

The background of the cover is a close-up photograph of maple leaves in various stages of autumn color. Some leaves are bright green, while others are transitioning to yellow, orange, and deep red. The lighting is soft, highlighting the intricate vein patterns on the leaves.

The American GARDENER®

The Magazine of the American Horticultural Society

September / October 2015

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LEFT: KARRIE JENKS, COURTESY OF IN HARMONY SUSTAINABLE LANDSCAPES.
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NOTES FROM RIVER FARM

ENSURING THAT the love of plants and gardening is passed on to the next generation of gardeners is a core part of the American Horticultural Society's mission. It not only yields rewards on a personal level, but also translates into positive things for our communities. Here at River Farm, for example, we are constantly reminded of the value gardens offer to children when we hear the delighted squeals of wonder from our youngest visitors. Research indicates that forging these sorts of connections with the natural world at an early age results in greater environmental awareness in adulthood, which, of course, benefits us all.



Interns at the AHS's River Farm headquarters this summer were (left to right): Amy G. McDermott of Santa Cruz, California; Stacey Snyder of Knoxville, Tennessee; and Sam Guccione of Columbia, Missouri—here during a visit to the gardens at nearby Mt. Vernon.

Our dedication to getting young people involved in gardening and the outdoors is particularly evident each summer during our National Children & Youth Garden Symposium. Among the many highlights of this year's 23rd symposium was learning about new research that reveals just how much of a difference gardening can make in the lives of kids. The International Junior Master Gardener Program of the Texas AgriLife Extension Service in College Station, Texas, recently completed a long-term study—conducted in conjunction with several other Texas institutions—that resulted in development of a whole new garden curriculum. To read more about this inspiring organization's work, turn to page 34.

In addition to partnering with the Junior Master Gardeners for this year's symposium, each year the AHS also jointly presents the Growing Good Kids—Excellence in Children's Literature Awards, which spotlight children's books that present plant, garden, and nature themes in an engaging way. Find out this year's winners on page 8.

Another way we invest in the future of horticulture is through the AHS internship program, which helps aspiring horticulturists and garden communicators get some hands-on experience and refine their career interests. Scores of our former interns have moved on to positions with leading companies and gardens, where they in turn are influencing gardening in America and beyond.

As our summer interns head back to school, our gardens are experiencing a transition of their own. Fall can be a great time for dividing perennials, tackling seasonal lawn care tasks, and harvesting seeds. This issue of *The American Gardener* has an array of features to get you started, including how to liven up your end-of-season garden, tips for cultivating an organic lawn, and a fascinating look at research about the benefits of indoor plants.

As always, thank you for being a part of our AHS family. Happy gardening!

Tom Underwood
Executive Director

The American GARDENER

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The American Gardener (ISSN 1087-9978) is published bimonthly (January/February, March/April, May/June, July/August, September/October, November/December) by the American Horticultural Society, 7931 East Boulevard Drive, Alexandria, VA 22308-1300, (703) 768-5700. Membership in the Society includes a subscription to *The American Gardener*. Annual dues are \$35; international dues are \$55. \$10 of annual dues goes toward magazine subscription. Periodicals postage paid at Alexandria, Virginia, and at additional mailing offices. Postmaster: Please send Form 3579 to *The American Gardener*, 7931 East Boulevard Drive, Alexandria, VA 22308-1300.

Botanical nomenclature is based on *The American Horticultural Society A-Z Encyclopedia of Garden Plants*, on *A Synonymized Checklist of the Vascular Flora of the United States, Canada and Greenland* and on the *Royal Horticultural Society Index of Garden Plants*. Opinions expressed in the articles are those of the authors and are not necessarily those of the Society. Manuscripts, artwork, and photographs sent for possible publication will be returned if accompanied by a self-addressed, stamped envelope. We cannot guarantee the safe return of unsolicited material. Back issues are available at \$8 per copy.

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Printed in the U.S.A.



MEMBERS' FORUM

PROMOTING CAREERS IN HORTICULTURE

AHS Executive Director Tom Underwood's column in the July/August issue of *The American Gardener* reminded me that I want to do even more to support one of the core missions of the AHS—promoting horticultural education and careers.

As a horticulture professor at Kansas State University, I have personal experience with the shortfall in horticulture students. Even though we have an outstanding, nationally recognized horticulture program, we are not able to keep up with the horticulture industry's need for graduates. And we are just one of many horticultural programs that have seen slipping enrollment over the last several years.



