) aka ditch lily

Hardiness: USDA Zones 3–9

Hails from: Asia

Varieties to try: For culinary purposes, stick to *H. fulva* rather than daylily cultivars.

Daylilies are perhaps the perfect perennial. They're easy to grow, adapt to a wide variety of soil and light conditions, and are drought tolerant and insect resistant. Plus, they produce weeks of gorgeous flowers. And they're edible. We eat the flower buds, raw and cooked, and add the opened blooms to salads, but another treasure is waiting beneath the soil surface: a bounty of tubers.

The tubers look like baby fingerling potatoes and are eaten raw or cooked. They have a crisp texture paired with a nutty sweetness that is nice when they are pan-fried or roasted until tender. There are tens of thousands of daylily cultivars, but for culinary purposes, I would recommend sticking to the regular orange ditch lily, *Hemerocallis fulva*. Please note that these are *not* true lilies (*Lilium* species), which are toxic.

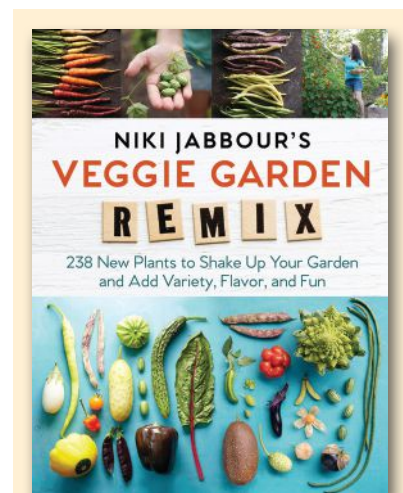
SO EASY TO GROW

In some regions of the United States, ditch lilies are considered an invasive species for their ability to spread rapidly. Most cultivated forms of daylily are clump-forming and don't become invasive. Ditch lilies, on the other hand, spread by rhizomes and can form large colonies if unchecked.

As you may have guessed from the above warning, ditch lilies are easy to grow and happy in a wide variety of soils and light conditions. To encourage the largest harvest of tubers (or flower buds), plant them in good garden soil in full sun—perhaps in a raised bed where their enthusiastic growth can be contained.

The highest-quality tubers are harvested in late fall or very early spring. In summer, the tubers turn spongy and are not palatable. The tubers don't need to be peeled, but they will need a good scrubbing to remove any dirt. Once clean and patted dry, toss them with olive oil, sprinkle with salt and pepper, and roast them in the oven until fork-tender.

Some people (an estimated five percent of the population) have issues digesting daylilies, so begin with a small quantity until you know whether you can tolerate this forager favorite.



This is an adapted excerpt from *Niki Jabbour's Veggie Garden Remix* by Niki Jabbour, with photography by Mars Vilaubi, available February 2018. Used with permission from Storey Publishing.



GROUNDNUT

(*Apios americana*) aka American groundnut, hopniss, potato bean, Indian potato

Hardiness: USDA Zones 4–9

Hails from: North America

Varieties to try: 'Nutty'

Groundnut is a perennial vine native to North America and often favored by foragers. Although it belongs to the bean family, its main crop is its peculiar tubers, which look like beads on a string. Each individual tuber is about the size and shape of a walnut or a chicken egg, and to me, the flavor is kind of like a nutty potato, but with hints of turnip. The texture is also similar to that of potatoes, and they can be boiled, steamed, roasted, baked, or fried like potatoes.

Grow it for the tubers, or grow it for the bright green foliage and large clusters of highly fragrant, maroon-and-ivory flowers. The pealike blooms appear in mid- to late summer and are also edible. These are followed by green beanlike pods, which contain edible seeds. Unfortunately, my growing season isn't long enough to mature the seeds, but that's okay, as the tubers are the star of the show.

GROWING GROUNDNUT

In its natural habitat, groundnut grows near streams, rivers, or marshes. It loves rich, moist soil and therefore will do just fine when planted in a damp spot. However, if you don't have such a site, it will still grow fine in regular loam, just be sure to dig in plenty of compost or aged manure before planting. You'll also need to provide a strong support like a fence, trellis, or arbor for the plants to climb. They can grow more than 10 feet in a single season, so be prepared for vigorous vines. It's a good choice for an edible forest garden, spreading as a groundcover or climbing nearby trees and shrubs.

Tubers can be ordered from some seed catalogs; you might also find a container-grown plant at a native plant nursery. Or if you have a gardening friend with an existing vine, just ask for a few tubers. Plant them two to three inches deep in spring, as early as a few weeks before the last expected frost.

DIGGING ROOTS

Groundnut should be harvested in the autumn of its second year. You can dig a few small tubers the first year, but they'll only be about an inch in diameter. If you can wait until the following season, they will be egg-size. It's also a good idea to wait to harvest until the plants have been hit with frost and have died back. This will enhance the flavor of the tubers.

The swollen tubers lie just below the soil surface. Dig carefully until you find a string and then pull gently, loosening the soil with your hand or a tool, to expose the tubers. Don't overharvest! Make sure to leave a few tubers so that your plants will come back.

The protein-packed tubers (17 percent protein content) have a latexlike sap that makes the raw tubers bitter, so it's best to cook them. We like to boil them first and then pan-fry slices in a bit of olive oil. You can also add the boiled chunks to soups, stews, and other dishes. As with all new-to-you foods, start with a little to reduce the severity of a potential allergic reaction.

The young seedpods, which look like green beans, can also be eaten young. Once mature, the seeds inside can be shelled and dried for winter soups and other bean dishes. They need to be cooked thoroughly before being consumed.



DAHLIA

(*Dahlia pinnata*)

Hardiness: USDA Zones 8 and above

Hails from: Central and South America

Variety to try: 'Yellow Gem'

When I first started planting dahlias, I did it for the flowers. From tiny pompon to huge dinner-plate types, I've loved them all. Each spring, I would tuck clumps of tubers into our flower and vegetable beds to provide a long show of color and countless stems for cut flowers. Plus, the blooms are irresistible to pollinators! Come autumn, those tubers would be dug up again for winter storage, with the large clumps piled up on the soil like just-harvested potatoes. And, like potatoes, the tubers of dahlias are edible.


Dahlias are a member of the sunflower family and are also related to Jerusalem artichokes (*Helianthus tuberosus*). If you can't tolerate Jerusalem artichokes, you probably don't want to eat your dahlias. But if you do, keep in mind that of the tens of thousands of cultivars grown in gardens, not all make good eating; modern dahlias are bred for their flowers, not their tubers. However, dahlias were an important crop to the Aztecs and even as a food source in Europe as recently as several hundred years ago. Once the flowers became popular, though, the edible tubers were largely forgotten.



CRUNCHY AND MILD

Not all dahlia tubers taste good; some are bitter, some are bland, others have a sweet flavor with a crunchy texture or a mild flavor often compared to that of water chestnuts or celery. Food historian William Woys Weaver recommends the heirloom variety *Dahlia pinnata* 'Yellow Gem'. In my garden in Canada, dahlia tubers are not perennial (they're hardy to Zone 8—or 7 with protection) and need to be planted in mid-spring, when the soil temperature has reached 60 degrees F/15 degrees C). Look for a sunny site with decent soil, and dig in a few inches of compost or aged manure. Plant the clump six to eight inches deep.

Once the plants have been touched by frost in autumn, it's time to dig the tubers for eating and storing. Lift the tubers, gently removing any dirt. Large clumps can be divided in fall or spring; just make sure to leave at least one eye on each clump. The eye is the part that will grow the foliage and flowers once planted. To overwinter tubers, store them in dry peat moss at 40 to 50 degrees F (4 to 10 degrees C). Check them periodically for rot, removing any affected tubers.

Grate or dice them raw in salads and slaws, where the crisp apple texture and celerylike flavor will shine. They can also be grated for baked goods like breads or muffins. Or roast or boil the tubers, eating them like potatoes. Chunks of diced tubers can also be added to soups and stews. 

Niki Jabbour is the author of several books on edible gardening and the host of a Canadian garden radio program. She lives in Halifax, Nova Scotia.

Rose Rosette Disease

by Scott Aker



Left: Rose rosette disease presents itself with red, distorted, swollen stems, as seen on this specimen of 'Ingrid Bergman'. Weedy multiflora roses, above, help spread the disease virus.

STARTING about 20 years ago, the introduction of superior disease-resistant landscape roses such as the Knock Out® series created a mini gardening revolution. Hailed as high-performing, low maintenance, and virtually indestructible, millions of them were planted across the country. Unfortunately, Knock Out® roses—like many other rose varieties—now are becoming infected by a virus that causes rose rosette disease (RRD). Although there is no evidence Knock Out roses are more susceptible than other varieties, RRD is commonly seen on them simply because they are so ubiquitous.