Cathie Lavis instructs one of her students on proper tool use at Kansas State University.

While we have stepped up recruiting efforts, we realize that fostering the development of a passion for plants and gardening must start at an early age. Reaching these young kids is a challenge, so I appreciate what the AHS does in this regard with its youth gardening programs.

I believe many young people are unaware they can make a career working outdoors, and if they do, their knowledge about the opportunities and varieties of careers is limited. I always remember the words of a former student, who during the

We are looking for candidates for our “AHS Members Making a Difference” department, in which we profile current members who are using their gardening or horticultural skills for the greater good. If you have a story you'd like us to consider, e-mail a brief description of your efforts to editor@ahs.org or send a letter to us at the address listed below.

first week in my arboriculture class said, “I had no idea I could climb trees for a living.” Today he is a professional arborist.

As we know, horticulture is an amazing field filled with passionate, creative, and talented professionals. Let's all do what we can to encourage young people to get involved.

Cathie Lavis
Associate Professor & Extension Specialist
Department of Horticulture, Forestry &
Recreation Resources
Kansas State University
Manhattan, Kansas

POLLINATOR CHALLENGE

I want to thank you for passing on information about the Million Pollinator Garden Challenge (MPGC) in the last issue. I'm a landscaper on the North Fork of Long Island and I announced the challenge in my garden newsletter. So far, 47 people have signed up for the challenge and I'm aiming to recruit 100 from my local area. This is a great way to motivate concerned gardeners who feel they don't know how to make a difference. I hope other landscapers and retail nurseries will take up the challenge so that we really can meet the goal.

Sherry Thomas
Orient, New York

Editor's note: Thanks, Sherry! To learn how to participate in the MPGC, visit “News & Press” at the AHS website (www.ahs.org).

SUDDEN OAK DEATH

I appreciated Scott Aker's column about Sudden Oak Death (SOD) (“Garden Solutions,” July/August 2015). As a long-time

follower of the monthly reports issued by the California Oak Mortality Task Force, I would like to emphasize the important role home gardeners and landscape professionals can play in preventing the spread of this devastating disease in landscapes.

Before they reach home gardeners or landscapers, plants pass through a number of hands, starting with the propagating nursery in the Pacific Northwest and then various levels of wholesale and retail vendors. The key to preventing the spread of SOD in gardens is the ability to trace *every* reported case of sudden oak death back to the original source of the infected plant.

So if home gardeners and landscape company owners keep a diary or inventory that includes the origin of any new plants they acquire, they will be able to help investigators out. Helping prevent spread of a deadly disease is yet another reason for all gardeners to keep good records!

Glenn Palmer
Asheville, North Carolina

PHOTO CAPTION CORRECTION

The image published on page 35 of the July/August issue [shown below] was in-



correctly identified. The plant is Japanese anise tree (*Illicium anisatum*). Thanks to reader Leslie Pierpont of Jacksonville, Florida, for pointing out this error. 🌿

PLEASE WRITE US! Address letters to Editor, *The American Gardener*, 7931 East Boulevard Drive, Alexandria, VA 22308. Send e-mails to editor@ahs.org (note Letter to Editor in subject line). Letters we print may be edited for length and clarity.

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

RECIPROCAL ADMISSIONS PROGRAM The AHS Reciprocal Admissions Program offers members free admission and other discounts to nearly 300 botanical gardens and other horticultural destinations throughout North America. A list of participating gardens can be found on www.ahs.org/rap. For more information, call (800) 777-7931 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.ahs.org.

TRAVEL STUDY PROGRAM Visit spectacular private and public gardens around the world through the Society's acclaimed Travel Study Program. For information about upcoming trips, call (703) 768-5700 ext. 127, e-mail development@ahs.org, or visit the Gardening Programs section of www.ahs.org.

WEBSITE: www.ahs.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.