DEADLY VIRUS CARRIED BY MITES

Rose rosette disease was first documented in 1940 in Manitoba and has been expanding its range over time, thanks to the spread of the aggressive and thorny nonnative multiflora rose (*Rosa multiflora*), which was widely planted in the last century and is now considered invasive in many areas of the country. Thriving in parts of all the lower 48 states except for the Dakotas and parts of the interior west, multiflora rose is quite susceptible to RRD, but the disease has not been effective in controlling it. Worse, multiflora rose serves as a reservoir for the RRD virus

and the pest that spreads it, the rose leaf curl eriophyid mite.

The main symptom of RRD is the abnormal growth of congested clusters of stems called witches' brooms. Although the young foliage of healthy roses is usually reddish before maturing to green, the leaves on the witches' brooms are stunted and the new growth stays red. The diseased canes usually do not produce flowers. Often, there is a proliferation of thorns on the stems, but these do not harden like normal rose thorns. The virus eventually impacts the rest of the plant and ultimately kills it.

PRACTICAL CONTROL TECHNIQUES

Since RRD is caused by a virus, there is no pesticide or treatment that will cure an infected plant. It is best to monitor roses every two weeks for symptoms and remove the entire plant, including all the

main roots, when symptoms are noted. Infected plants should be bagged and thrown away, not composted.

Many sources advise sanitizing pruning equipment when pruning roses, but research has demonstrated the virus is not effectively transferred by anything other than the rose leaf-curl mite, which can only survive for eight hours off their rose hosts.

While miticides can reduce the mite population, the best way to foil mites is to create a barrier. Mites are about the size of a pollen grain and wingless, so they depend on air movement to transport them. Chance determines if they end up on another rose they can feed on. Studies have shown that roses separated from other roses by a barrier of dense foliage to intercept the mites are much less likely to be infected, even when high populations of rose leaf-curl mites are present nearby. A tall, dense hedge or planting of ornamental grasses intercepts mites very efficiently.

Breeding resistant roses will likely be the ultimate tool for managing RRD, but this work has just begun. Testing to determine which species are resistant was only recently completed. Many of our most widespread native roses—such as prairie rose (*Rosa arkansana*), smooth rose (*R. blanda*), and Carolina rose (*R. carolina*)—are resistant to RRD or do not develop disease symptoms when infected. Genes from these species might prove useful in developing a new line of landscape roses. No commercially available rose cultivar has been shown to be resistant to RRD.



RRD-infected canes often develop excessive, soft, reddish thorns that never turn green or harden.

Gardening Q&A with Scott Aker

GETTING RID OF BINDWEED

Last summer bindweed covered my phlox; it grew faster than I could keep up with it. What is the best way to remove it?

Field bindweed (*Convolvulus arvensis*) is aptly named. Its fast-growing stems twine around other vegetation, binding and smothering it. It is impossible to control by pulling, since it has far-reaching rhizomes that can grow as deep as 20 feet. The most effective strategy is killing it with a non-selective herbicide containing glyphosate. Move the phlox to another area when spring comes so you can spray the bindweed. You may need to spray established plants several times. You can also smother the bindweed with black plastic or cardboard, but you will have to keep the area covered for at least an entire growing season.

SICKLY BOXWOOD

I have a boxwood hedge in my Southern California garden, and I've noticed some of the plants are losing leaves in spots and dying. What can be done to stop this?

If whole plants are failing, it is likely a root problem. These plants may have been planted more deeply than others, which would make them more prone to root rot, or they may be affected by poor drainage or overwatering. Boxwood (*Buxus* spp.) resents frequent irrigation, so if nearby turf is irrigated, that should be curtailed.

If individual branches are dying, I suspect *Volutella* blight. This is common in boxwood that is sheared, and is most severe in climates with periods of high humidity. Thinning the hedge to promote air circulation, and cessation of shearing, will help control the disease. Remove enough of the outer branches—cutting them back to the spot where they join a larger branch—until you can just begin to see some of the interior branches of the hedge.

—S.A.

Send your gardening questions to Scott Aker at saker@ahsgardening.org (please include your city and state with submissions).

Geography also limits the impact of RRD. Currently, the disease does not appear to be able to spread south of about 30° North latitude—that is, the Gulf Coast, Florida, and much of Texas,

Arizona, and southern California—and it cannot easily spread in areas inhospitable to multiflora rose. In these areas, plant new roses in an area far from other roses just in case they were grown in a part of the country where RRD occurs. If plants are healthy after two seasons of growth, they can be moved into proximity with other roses.

Despite the threat of RRD, you can still successfully grow roses. The key is frequent monitoring and immediate, complete removal of infected plants. New roses from a reputable source free of RRD can be planted in the same area, since the virus does not persist in soil, but be sure to remove most of the root system of the diseased roses and allow time for the fine roots to decay before replanting.

Scott Aker is head of horticulture and education at the U.S. National Arboretum in Washington, D.C.

Nanking Cherry: Big Flavor in a Small Package

by Judith Docken

CHERRY-LOVING home gardeners who don't have room for a full-size cherry tree should look no further than the Nanking cherry (*Prunus tomentosa*, USDA Hardiness Zones 2–7, AHS Heat Zones 7–1). Growing only six to 10 feet tall and wide, this densely twiggy, moderately fast-growing shrub native to China, Japan, and the Himalayas produces an abundant crop of red fruits in summer that are small in size but big in tart cherry flavor. Also called Manchu cherry, Chinese bush cherry, and downy cherry—for the fine hairs on the leaves and fruits—it is extremely easy to grow.

In addition to providing delectable fruit, Nanking cherry is also quite ornamental. The dark brown shiny branches of mature shrubs provide a beautiful contrast to the abundant fragrant, early to late spring blossoms that are pink in bud, expanding to white. In winter, the shrub's reddish exfoliating bark continues to add visual interest. A grouping of Nanking cherries makes an attractive hedge, windbreak, or border.

GROWING GUIDELINES AND TIPS

Nanking cherry grows best in loamy, well-drained soil with a pH between 5 and 7.5 and full sun, although it will tolerate a little shade as well as wind. It can handle semi-arid conditions, so it's an ideal choice for dry locations that are unsuitable for many other fruiting plants.

Nanking cherry needs little pampering once it is established. Mulch around its base with bark, straw, or dry leaves to help moderate the soil moisture and temperature and keep down weeds.

To ensure an abundant harvest, it is best to grow two or more plants close together. Because shrubs produce suckers, allow about six feet between plants. If the production falls off after several years, giving the shrubs a late-winter prun-



Although the tart fruits of Nanking cherry are only about as large as blueberries, the crop is often abundant and the fruits ripen at the same time, providing a generous harvest.

ing may help rejuvenate them. Remove some older branches to open the center to light and to encourage the development of productive new stems. Plants grown as a hedge can also be sheared.

You may need to install fencing to protect stems from foraging rabbits and deer. To protect the crop from hungry birds, wrap plants in wildlife netting; Nanking cherry's small stature makes this feasible. Make sure there isn't an

opening for birds to get in, or they may become trapped.

Another danger to berry production is hail. In southern Alberta, Canada, where I live, this is the biggest weather danger. A severe hailstorm when the plants are flowering can knock off all the blossoms, reducing the cherry crop to almost nothing. If hail is predicted when the shrub is in bloom, drape a sheet, light blanket, or tarp over it to protect the blossoms.

Remove the covering after the storm so insects can pollinate the flowers.

PEST AND DISEASES

Nanking cherry is susceptible to a bacterial infection called branch canker. An infected branch develops small, dark, wet lesions that eventually spread. The infection can be controlled by removing the diseased branches on the first warm, dry day in early spring.

Branch dieback caused by fungi or bacteria occasionally occurs. This too can be controlled by removing diseased branches. Fortunately, such infections rarely kill the whole plant.

Do not grow Nanking cherry near black walnut trees or their relatives, as they do not tolerate juglone, a natural growth inhibitor produced by black walnut roots.

RECOMMENDED VARIETIES

At one time, several cultivars of Nanking cherry were readily available, but this genetic diversity seems to have been lost over the years. Most Nanking cherries of-

fered at nurseries are red-fruited seedlings of the straight species, although you may encounter a white-fruited cultivar called 'Leucocarpa' at a local nursery.

ENJOYING THE HARVEST

Nanking cherry is a relatively short-lived shrub, but it will produce crops for 15 years or so given the right conditions. A mature shrub can produce 12 to 15 pounds of fruit, with most cherries on a single plant ripening all at once. The location of your garden affects harvest season. And since most Nanking cherries are grown as seedlings, there is some variability in the timing of fruit ripening—as well as the size and flavor of fruit—even among plants in the same garden.

In my Calgary garden, fruits turn deep red and are ready for harvest in July or August, although growers in other regions harvest as early as late June. The delicate fruits pull off easily, and can be harvested by handfuls into a bucket. They can be kept in a plastic bag in the refrigerator for a day or two, but deteriorate

PLANTING BASICS

Getting Started Nanking cherry is usually sold as seedlings, which can be planted in late spring, after danger of frost. If you have heavy clay soil, incorporate some compost. Set the seedlings into a hole that is deep and wide enough to accommodate the roots, cover firmly with soil and water well. Water the seedlings regularly until they are established.

Spacing Space plants six to 10 feet apart.

Days to Harvest Shrubs usually begin bearing fruit within three years after planting and continue producing a crop for about 15 years.

Sources

Arbor Day Foundation, Nebraska City, NE. www.shoparborday.org.

Edible Landscaping, Afton, VA. www.ediblelandscaping.com.

Fedco Seeds, Clinton, ME. www.fedcoseeds.com.

Raintree Nursery, Morton, WA. www.raintreenursery.com.



Nanking cherry's profusion of fragrant spring flowers make it a desirable ornamental shrub.

quickly, so use them as soon as possible.

The fruits can be eaten fresh, pitted and dried, or used to make delicious pies. Since the pits are large in relation to the fruit and are a bit tedious to remove, you may prefer to cook the whole fruit and press them through a sieve with a potato masher or the back of a wooden spoon. You can also press the pulp through cheesecloth to extract the clear juice. I use a jelly strainer.

The seedless pulp can be used for preserves, fruit leathers, jams, pies, tarts, or as flavoring in beverages, vinegar, or savory sauces like salsas, salad dressings, or barbecue sauce. The clear juice makes excellent jelly, syrup, juice, or wine.

This ornamental edible has a lot going for it—both in terms of beauty and flavor. And because it's so undemanding, I encourage cool-region gardeners to consider adding a few to their landscapes. ♡

Judith Docken is a garden writer who grows a variety of edibles at her home in Calgary, Alberta.

Massee Lane Gardens: A Camellia Collector's Paradise

by Aaron Dorman

DEEP IN THE heart of central Georgia's peach-growing region lies another source of southern pride: a garden showcasing one of the world's most extensive collections of camellias. These evergreen shrubs come into bloom in either fall or winter, when most other flowering plants are dormant.

Located in Fort Valley, about 100 miles south of Atlanta, Massee Lane Gardens was originally the private home of David C. Strother, a local peach grower who became fascinated by camellias in the 1930s. He began arranging them around his farm, gradually expanding the plantings as he added more varieties. Legend has it that there was never a camellia he didn't like, but according to Celeste Richard, executive director of the gardens, Strother's favorite was 'Ville de Nantes', a camellia whose flowers have red and white variegation and serrated edges. Its petals fold upright in a "rabbit ear" formation. You can still find this selection today, growing along one of the gardens' many brick walkways.

WINTER WONDERS

Before he died, Strother donated the garden and grounds to the American Camellia Society (ACS) in 1966. The society helps coordinate camellia shows around the country and promotes more widespread use of camellias in gardening. Today, Massee Lane has a little over 30 acres of plantings, about a third of which is devoted to more than 1,000 camellia species and selections.

"The camellia is not only beautiful," says Richard, "it blooms in the fall and winter—quite the opposite of many other flowering plants—which is why it is sometimes called 'The Winter's Rose.'"

In fact, Massee Lane's "peak" season is in February, when the winter-blooming varieties are in full flower and the garden hosts its month-long "Festival of the Camellia," which includes weekly gardening



Massee Lane's Abendroth Japanese Garden features a small pavilion and koi-filled pond.



Young visitors enjoy a guided tour in the tropical-themed area of the Children's Garden.

workshops, camellia photography displays, and a competitive camellia show. The other primary bloom period for some camellias is in September and October.

The garden includes areas devoted to species camellias, hybrids, and “antique” selections introduced prior to 1900. One of the newest garden areas, located on the west side of the property, contains a collection of wild camellia species. This garden allows curators to evaluate the landscape potential for some of these little-known camellias and also serves a role in conserving the germplasm of some rare species. Visitors

can follow the walking path or take a golf cart through this area. The curators hope to complete the species garden in the near future, although, as Richard observes, “there are always more species to collect and add.”

Camellia varieties too tender to be grown outdoors can be viewed in the **Thomas Jefferson Smith Memorial Greenhouse**, which also serves as a demonstration area for growing camellias for the production of show flowers. Plantings in the greenhouse are complemented by brick walking paths and a central reflecting pool.



The Environmental Garden shows off a collection of Southeast native plants.

Additional Information

Massee Lane Gardens, 100 Massee Lane, Fort Valley, GA 31030. (478) 967-2358. www.americancamellias.com.

■ Hours: Year round from 10 a.m. to 4:30 p.m., Tuesday through Saturday. Open on Sundays 1 p.m. through 4:30 p.m. Closed on Mondays.

■ Admission: Adults (12+) \$5; Seniors (55+) \$4; free for children under 12.

■ Massee Lane Gardens participates in the American Horticultural Society Reciprocal Admissions Program. AHS members showing a current membership card receive free admission and discounts on educational programs or events.

Other nearby places to explore:


Lane Southern Orchards, Fort Valley, GA. www.lanesouthernorchards.com.

Pearson Farm, Fort Valley, GA. www.pearsonfarm.com.

ADDITIONAL OFFERINGS

Visitors sated by camellia blossoms can follow steppingstones through and around Massee Lane’s **Abendroth Japanese Garden**, to enjoy its small koi pond and pavilion. Massee Lane also has a 15-acre **Environmental Garden** devoted to plants native to the Southeast, and a picnic pavilion overlooking a lake. The lake area hosts a variety of waterfowl, and is a repository for locally endangered flora. Other gardens on the property include a children’s garden divided into several themed areas, a daylily garden embellished with Alice in Wonderland sculptures, a rose garden, and a bog containing orchids and pitcher plants.

The main building houses a notable collection of porcelain sculptures—many of birds and other wildlife—by 20th-century American artist Edward Marshal Boehm. It is also where camellia workshops are held several times a year (the next one is in late January 2018), among other educational events offered by the ACS.

However you spend your time at Massee Lane, your visit will surely leave you as fascinated with camellias as Strother was when he first encountered them almost a century ago. 

Aaron Dorman is an editorial intern for The American Gardener.

Horticultural News and Research Important to American Gardeners



ORNAMENTAL ALLIUM IS 2018 PERENNIAL PLANT OF THE YEAR

The Perennial Plant Association (PPA) has named *Allium* 'Millenium', shown above, as its 2018 Perennial Plant of the Year. This ornamental onion cultivar distinguishes itself with its easy-going nature and season-long good looks. Hardy to USDA Hardiness Zones 3 or 4, 'Millenium' produces neat clumps of grasslike foliage reaching between 10 to 15 inches tall. Spherical rose-purple blooms appear in mid- to late summer and last up to four weeks, drawing pollinators. It thrives in full sun, but will benefit from afternoon shade in regions with hotter climates.

Once established, 'Millenium' is drought-tolerant. Insect pests and deer don't bother it. And unlike some ornamental alliums, 'Millenium' self-sows at a manageable rate. The PPA recommends pairing this cultivar with shorter goldenrods (*Solidago* spp.) or with plants with silvery foliage for striking color contrasts.

Find out more about 'Millenium' and the PPA's Perennial Plant of the Year program at www.perennialplant.org.

STUDY IDENTIFIES NATIVE OAKS AT RISK

Around the globe, oaks (*Quercus* spp.) are key ecosystem species that a myriad of other species depend upon for survival. However, factors such as habitat destruction, climate change, and invasive pests have caused many oak populations to decline to the point of becoming threatened. In the United States, almost a quarter of its native oak species are of "conservation concern," according to a recently published report by the Morton Arboretum in Lisle, Illinois. The report is part of the "Red List of Threatened Species" series of the International Union for Conservation of Nature (IUCN), aimed at identifying flora and fauna most in need of intervention to prevent extinction.

The good news is that none of the 91 American native oak species have gone extinct yet, but three—*Q. boyntonii*, *Q. graciliformis*, and *Q. hinckleyi*—are considered



A Morton Arboretum scientist holds a twig of critically endangered *Quercus boyntonii*.

critically endangered, meaning they have a very high risk of disappearing in the wild. These and the other 13 native oak species identified as threatened are all endemic to the southern and western portions of the country. While climate change is the biggest threat to native oak species overall, most populations are healthy enough to avoid a

"conservation concern" label. Other factors impacting already-vulnerable species include wildfires, land use changes, invasive pests, and logging.

To read the full report, visit www.mortonarb.org/files/Oaks5.pdf.

HALO EFFECT HELPS BEES FIND FLOWERS

Have you ever noticed a slight blue glow around certain flowers? Probably not, because this "halo" occurs mainly in the ultraviolet (UV) portion of the spectrum, which is not visible to humans. Scientists studying the microscopic structure of flower petals recently discovered what creates this halo and why. The researchers—from the University of Cambridge, the Royal Botanic Gardens Kew, and the Adolphe Merkle Institute at the University of Fribourg, Switzerland—were curious about whether there was an explanation for the irregular structures on the surface of some petals, or if, as senior author Beverly Glover put it, they were there because the "flowers couldn't do any better."

The research team found that the asymmetric petal grooves scatter UV light in a way that bees see as a blue halo. To test the impact of the flower "halo effect," the researchers conducted experiments with artificial surfaces and bumblebees. The bumblebees were able to more quickly locate surfaces that produced the halo, regardless of the actual surface pigmentation.