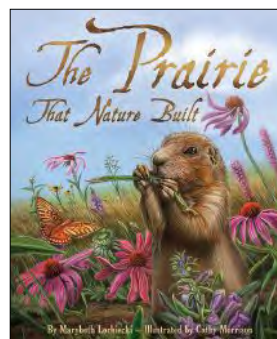
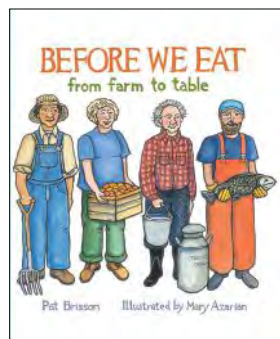
News from the AHS

September / October 2015

PROGRAMS • EVENTS • ANNOUNCEMENTS

CHILDREN'S BOOKS RECOGNIZED FOR FOCUS ON GARDENING AND THE NATURAL WORLD

TWO CHILDREN'S picture books received the 2015 "Growing Good Kids—Excellence in Children's Literature Award," jointly administered by the American Horticultural Society and the International Junior Master Gardener Program. This annual award program recognizes children's books that effectively promote an appreciation for gardening, plants, and the environment.



This year's winners, selected from books published in 2014, are: *Before We Eat: From Farm to Table* by Pat Brisson, illustrated by Caldecott Medalist Mary Azarian (Tilbury House Publishers & Cadent Publishing), which explores the agricultural origins of familiar foods; and *The Prairie That Nature Built* by Marybeth Lorbiecki and illustrated by Cathy Morrison (Dawn Publications), which provides insight into the fascinating ecology of the American prairies. Awards were presented to the publishers' representatives during the AHS's 2015 National Children & Youth Garden Symposium in Austin, Texas.

Nominations for the best children's gardening books published in 2015 are being accepted through May 13, 2016. For more information about the "Growing Good Kids" book award program, including a list of past winners, visit <http://jmgkids.us/bookawards>.

We Eat: From Farm to Table by Pat Brisson, illustrated by Caldecott Medalist Mary Azarian (Tilbury House Publishers & Cadent Publishing), which explores the agricultural origins of familiar foods; and *The Prairie That Nature Built* by Marybeth Lorbiecki and illustrated by Cathy Morrison (Dawn Publications), which provides insight into the fascinating ecology of the American prairies. Awards were presented to the publishers' representatives during the AHS's 2015 National Children & Youth Garden Symposium in Austin, Texas.

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PHOTO CONTEST WINNER

FOR THE fifth consecutive year, Richard States of Youngstown, Ohio, has won "Best of Show" in the annual photography competition organized by the Gardeners of America/Men's Garden Clubs of America (TGOA/MGCA). In addition to the



Richard States' winning entry

top prize, garnered for his image of *Hydrangea macrophylla* 'Endless Summer', States also took the Sweepstakes award for the highest combined points for all his photo submissions.

First runner-up went to John Eichhorn of Phoenix, Arizona, for his close-up of a pink zinna and second runner-up went to Karyn Chaffin of Denver, Colorado, for her image of a waterlily in a pond along with a reflection of a purple Chihuly glass sculpture.

Through a special partnership with TGOA/MGCA, AHS members are eligible to participate in this annual photography contest. The winning images from each year's competition are featured in TGOA/MGCA calendars. For details on how to enter, visit www.tgoa-mgca.org.

BOTTOM: COURTESY OF RICHARD STATES

Texas-Size Welcome at 2015 Symposium



Participants in the AHS's 23rd annual National Children & Youth Garden Symposium in July pause to admire the Texas native species in the Wetland Pond at the Lady Bird Johnson Wildflower Center in Austin, Texas. As a co-host of the symposium, the Wildflower Center welcomed attendees with a tour and dinner in its inspiring gardens.

APPLICATIONS FOR NEW HORTICULTURAL FELLOWSHIP NOW OPEN

APPLICATIONS are now being accepted for the AHS's first annual Wilma L. Pickard Horticultural Fellowship, which will debut in 2016. This fellowship was made possible thanks to a generous gift from the late Pickard, who was a longtime AHS member. For more information about this new fellowship program, based at the AHS's River Farm headquarters, please visit the AHS website at www.ahs.org.



The late Wilma Pickard

SEED EXCHANGE REMINDER

NOVEMBER 1 is the last day AHS members can mail in seeds for inclusion in the 2016 AHS Seed Exchange, so remember to save seeds from rare or favorite varieties to share with gardeners across the country. Those who donate seeds get first pick from the complete list of seeds that will be posted on the AHS website in mid-January. For details and a seed donation form, see page 61, or visit www.ahs.org.