Interestingly, one of the research team's conclusions is that different plant species arrived at this same adaptation over time, a phenomenon known as "convergent evolution." The scientists found that development of these "messy" ridges on petals coincided with the rise of pollinating insects, around 100 million years ago. Plants that use this technique include Chilean evening primrose (*Oenothera stricta*), Namakwa daisy (*Ursinia speciosa*), and flower-of-an-hour (*Hibiscus trionum*).

You can learn more about this research at www.cam.ac.uk/research/news.

GENE-EDITING TECHNOLOGY USED TO CHANGE FLOWER COLOR

In what has been reported as a milestone in ornamental plant breeding, a Japanese research team has used a newer genome-editing process to create a white-flowered version of the common Japanese morning glory (*Ipomoea nil*). The re-



searchers used a tool called CRISPR, which stands for Clustered Regularly Interspaced Short Palindromic Repeats. The process involves using an enzyme to slice and remove

a specific section of the DNA sequence that controls production of anthocyanin, the pigment that gives morning glory flowers their normal pink to purple coloring.

Although the color change achieved in this experiment is not intended to wow gardeners or create a new plant introduction, scientists indicate the study has broader implications for the efficacy of using this

Researchers used CRISPR technology to remove the genes that make Japanese morning glory flowers purple, resulting in a version that produces white flowers.

gene-editing technology to alter not only flower color but other

physiologic factors in a wide array of plants.

You can read more about the experiment at www.nature.com/articles/s41598-017-10715-1.

HELP HARVARD'S ARBORETUM IMPROVE PLANT IMAGE LIBRARY

The Arnold Arboretum of Harvard University in Boston, Massachusetts, is home to a diverse collection of 15,000 plants from around the world. It holds thousands of contemporary and historic images of this collection, available on the arboretum's website. Now it has launched "TreeVersity," a crowd sourced project to add "tags"—terms that describe what's in the image—to improve the searchability of its plant image database.

TreeVersity volunteers can follow a simple tutorial, then for each image, they can select terms from a list of plant parts such as bark, trunk, and fruits/seeds. If insects, birds, or plant health issues are visible, these can be tagged as well. The goal is to make this resource more widely useful for plant identification and other purposes to researchers, educators, botanical garden staff, and the general public. To get involved in TreeVersity, visit www.zooniverse.org/projects/friedmaw/treeversity.

News written by Editorial Intern Aaron Dorman and Associate Editor Viveka Neveln.

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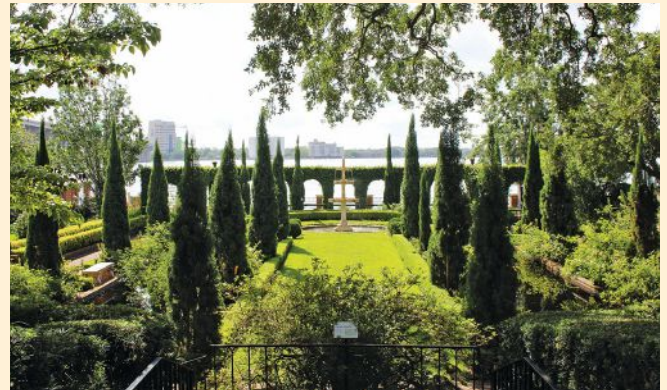
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HURRICANE DAMAGE UPDATE FOR RECIPROCAL ADMISSIONS PROGRAM GARDENS



The Italian Garden at the Cummer Museum of Art & Gardens, above, suffered extensive flooding and wind damage from Hurricane Irma, left.

Along with the homes and businesses devastated by Hurricanes Harvey, Irma, and Maria this past summer, several botanical gardens and other public green spaces in the Southeast and Gulf Coast also sustained a great deal of damage. According to the American Public Gardens Association, “These hurricanes have dealt devastating blows to unique and historic plant collections that are invaluable to the mission of conserving and inspiring the protection of plant biodiversity for future generations.” Here is an update on the affected places that participate in the American Horticultural Society’s Reciprocal Admissions Program (RAP).

Two RAP gardens in the Houston, Texas, area—**Mercer Botanic Gardens** and **Shangri La Botanical Gardens and Nature Center**—are among the hardest hit. Both remain closed after heavy flooding and strong winds from Hurricane Harvey. Mercer is trying to purchase acreage on higher ground and relocate greenhouses. Similarly, the grounds of the **Cummer Museum of Art & Gardens** in Jacksonville, Florida, are closed indefinitely because flooding from Irma destroyed much of the soil, plantings, and infrastructure.

Other gardens in Florida suffered extensive tree losses and damage. **Fairchild Tropical Botanic Gardens** in Coral Gables lost about 20 percent of its tree collection. **Mounts Botanical Garden** in the Palm Beach area estimates that a quarter of its tree canopy was damaged. At **Fleming Gardens** in Davie, the storm brought down a number of trees, including two Florida Champion Trees (tallest of their species in the state): a korina tree (*Terminalia superba*) and an American oil palm (*Elaeis oleifera*). The Har-



The recent hurricanes toppled many large trees, such as this one at Mounts Botanical Garden.

ry P. Leu Gardens in Orlando lost 175 trees, and a large limb damaged the roof of the historic house there.

Several more Florida gardens impacted by Irma are fully operational again but still clearing debris and in need of volunteers, supplies, and funds to assist with reconstruction efforts. These include **Bok Tower Gardens** in central Florida, **Heathcote Botanical Gardens** in Fort Pierce, **Jacksonville Arboretum & Gardens**, **Marie Selby Botanical Gardens** in Sarasota, and **Miami Beach Botanical Gardens**.



Volunteers at Fairchild Tropical Botanic Gardens help clear debris.

In Georgia, **Massee Lane Gardens** (see article on page 40) and **Lockerly Arboretum** are also undergoing storm cleanup but have opened to the public again. Outside of the mainland United States, the **St. George Village Botanical Garden** on St. Croix (Virgin Islands) was in the path of both hurricanes Irma and Maria, taking most damage from the latter, which brought down many of its trees, especially palms.

For more information about ongoing recovery efforts at these gardens, or to find out how you can help, visit www.ahsgardening.org/rap.

—Aaron Dorman, Editorial Intern

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Welcoming Birds, Bees, and Bats

by Rita Pelczar

AS GARDENERS, we may tend to obsess about plants, but our gardens are habitats for all sorts of creatures, from earthworms to woodpeckers and squirrels. While some of them—yellow jackets, Japanese beetles, and raccoons, to name a few—are not always welcome, others, such as songbirds, pollinating bees, and insect-eating bats generally make our gardens more fruitful and enjoyable. The following products will encourage the latter to call your garden “home.”

INVITING AVIAN VISITORS

I love watching birds flock to my feeders, and observing the change of species as the seasons progress—migratory birds such as ruby-throated hummingbirds come and go, while others such as cardinals stick around all year.

I have a variety of feeders, but among the most attractive are two from Gardener’s Supply Company (www.gardeners.com). The **Moon Bird Feeder** is made of thick cracked glass that sparkles when light catches it; mine is blue, but it’s also available in purple. The nine-inch-wide donut-shaped feeder holds up to two-and-a-half cups of birdseed; it’s equipped with drainage holes to keep the seed dry. Birds feed both from the outer rim and from inside the disk. The **Edwardian Bird Feeder** features a 14-inch-high decorative steel cage surrounding a six-ported clear plastic seed tube that allows smaller birds such as nuthatches, chickadees, and finches access to the seed while discouraging most squirrels and larger birds. This feeder holds up to three-and-a-half cups of seed.

Hummingbird feeders come in many styles, but they all require regular cleaning to avoid a buildup of mold and bacteria. This can be challenging given their typically narrow necks and



Top left: Moon Bird Feeder. Top right: Edwardian Bird Feeder. Above: Best Combo Brush Set

small ports. Songbird Essentials’ (www.songbirdessentials.com) **Best Combo Brush Set** makes short work of cleaning hummingbird feeders. It includes two brushes, with different configurations of non-scratching nylon bristles at each end. The smaller brush is great for cleaning ports and bee guards while the larger easily reaches into feeder bottles or tubes.

Also from Songbird Essentials is the **Birdhouse & Feeder Cleaner**, a non-aerosol spray that helps you provide a clean, safe environment for birds and their young. It contains plant enzymes that eliminate parasites and organic contamination that can build up in birdhouses and feeders. To treat birdhouses, remove nesting material after birds leave for the year and scrub with the diluted



Birdhouse & Feeder Cleaner

cleaner. Feeders should be periodically cleaned throughout the year.

Water is important for your avian guests, and while birdbaths are easy to keep filled in summer, they are trickier in winter. The **Three-In-One Heated Birdbath** from the Wild Bird Habitat Store (www.wildbirdhabitatstore.com) uses a thermostatically controlled 75-watt heater to keep water from freezing when temperatures drop, and it's effective to -20 degrees Fahrenheit. The 13-inch-diameter insulated plastic basin has a powder-coated steel exterior, and it holds two quarts of water, but it is shallow, which most birds prefer. With the included hardware, the birdbath can be mounted on a four-by-four-inch deck or fence post, clamped to the top rail of a deck, or placed on the ground.



Three-in-One Heated Birdbath

ABODE FOR POLLINATING BEES

There are about 3,500 species of pollen bees, also known as solitary or wild bees, in North America. Of these, mason bees and leaf-cutter bees are among the best known. They differ from honeybees in that they are smaller, build individual nests without help from a colony, and pollinate flowers about 15 times faster.

You can attract these non-aggressive pollinators to your garden with a **Pollen Bee Nest** (www.pollenbeenest.com) from Armstrong and Blackbury Horticultur-



Pollen Bee Nest

al Products of Caledon, Ontario. I installed one of the tube-filled nests on my kitchen garden fence at a height of 40 inches—12 to 50 inches is recommended. Bees moved into the nest less than two weeks after it was mounted.

Scientifically designed to provide a safe nesting site to a variety of pollen bees, it includes a proprietary granular rock filler that prevents moisture from building up in the nest, which can harm the developing bees. It also acts as insulation, providing bees a safe haven to overwinter. The kit includes complete instructions for installing and cleaning the nest, as well as a list of plants you can include in your garden to help attract and sustain the bees.

ATTRACTING BENEFICIAL BATS

While bats make some people cringe, they are very efficient at controlling insect populations. Every night, most bats eat their body weight in bugs—including pests such as mosquitoes. Some bats are also effective pollinators.

Installing a bat house is one way to attract these nocturnal creatures to your

garden. Many of the commercially available bat abodes don't provide the optimal environment for bats, but the **Bat House** from Polly Products of Mulliken, Michigan (www.pollyproducts.com), meets all the criteria set by Bat Conservation International (www.batcon.org), which has certified the product. Constructed of recycled, high-density polyethylene plastic, this bat house is impervious to moisture and resists mildew; it has three chambers that can accommodate up to 150 bats, and the interior



Bat House

walls are grooved to provide traction for climbing and roosting. The house comes in four colors matched to the average July temperature and sun exposure for your location. The bat house is about 19 inches high and 15.5 inches wide, comes fully assembled, and should be mounted on a building or post in a sunny site, 10 to 15 feet off the ground, and 20 to 30 feet from the nearest tree. This bat house is pricier than many others you can find, but is worth it if you are serious about creating shelter for bats.

When you provide birds, bees, and bats the resources they need to survive, they'll help make your gardens more productive and lots more enjoyable. 🦇

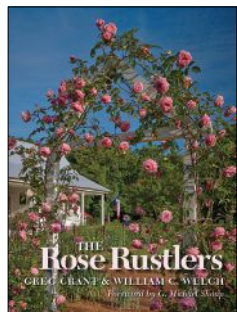
Rita Pelczar is a contributing editor for The American Gardener.

Recommendations for Your Gardening Library

The Rose Rustlers

Greg Grant and William C. Welch. Texas A&M University Press, College Station, TX, 2017. 248 pages. Publisher's price, softcover: \$30.

GREG GRANT and William C. Welch, two of the most celebrated horticulturists involved with the revival of old roses, have written about collecting—or “rustling” in their argot—forgotten plant varieties from Southern cemeteries and ancient homesteads for almost 30 years. But neither of them, and perhaps no one else, has made antique roses more accessible than they have in *The Rose Rustlers*. It is a master class in the methods and philosophy of collecting and preserving roses, written almost as if it were a series of letters to a friend.



Their message is perhaps more timely today than when the authors started out. Since Welch's *Antique Roses for the South* appeared in 1990, new cultivars like those in the KnockOut™ series have given more gardeners a taste for low-maintenance options with a greater diversity of flower forms. Welch and Grant make the case that those who love such newer roses have everything to gain by trying roses that have survived a hundred years with no care—many of which are repeat-blooming, richly perfumed, and luxurious in flower.

The authors' proof is compelling. A few samples: 'Peggy Martin', the only rose in an extensive collection to survive Hurricane Katrina; 'Souvenir de la Malmaison', a shrub that Welch describes as “perhaps the most beautiful rose” he has ever seen; and 'Highway 290 Pink Buttons', whose evocative name says it all. The authors seal their argument by including photos of their own effective use of these plants in their personal gardens going back to the 1980s. And in keeping with contemporary usage, they show how these roses can be used as part of a landscape of diverse plants.

On a more basic level, this is a book about getting it done. Along with details on everything from disease, propagation, and ethics, it offers business anecdotes, such as partnering with brand-name products and local TV stations, and founding the iconic Antique Rose Emporium, a retail and mail-order nursery.

The only flaw in the book is that there's space for only abbreviated vignettes of deserving people like Pam Puryear, an epic eccentric who initiated the authors into a fellowship of roses. That aside, this is a book that will do for readers what Puryear did for the authors.

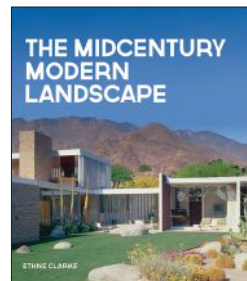
—Benjamin Whitacre

Benjamin Whitacre is a rose aficionado who has served as a research assistant focused on rose history at the Arnold Arboretum of Harvard University in Boston, Massachusetts.

The Midcentury Modern Landscape

Ethne Clarke. Gibbs Smith US, Layton, UT, 2017. 224 pages. Publisher's price, hardcover: \$30.

ETHNE CLARKE'S career has encompassed both writing popular books on a wide range of gardening styles and practices, and editing stints with national magazines such as *Traditional Home* and *House & Garden*. If this well-traveled, cosmopolitan garden communicator decides to turn her attention to the midcentury modern design style so popular today, you know it will be a thorough and insightful treatment. Clarke also brings a personal perspective, because she grew up in the post-war, planned community of Park Forest, Illinois, and currently resides in a small ranch style home built in 1958.



The first section of the book is dedicated to a survey of the architects and landscape architects who attempted to develop a residential style of and for the 20th-century. Clarke provides a nice overview of the accomplishments and the limitations of Frank Lloyd Wright, the Bauhaus School, the New Canaan Modernists, and the landscape architects who struggled to achieve equal recognition for their work in developing a modern landscape aesthetic. Ultimately, she implies, landscape architects understood as well or better than their architect counterparts that “gardens are for people,” as landscape architect Thomas Church proclaimed in the title of his 1955 book on the topic.

Readers looking for inspiration for their own gardens will find plenty here. “Make it midcentury, but make it your own,” is Clarke's wise advice. She urges readers to express the same individuality and embrace the emphasis on outdoor living that characterized the era. Evoke midcentury modernism, she suggests, rather than attempt an exacting reproduction.

That concept extends to plant palettes. For example, ornamental grasses were not known in the United States until relatively recently. Yet, Clarke notes, they serve well in midcentury modern settings because their movement and seasonal changes bring nature closer to the home—a key element of the era's design style.

Although some of the photos left a little to be desired in terms of quality, *The Midcentury Modern Landscape* is well written and well priced. It would be just the ticket for the new owner of a ranch-style home, or any landscape history buff.

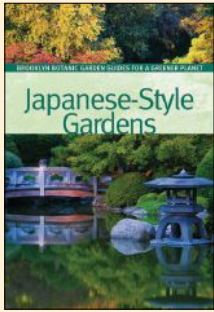
—Susan Hines

Susan Hines is a former staff writer for Landscape Architecture magazine. She lives and gardens in Hyattsville, Maryland.

GARDENER'S BOOKS: JAPANESE GARDENS

ORNAMENTAL GATES, cherry blossoms, steppingstones—these motifs and landscaping details may be what most Americans associate with Japanese gardens. But what really defines these distinctive gardens is their ability to evoke a connection with nature. The following books explore the essence of this aesthetic and profile exemplary Japanese-style gardens across the country and abroad.

In *Japanese-Style Gardens* (Brooklyn Botanic Garden, 2015, \$12.95), readers



will learn about the essential components of style and substance—a garden's *ma* and *kisei*. These components can be found in any size space, from small stone arrangements to expansive

“stroll” gardens, complete with lakes and waterfalls. The book highlights several notable gardens around the United States and concludes by offering tips for creating Japanese-inspired gardens at home.

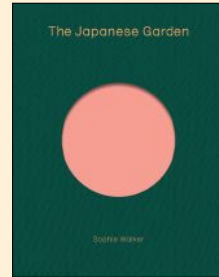
Visionary Landscapes (Tuttle Publishing, 2017, \$24.95) by Kendall H. Brown



spotlights the work of various prominent designers of Japanese-inspired landscapes. Each artist highlights a different

aspect about these gardens' power to impact the viewer, such as modernist motifs to tell “visual stories,” or restorative and meditative elements. The photography by David Cobb vividly captures the quintessence of these varied spaces created at private residences, public gardens, and other sites.