News written by AHS staff.



AHS NATIONAL EVENTS CALENDAR

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

OCT. 7-15. **Gardens in and Around Rome, Italy.** AHS Travel Study Program.

DEC. 1-24. **Indoor Holiday Display.** River Farm, Alexandria, Virginia.

DEC. 12. **Holiday Open House.** River Farm, Alexandria, Virginia.

2016

JAN. 9-20. **South Africa: Gardens of the Cape** (with optional post-tour safari, Jan. 20-23). AHS Travel Study Program.

APR. 22-MAY 2. **Gardens of Portugal: Lisbon, Sintra, & Madeira.** AHS Travel Study Program.

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 July 1 and August 31, 2015.

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AHS MEMBERS MAKING A DIFFERENCE: Scott Zanon

by Amy G. McDermott

ABUCKEYE THROUGH and through, Scott Zanon has championed Midwestern trees since his college days at Ohio State University (OSU), where he earned dual degrees in agronomy and turfgrass science, and in landscape horticulture.

After college, he put horticulture on hold to travel the world working in the wine industry. In the early 2000s, he also started his own business selling automated external defibrillators (AED), a medical device. Yet over the course of his colorful and wide-ranging career, Zanon always maintained his passion for trees, eventually channeling it into two books to help gardeners select appropriate species for their needs.

Today, in addition to writing books and selling AEDs, Zanon makes his own wine, Zanon Zinfandel, exclusively distributed in Ohio. “I loved Zinfandel from the first time I tasted it,” he explains. Zanon says his wine business “doesn’t make any money, but it’s fun! You’ve got to have a balance in life, so that’s my balance.”

TREE-LINED BEGINNINGS

Zanon, who has been an AHS member since 2002, freely admits he favors trees over other kinds of plants. Growing up in rural eastern Ohio, he admired local trees for their beauty, and in high school, excelled in tree identification. “My high school biology teacher made us go out and collect leaves of 20 different trees. He would take one behind his back and then pop up the leaf, and we would have to identify it,” Zanon recalls. “I thought that was pretty cool.”

At OSU, Zanon took classes with horticulture professor Steve Still, who recalls him conducting research on rooting serviceberries (*Amelanchier* spp.) from cuttings for an article published in the *Journal of Environmental Horticulture*. The two shared an interest in foraging for serviceberries, blueberries, and other wild fruits and have kept in touch over the years.

NO HANDICAP TO PUBLICATION

Zanon’s venture into publishing came about indirectly through another of his interests: golf. In 2001, he became an alumnus representative—and ultimately chair—of the OSU Golf Club’s green committee. “Green committees play an advisory role, to help make good



at OSU—and other collaborators at the university, Zanon narrowed his list to 50 trees that were included in his first book, *Desirable Trees for the Midwest: 50 for the Home Landscape and Larger Properties*, which he self-published in 2009.

Over the next five years, he supplemented the initial list with 15 new varieties



Scott Zanon, left, and his award-winning second book, above.

decisions for the golf course, whether it’s from an agronomic or horticultural standpoint,” Zanon explains.

The OSU Golf Club has two courses designed by the famous Scottish golf course architect Alister MacKenzie. In 2004, one of the courses was in need of restoration, and Zanon took the helm. Needing to replace a number of damaged or oversized trees, Zanon started doing some research and realized there was a gap in the gardening literature. “There was really nothing out there” to help home gardeners, or golf course and park designers make informed decisions about selecting the right size and species of tree for their needs.

Applying the horticultural knowledge he had developed in college, Zanon made a long list of the trees that grow well in the Midwest. With help from Still—who is now a professor emeritus

and cultivars that were included in his second book, *Landscaping with Trees in the Midwest: A Guide for Residential & Commercial Properties* (Swallow Press/Ohio University Press, 2014), which received a 2015 Silver Award of Achievement from the Garden Writers Association.

Zanon is particularly proud of this book because it includes five images of each species, allowing readers to get a sense of how each tree looks at different stages of its growth. “I just hope that this book is helpful to people,” he says.

In addition to his books, Zanon maintains a website (www.desirabletrees.com) to help people gain a better understanding of trees. He is always happy to share his expertise with and passion for trees, regardless of the medium. 🌿

Amy G. McDermott is an editorial intern for *The American Gardener*.