The Japanese Garden (Phaidon Press, 2017, \$69.95) by Sophie Walker



begins by providing context within the larger genre of gardening. Reflecting on Japanese gardens and their “cultural resonance,” Walker writes that “garden-making

belongs to the highest arts...a significant achievement in our human consciousness.” The book profiles hundreds of unique and stunning gardens around Japan that reflect her viewpoint of horticulture as art form.

—Aaron Dorman, Editorial Intern

Listen to the Land is an engaging, informative, and poignant memoir of a life spent tending one particular property, a woodland garden in Alabama. Louise Agee Wrinkle grew up on this land, returned to it in mid-life, and has, for the last 30 years, tended it with care and creativity, according to her philosophy of allowing the land to speak for itself.

Published by *Birmingham Home and Garden* | birminghamhomeandgarden.com

I think that family, friends, garden club members, master gardeners, and other serious gardeners will find this book inspiring and informative.

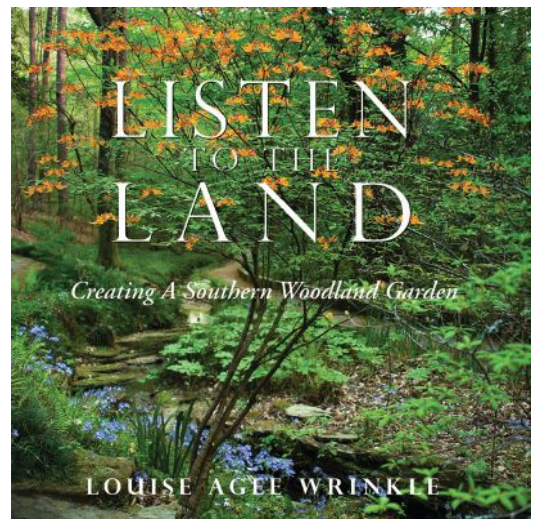
—Neil Odenwald, Ph.D., Professor Emeritus, past Director, Robert S. Reich School of Landscape Architecture, Louisiana State University

The Plant Profiles will be valuable to any gardener. This is not just a list of plants with descriptions, but rather examples that Wrinkle has or had in her garden, and her personal experiences with them.

—John Alex Floyd, Jr., Ph.D., Retired Editor in Chief, *Southern Living*

This is a coming-of-age story that spans a lifetime and is a must-read for any avid gardener today.

—Fred Spicer, Executive Vice President and Director, Chicago Botanic Garden

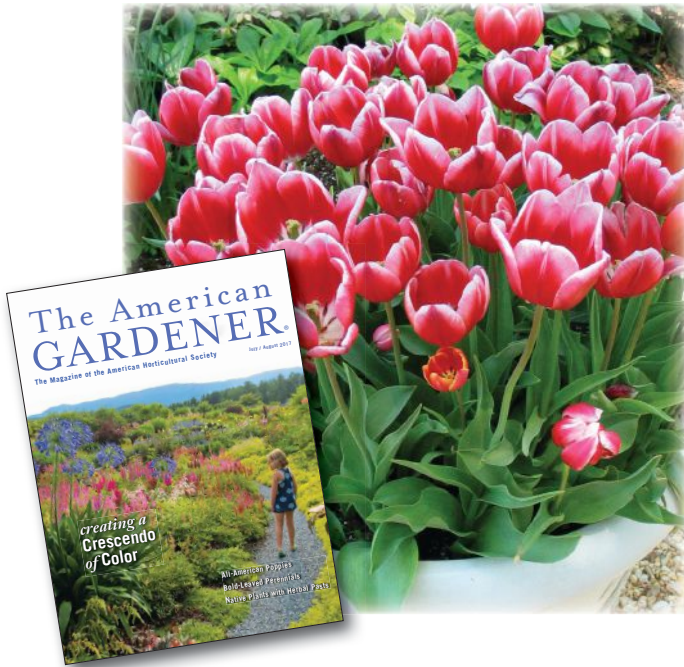


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To order: louisewrinkle.com

GIFTS FOR THE GARDENER

*Need some ideas for garden-themed gifts?
Here are some must-haves for this holiday season.*



AHS Membership

Gift memberships for the American Horticultural Society are a great way to share inspiration, information, and a worthy cause with everyone on your list. \$35 for individual membership. (703) 768-5700. www.ahsgardening.org.



Digital Soil Analyzer

Conveniently measure your soil's pH, temperature, and levels of key nutrients with this easy-to-use device. Batteries included. \$34.99 from A.M. Leonard's Gardener's Edge. (888) 556-5676. www.gardenersedge.com.



Firefly Solar Lantern

A solar-powered LED light with a flexible, waterproof silicone bulb combine into a versatile accessory for gardeners and other outdoor enthusiasts. \$19.95, or 2 for \$17.95 each from Plow & Hearth. (877) 255-3700. www.plowhearth.com.



Metal Dragon Plant Stand

This friendly fire-breather is perfect for holding an assortment of plants on its back and in its front "claws." Made from reclaimed metal with copper highlights. \$135.97 from Wind & Weather. (877) 255-3700. www.windandweather.com.



Herb Drying Rack

Parsley, sage, rosemary, and thyme—they can all fit together on this six-compartment, mesh herb-drying rack. It reaches six feet in length when hanging and flattens down for compact storage. \$45.95 from Gardener's Supply Company. (888) 833-1412. www.gardeners.com.



Seeding Square

Starting a garden from seed is a snap with this tool. Its holes are color coded to ensure the ideal spacing, and it comes with a seeding "wand" to poke holes to the correct depth. \$19.95. (604) 616-6528. www.seedingsquare.com.



Floral Soap Set

Bring the scents of lilac, gardenia, and honeysuckle indoors with these fragrant soap bars. Made in collaboration with the New York Botanical Garden, a portion of the proceeds supports its plant research efforts. \$24 for a three-bar set from Caswell-Massey. (800) 326-0500. www.caswellmassey.com.



Worm Bin

Just add kitchen waste, and the worms will do the rest. The kit includes an illustrated guide on how to use the resulting compost. Worms are included but arrive separately. \$119.95 from Bluestone Garden. (866) 543-1222. www.bluestonegarden.com.

Products profiled are chosen based on qualities such as innovative design, horticultural utility, and environmental responsibility; they have not necessarily been tested by the American Horticultural Society. Listed prices are subject to change.



REGIONAL HAPPENINGS

Horticultural Events from Around the Country

NORTHEAST

CT, MA, ME, NH, NY, RI, VT

RAP THROUGH DEC. 31. **Gardens Aglow.** Lights exhibit. Coastal Maine Botanical Garden. Boothbay, ME. (207) 633-8000. www.mainegardens.org.

RAP NOV. 24–JAN. 7. **Poinsettias.** Exhibition. Buffalo and Erie County Botanical Gardens. Buffalo, NY. (716) 827-1584. www.buffalogardens.com.

NOV. 29–DEC. 1. **New England Grows Expo.** Boston Convention and Exhibition Center. Boston, MA. (508) 653-3009. www.newenglandgrows.org.

RAP DEC. 4. **Of Monarchs and Milkweed.** Lecture. Arnold Arboretum of Harvard University. Boston, MA. (617) 384-5209. www.arboretum.harvard.edu.

RAP DEC. 9. **Meadows 1-2-3.** Class. New England Wild Flower Society. Framingham, MA. (508) 877-7630. www.newenglandwild.org.

RAP DEC. 16. **Kokedama: Hanging Garden Workshop.** Brooklyn Botanic Garden. Brooklyn, NY. (718) 623-7200. www.bbg.org.

RAP DEC. 18. **Pomander Holiday Centerpieces.** Workshop. Blithewold Mansion, Gardens & Arboretum. Bristol, RI. (401) 253-2707. www.blithewold.org.

Looking ahead

JAN. 12 & 13, 2018. **Ecological Landscape Symposium.** Connecticut College Arboretum. New London, CT. (860) 439-5020. www.conncoll.edu/the-arboretum.

RAP JAN. 20. **Plant-O-Rama.** Tradeshow and symposium. Brooklyn Botanic Garden. Brooklyn, NY. (718) 623-7200. www.bbg.org.

MID-ATLANTIC

DC, DE, MD, NJ, PA, VA, WV

RAP NOV. 24–JAN. 8. **GardenFest of Lights Illumination.** Holiday display. Lewis Ginter Botanical Garden. Richmond, VA. (804) 262-9887. www.lewisginter.org.

RAP DEC. 1–10. **Gingerbread Wonderland.** Festival. The Frelinghuysen Arboretum. Morristown, NJ. (973) 326-7601. www.arboretumfriends.org.

Botanical gardens and arboreta that participate in AHS's Reciprocal Admissions Program are identified with the **RAP** symbol. AHS members showing a valid membership card are eligible for free admission to the garden or other benefits. Special events may not be included; contact the host site for details or visit www.ahsgardening.org/rap.

DEC. 2. **Pruning for Homeowners.** Workshop. Mt. Cuba Center. Hockessin, DE. (302) 239-4244. www.mtcubacenter.org.

RAP DEC. 8. **The Living Forest.** Lecture. Morris Arboretum at the University of Pennsylvania. Philadelphia, PA. (215) 247-5777. www.morrisarboretum.org.