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Seasonal Bookends

Get more bang for your buck with these double-duty plants that sparkle in both fall and spring.

BY RITA PELCZAR





SOME OF THE showiest plants in spring present an encore performance in autumn, bracketing the growing seasons with a second bloom or with equally colorful fruit and/or foliage. While cold-winter regions tend to produce the most dramatic fall displays, milder regions have their own cadre of plants that turn heads in both spring and fall. Here garden designers and plant experts from across the country recommend herbaceous perennials, shrubs, and trees that make terrific seasonal bookends.



Opposite page: A great groundcover for sun or part shade, bigroot geranium looks good from late spring, when its magenta flowers open, through fall, when the deeply dissected leaves turn shades of orange and red. Above and right: *Fothergilla gardenii* lights up shady settings with its white bottlebrush flowers in late spring and bright yellow fall foliage.

HERBACEOUS BEAUTIES

Two North American bluestars, *Amsonia hubrichtii* (USDA Hardiness Zones 4–9, AHS Heat Zones 9–5) and *A. tabernaemontana* (Zones 3–9, 9–3), are good choices for both East and West Coast gardens. Tony Avent, owner of Plant Delights Nursery in Raleigh, North Carolina, calls *A. hubrichtii* “a treasure in the garden because it provides two rare traits: true sky-blue flowers in spring and brilliant yellow foliage in fall—a trait usually reserved for deciduous trees.”

Garden designer Lucy Hardiman of Portland, Oregon, believes that *A. tabernaemontana* should be more widely

grown. “Once established, it is a perennial workhorse for the middle of the border. Panicles of delicate blue flowers adorn the willow-shaped foliage in the late spring and early summer. The gray-green leaves stand up to the rigors of rain and heat throughout the summer, signaling their last hurrah in a blaze of bright yellow in autumn,” she says.

Another Hardiman favorite for both spring and fall is false Solomon’s seal (*Maianthemum racemosum*, syn. *Smilacina racemosa*, Zones 3–8, 8–3), which is native to much of temperate North America east and west of the Rockies. “In the Pacific Northwest, it thrives in dry shady positions in woodland and shade gardens.

In mid-spring, intricate plumes of small white flowers appear, perfuming the garden with the scent of rose. Showy, round red berries herald the onset of autumn,” says Hardiman.

Bigroot geranium (*Geranium macrorrhizum*, Zones 4–8, 8–1) is a spring and fall favorite of garden designer Sabrena Schweyer of Akron, Ohio. “Bigroot geranium’s magenta flowers in May don’t last long, but provide a bright spot of color to the spring landscape,” says Schweyer. “In the fall the foliage takes on a red hue, and is especially handsome covered in morning frost,” she adds.

Plantsman and designer Jenks Farmer



A shade-loving perennial broadly native to temperate woodlands across North America, false Solomon’s seal bears terminal clusters of fragrant, lacy white flowers in mid-spring, left. In fall, clusters of bright red berries adorn the glossy dark green foliage.

of Columbia, South Carolina, is partial to *Crinum bulbispermum* (Zones 7–10, 10–5), especially the Jumbo strain. Its large funnel-shaped flowers, which appear in April, are “dramatic and bold among spring’s pretty but mostly frail perennials. The foliage is killer in autumn: great curving blue-gray leaves that are perfect in combo with fall mums, asters, and grasses,” says Farmer.

DUAL-SEASON SHRUBS

Schweyer suggests *Fothergilla gardenii* (Zones 4–9, 9–3) and *F. major* (Zones 5–8,



8–5) because the white bottlebrush flowers “are a magnet for bees—and for anyone who appreciates fragrance in the spring landscape.” Although the flowers of these eastern U.S. natives are rather delicate, they appear at ends of stems before the leaves emerge, so they stand out. “But we plant fothergilla primarily for fall color: vivid orange, with gold and deep red-purples,” says Schweyer.

Many species and varieties of viburnums shine in spring and fall. For example, the linden viburnum (*Viburnum dilatatum*, Zones 5–8, 8–5) produces large domed clusters of creamy white flowers in late spring. “*Viburnum dilatatum* is a really underutilized plant with a terrific fall fruit show, especially the cultivar, ‘Hen-

Native to Japan, redvein enkianthus, left and below, features dangling clusters of pink-tinted, bell-shaped flowers in spring and then closes out the year with bright orange to red fall foliage.

neke’ (trademarked Cardinal Candy). The fruit set is spectacular,” says Nina Bassuk, horticulture professor and program leader of the Urban Horticulture Institute at Cornell University in Ithaca, New York. “This plant is also resistant to the viburnum leaf beetle which decimates several viburnums,” adds Bassuk. The dark green leaves turn burgundy-bronze in fall.