RAP DEC. 14. **Make and Take Holiday Greens Arrangement.** Workshop. PHS Meadowbrook Farm. Jenkintown, PA. (215) 887-5900. www.phsonline.org.

RAP DEC. 17. **Blandy Bird Count and Family Festival.** State Arboretum of Virginia. Boyce, VA. (540) 837-1758. www.blandy.virginia.edu.

Looking ahead

RAP JAN. 13. **Monarch Butterfly: Conservation of a Migratory Insect.** Lecture. The West Virginia Botanic Garden. Morgantown, WV. (304) 322-2093. www.wvbg.org.

RAP JAN. 14. **Make and Take: Herbal Toolkit for Seasonal Depression and Anxiety.** Workshop. Bartram's Garden. Philadelphia, PA. (215) 729-5281. www.bartramsgarden.org.

SOUTHEAST

AL, FL, GA, KY, NC, SC, TN

RAP NOV. 24–DEC. 22. **Gardens-A-Glow.** Exhibition. Dothan Area Botanical Gardens. Dothan, AL. (334) 793-3224. www.dabg.com.

RAP NOV. 24–DEC. 31. **Holiday Lights in the Garden.** Exhibition. The Florida Botanical Garden. Largo, FL. (727) 582-2100. www.flbg.org.

RAP DEC. 1. **Plant ID Workshop.** Fairchild Tropical Botanic Garden. Coral Gables, FL. (305) 667-1651. www.fairchildgarden.org.

RAP DEC. 2. **Orchids 101.** Class. Marie Sel-

by Botanical Gardens. Sarasota, FL. (941) 366-5731. www.selby.org.

RAP DEC. 3. **Meet the Grumpy Gardener!** Book signing and lecture. Mobile Botanical Garden. Mobile, AL. (251) 342-0555. www.mobilebotanicalgarden.org.

RAP DEC. 9. **Bonsai Study Group.** Class. Smith-Gilbert Gardens. Kennesaw, GA. (770) 919-0248. www.smithgilbertgardens.com.

RAP DEC. 16. **Winter Fair at the Gardens.** Sarah P. Duke Gardens-Duke University. Durham, NC. (919) 684-3698. www.gardens.duke.edu.

Looking ahead

RAP JAN. 18 & 25. **Building Healthy Soil.** Class. Sarah P. Duke Gardens-Duke University. Durham, NC. (919) 684-3698. www.gardens.duke.edu.

NORTH CENTRAL

IA, IL, IN, MI, MN, ND, NE, OH, SD, WI

RAP DEC. 2 OR 3. **Holiday Greens Workshop.** Fernwood Botanical Garden & Nature Preserve. Niles, MI. (269) 695-6491. www.fernwoodbotanical.org.

RAP DEC. 5. **Evergreen Swag Making Workshop.** Olbrich Botanical Gardens. Madison, WI. (608) 246-4550. www.olbrich.org.

RAP DEC. 8. **Kid's Nature Club-Natural Tree Decorations.** The Brenton Arboretum. Dallas Center, IA. (515) 992-4211. www.thebrentonarboretum.org.

RAP DEC. 19. **Holiday Centerpiece.** Workshop. Fellows Riverside Gardens. Youngstown, OH. (330) 740-7116. www.millcreekmetroparks.org.

Looking ahead

RAP JAN. 27 & 28. **Super Seed Weekend.** Conference. Chicago Botanic Garden. Glencoe, IL. (847) 835-5440. www.chicagobotanic.org.

SOUTH CENTRAL

AR, KS, LA, MO, MS, OK, TX

RAP NOV. 18–JAN. 1. **Gardenland Express Holiday Flower and Train Show.** Missouri Botanical Garden. St. Louis, MO. (314) 577-5118. www.mobot.org.

RAP DEC. 2–JAN. 7. **Festival of Lights.** Powell Gardens. Kingsville, MO. (816) 697-2600. www.powellgardens.org.

RAP DEC. 2. **Birds Christmas Tree.** Holiday festival. Fort Worth Botanic Garden. Fort Worth, TX. (817) 392-5548. www.fwbgb.org.

RAP DEC. 9. **How Do I...Garden for Wildlife?** Class and lecture. Texas Discovery Gardens. Dallas, TX. (214) 428-7476. www.texasdiscoverygardens.org.

Looking ahead

JAN. 5–8. **The American Camellia Society National Convention.** Southern Hotel. Covington, LA. (478) 967-2358. www.americancamellias.com.

SOUTHWEST

AZ, CO, NM, UT

RAP DEC. 2. **Nifty, “Gifty” Gourds.** Class. Tohono Chul. Tucson, AZ. (520) 742-6455. www.tohonochulpark.org.

RAP DEC. 5. **Holiday Terrarium Workshop.** Ashton Gardens at Thanksgiving Point. Lehi, UT. (801) 768-2300. www.thanksgivingpoint.org.

DEC. 15–JAN. 15. **Kadomatsu in the Japanese Garden.** Workshop. ABQ BioPark Botanic Garden. Albuquerque, NM. (505) 768-2000. www.cabq.gov/culturalservices/biopark/garden.

WEST COAST

CA, HI, NV

RAP DEC. 2–23 & 26–30. **Garden of Lights.** Exhibition. San Diego Botanic Garden. Encinitas, CA. (760) 436-3036. www.sdbgarden.org.

RAP DEC. 10. **Insect Hotels: Build Your Own.** Workshop. Santa Barbara Botanic Garden. Santa Barbara, CA. (805) 682-4726. www.sbbg.org.

RAP DEC. 13. **Air Plant Wreath.** Workshop. Lyon Arboretum. Honolulu, HI. (808) 988-0456. www.manoa.hawaii.edu/lyonarboratum.

NORTHWEST

AK, ID, MT, OR, WA, WY

RAP NOV. 24–DEC. 31. **Christmas in the Garden.** The Oregon Garden. Silverton, OR. (503) 874-8100. www.oregongarden.org.

RAP DEC. 9. **Mushroom Walk.** Mount Pisgah Arboretum. Eugene, OR. (541) 747-3817. www.mountpisgaharboretum.org.

CANADA

RAP DEC. 30. **Holiday Market and Open House.** Toronto Botanical Garden. Toronto, ON. (416) 397-1483. www.torontobotanicalgarden.com.

Washed Ashore Sculpture Exhibit in Florida

OCEAN DEBRIS creatively repurposed into giant sculptures of marine creatures is the theme of “Washed Ashore: Art to Save the Sea,” an exhibit opening December 2 at Mounts Botanical Garden in West Palm Beach, Florida.



Flash the Marlin is a nine-foot-tall sculpture created with bottle caps and other plastic waste found in the ocean.

According to Frank Rocco, Washed Ashore’s marketing director, the most common forms of trash found on beaches are water bottles and plastic bags. “We have seen almost everything humans use in their daily lives strewn on beaches,” says Rocco. “In the past seven years we have processed nearly 21 tons of debris...and it just keeps coming ashore.”

Find more information at www.mounts.org/event/washedashore.

Forces of Nature at LA County Arboretum

SIX YEARS AGO, the Los Angeles County Arboretum & Botanic Garden in California was hit by a windstorm that destroyed or damaged almost 1,000 trees. Rather than letting the fallen trees go to waste, the arboretum staff delivered some of them to artists, who creatively repurposed the wood for an exhibition titled “Forces of Nature: 2012.” The pieces, which included sculptures, clocks, and even a plant cell model, were then sold as part of a benefit for the arboretum’s Tree Fund.



A swamp mahogany bowl crafted by artist Bill Haskell

Now, after the recent felling of a cherished 150-year-old Tasmanian blue gum (*Eucalyptus globulus*), the garden is holding a sequel featuring the creative tributes of selected artists to trees that in the intervening years succumbed to infestations, drought, wind, and other issues. According to James Henrich, curator of living collections at the garden, wood from more than 40 species of trees, including the blue gum, was distributed to the artists. “One of the greatest parts of this show is watching the transformation of the wood as it goes from trees our garden staff spent years caring for, to the hands of artists who immediately see artistic potential with the unique texture of the wood,” says Brittany Fabeck, donor relations manager at the Arboretum. “Everyone involved in the process shares the sense of history that goes along with the art created.”

More than 100 pieces will be on display from December 1 to 10. Proceeds from their sale will again contribute to the Tree Fund, which is dedicated to planting new trees and maintaining the Arboretum’s existing collections. Visit www.arboretum.org/forces-of-nature for more information.