Among my favorite dual-season performers in western North Carolina is redvein enkianthus (*Enkianthus campanulatus*, Zones 4–8, 8–4). Its dainty, creamy yellow, bell-shaped flowers sport reddish pink stripes and edges. They dangle prettily from the whorled branches in late spring. And its leaves turn spectacular shades of orange and red in fall. “These are best planted as a group,” says Bassuk, “but be aware they do need acidic, moist soil to perform their best.”

Landscape designer and author Susan Morrison of Concord, California, recommends ‘Kaleidoscope’ abelia (*Abelia x grandiflora*, Zones 6–8, 8–5), which she calls a “garden chameleon.” In spring, it features red stems topped with bright chartreuse leaves striped with green that fade to a slightly softer two-tone green in the summer. “Small white flowers arrive in summer and linger through fall, when colder weather turns leaves attractive shades of orange, pink, and red,” says Morrison.

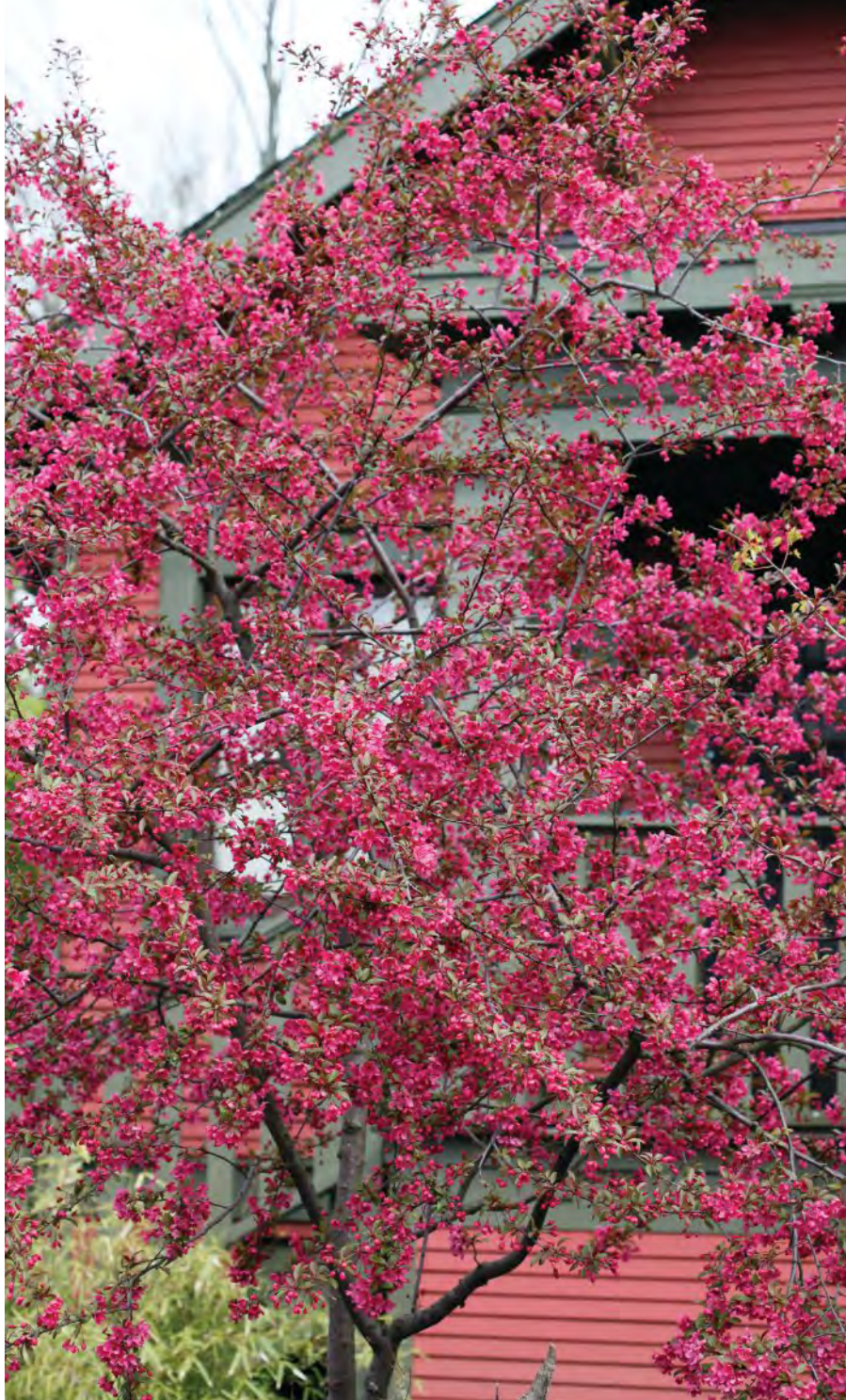


DOUBLE-DUTY TREES

When the purple-pink flowers of eastern redbuds (*Cercis canadensis*, Zones 4–9, 9–3) appear in gardens and along roadsides, I know that spring has arrived. In fall, when its heart-shaped leaves turn golden yellow, it's time to start gathering kindling for evening fires.

A similar species, *C. occidentalis*, (Zones 7–10, 10–6) is native to the American West and Southwest. Of the western redbud, Morrison says, “Magenta flowers that scream drama are displayed against bare branches in early spring. In the fall, leaves turn shades of gold or orange. Drought-conscious California gardeners struggling with clay soil will appreciate how well this native performs.”

Acer palmatum (Dissectum group) ‘Flavescens’ (Zones 5–8, 8–2) is a dissected



Japanese maple selection that Morrison finds appealing for small California gardens. New spring growth emerges a bright green-gold that eventually deepens to a restful green in summer. It finishes the season in fall, “in a burst of orange before losing its leaves. With a graceful weeping form, it makes a colorful focal point in a small garden and adapts well to containers,” says Morrison.

The deep, pink-red, fragrant flowers of the widely adaptable prairie fire crabapple (*Malus* ‘Prairifire’) cover the spreading branches in spring. Blooms are replaced