—Aaron Dorman, Editorial Intern

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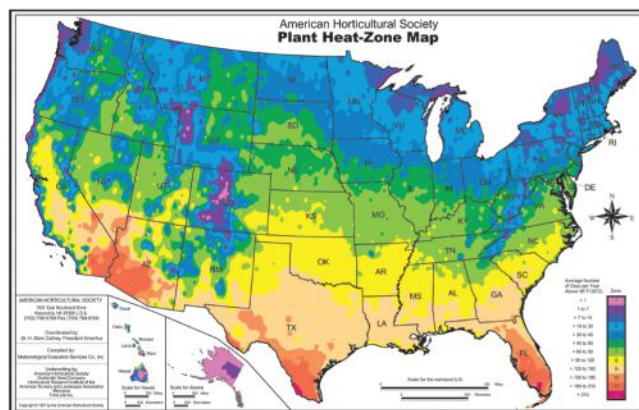

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PRONUNCIATIONS AND PLANTING ZONES

Most of the cultivated plants described in this issue are listed here with their pronunciations, USDA Plant Hardiness Zones, and AHS Plant Heat Zones. These zones suggest a range of locations where temperatures are appropriate—both in winter and summer—for growing each plant. USDA Zones listed are still aligned with the 1990 version of the USDA's map.



While the zones are a good place to start in determining plant adaptability in your region, factors such as exposure, moisture, snow cover, and humidity also play an important role in plant survival. The zones tend to be conservative; plants may grow outside the ranges indicated. A USDA zone rating of 0-0 means that the plant is a true annual and completes its life cycle in a year or less.

- Ageratina altissima** ah-jair-uh-TY-nuh
al-TISS-ih-muh (USDA Hardiness Zones 3-8, AHS Heat Zones 8-2)
- Alcantarea odorata** al-kan-TAR-ee-uh
o-doh-RAY-tuh (9-11, 11-5)
- Anguloa uniflora** an-gyew-LO-uh
yew-nih-FLOR-uh (min. 55°F, 12-5)
- Apios americana** AY-pee-oss uh-mair-ih-KAN-uh
(4-10, 10-3)
- Aristolochia gigantea** uh-ris-toh-LO-kih-uh
jy-GAN-tee-uh (11-11, 12-7)
- Atropa belladonna** AT-ro-puh bel-luh-DON-uh
(7-10, 10-6)
- Bulbophyllum phalaenopsis** bul-bo-FIL-um
fah-lay-NOP-sis (min. 60°F, 12-5)
- Cicuta maculata** sik-YEW-tuh mak-yew-LAY-tuh
(2-9, 9-1)
- Colocasia esculenta** kol-o-KAY-see-uh
es-kyew-LEN-tuh (9-11, 12-3)
- Convallaria majalis** kon-val-LAIR-ee-uh
muh-JAY-lis (2-7, 7-1)
- Dahlia pinnata** DAHL-yuh pin-NAY-tuh
(7-8, 12-1)
- Daphne cneorum** DAF-nee nee-OR-rum
(5-7, 7-5)
- D. genkwa** D. GENK-wuh (5-7, 7-5)
- D. gnidium** D. NID-ee-um (8-9, 9-8)
- D. laureola** D. law-REE-o-luh (5-8, 8-6)
- D. mezereum** D. meh-ZEE-ree-um (4-7, 7-4)
- D. odora** D. o-DOR-uh (7-9, 9-7)
- Datura metel** duh-TOOR-uh MET-el
(10-11, 12-4)
- Dracula vampira** DRAK-yew-luh vam-PEER-uh
(min. 50°F, 12-3)
- Eupatorium rugosum** yew-puh-TOR-ee-um
roo-GO-sum (4-8, 8-2)

- Helianthus tuberosus** hee-lee-AN-thus
too-bur-O-sus (4-9, 9-1)
- Hemerocallis fulva** hem-er-o-KAL-liss FUL-vuh
(3-10, 12-2)
- Mirabilis jalapa** mih-RAB-ih-liss jah-LAP-uh
(9-11, 12-1)
- Nandina domestica** nan-DEE-nuh do-MES-tih-kuh
(6-11, 12-4)
- Nerium oleander** NEER-ee-um o-lee-AN-der
(9-11, 12-1)
- Ophrys apifera** OFF-riss uh-PIF-er-uh
(7-9, 9-1)
- O. speculum** O. spek-YEW-lum (7-9, 9-1)
- Prunus tomentosa** PROO-nuss toh-men-TOH-suh
(2-7, 7-1)
- Rheum rhabarbarum** REE-um ruh-BAR-buh-rum
(5-8, 8-1)
- Ricinus communis** rih-SY-nuss com-YEW-niss
(0-0, 12-1)
- Rosa arkansana** RO-zuh ar-kan-SAN-uh
(4-8, 8-3)
- R. blanda** R. BLAN-duh (3-7, 8-3)
- R. carolina** R. kair-o-LY-nuh (4-9, 9-3)
- R. multiflora** R. mul-tih-FLOR-uh (5-9, 9-1)
- R. palustris** R. pah-LUS-triss (4-9, 9-3)
- Saponaria officinalis** sap-on-AIR-ee-uh
o-fiss-ih-NAL-iss (3-9, 9-1)
- Sarracenia purpurea** sar-uh-SEE-nee-uh
pur-PUR-ee-uh (2-9, 9-1)
- Symphoricarpos albus** sim-for-ih-KAR-pus
AL-bus (3-7, 7-1)
- Taxus media** TAK-suss MEE-dee-uh
(4-7, 7-3)

GARDEN MARKET

CLASSIFIED AD RATES: All classified advertising must be prepaid. \$2.75 per word; minimum \$66 per insertion. Copy and prepayment must be received by the 20th of the month three months prior to publication date. Display ad space is also available. To place an ad, call (703) 768-5700 ext. 120 or e-mail advertising@ahsgardening.org.

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(2) Free or Nominal Rate In-County Copies Included on PS Form 3541	0	0
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f. Total Distribution (Sum of 15c and 15e)	18,290	17,973
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h. Total (Sum of 15f and 15h)	20,416	20,283
i. Percent Paid	98.85%	99.67%

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a. Paid Electronic Copies	0	0
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c. Total Paid Distribution + Paid Electronic Copies	18,290	17,973
d. Percent Paid (Both Print and Electronic Copies)	98%	99%

I certify that all information furnished above is true and complete.

—David J. Ellis, Editor



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Index compiled by Editorial Intern Aaron Dorman.

Fragrant Alcantarea (*Alcantarea odorata*)

by Caleb Melchior



With its rosette of silvery, swordlike leaves, fragrant *alcantarea* makes a striking specimen plant.

UNLESS YOU live in the tropics, chances are you've never met an *alcantarea*. But that may change soon. Over the past few decades, members of this family of large bromeliads from Central and South America have become increasingly popular in tropical gardens around the world. One in particular, fragrant *alcantarea* (*Alcantarea odorata*, syn. *Vriesea odorata*, USDA Hardiness Zones 9–11, AHS Heat Zones 11–5) is now finding its way into American gardens, often as a container specimen.

Young fragrant *alcantarea* plants bear a rosette of a dozen silvery-blue ribbonlike leaves in an almost vase-like habit. But with each passing year the rosette expands, eventually forming a giant whorl of silver swords more than five feet across and three feet tall.

After 10 to 15 years, a red column emerges from the center of the plant, forming horizontal branches when it

reaches six feet tall or so. This fantastic floral structure erupts in hundreds of fragrant, greenish-yellow flowers that are highly attractive to hummingbirds, butterflies, and bees. After flowering, the main plant dies, leaving a few pups—baby plants—around its base. These can be separated and potted up to create a new generation of fragrant *alcantareas*.

The fragrant *alcantarea* generally available in the United States is the straight species, although you may notice slight variations in form—such as brighter silver

coloring, or broader leaf blades—between plants derived from different sources. A rare variegated form is available, but you may need to befriend some bromeliad experts or join a local society to obtain it.

GROWING ADVICE

Fragrant *alcantarea* is easy to grow. It's a lithophyte, growing on rocky hillsides in its native habitat in Brazil, so its compact root system works primarily as an anchor for the massive plant. Grow it in a free-draining potting mix and water directly into the central cavity created by the rosette of leaves. In temperate regions, grow the plant in as much sun as possible to keep the leaves silvery; too much shade turns the plant green. Established plants can survive a light frost, but fragrant *alcantarea* will not fare well where temperatures regularly dip below 35 degrees Fahrenheit. In temperate climates, overwinter it indoors in a sunny window or in a cool greenhouse. Shift it back outside once nights have warmed in the spring.

GARDEN USES

The striking form and color of fragrant *alcantarea* makes it especially suitable for contemporary landscapes. It looks sensational in a large container, especially something minimalist such as a dark sphere or sharp-edged trough. The silver foliage stands out against any dark background. In subtropical and tropical gardens, pair fragrant *alcantarea* with bright magentas, such as 'Barbara Karst' bougainvillea, or with plants in plummy purple shades, like 'Black Knight' and 'Black Magic' cordylines.

With winter approaching, now's the time to start searching for a fragrant *alcantarea*. That way you can have this silver showstopper lighting up your patio in time for the first summer cookout.

Sources

Michaels Bromeliads, Inc., Venice, FL. <http://shop.michaelsbromeliads.com>.

Tropiflora, Sarasota, FL. www.tropiflora.com.

Caleb Melchior is a freelance writer based in Little Rock, Arkansas.

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