‘Prairifire’ crabapple, above, grows to 20 feet tall with a rounded shape. Its dark pink flowers offer a spring show that is matched in fall by the display of its small red-purple fruits, left.

by purple-red fruits that mature in fall as leaves turn a magnificent orange. “‘Prairifire’ is a great crab. Very disease resistant—to powdery mildew, cedar-apple rust, fire blight, and apple scab. It is also very adaptable to soil pH,” says Bassuk.

Holly Forbes, curator at the University of California Botanical Garden at Berkeley, thinks the Pacific madrone (*Arbutus menziesii*, Zones 7–9, 9–7) is among the best trees in her region for

spring and fall interest, with “nice flowers early in the season and nice berries later,” all supported on branches with dramatically exfoliating bark. The eight-inch clusters of white flowers are held on erect panicles. Red, orange, or yellow fruits—sometimes all three colors in the same cluster—mature in fall.

Another eastern U.S. native pulling double-duty is the fringe tree (*Chionanthus virginicus*, Zones 4–9, 9–3). Late-



Pacific madrone offers western gardeners year-round appeal with attractive evergreen foliage and peeling, cinnamon-colored bark. Seasonal highlights include upright panicles of white flowers in early summer, above, and clusters of yellow to red berries in late summer to fall, left.

spring flowers are white, fragrant, and are borne in fluffy pendant panicles. Leaves turn yellow in fall. Farmer says that in South Carolina, “it’s one of our most spectacular trees; excellent in large containers, perfect fall color.”

Every season in the garden holds special appeal as flower buds swell, open, and fade; leaves emerge, expand, and perhaps change color before they fall; fruit forms, ripens, and often attracts various consumers. Plants that mark the beginning and end of each growing season with a dramatic show make good use of the space they occupy in the garden, and they help us appreciate the order of nature’s enduring cycles. (For additional plants that make great seasonal bookends in the garden, see the web special on the AHS website, www.ahs.org.)

Rita Pelczar is a contributing editor for The American Gardener.

clearing the air about Indoor Plants

CHANCES ARE, you have at least a few houseplants, and you've probably heard that they can clean your air. If not, a quick online search will yield dozens of articles on the subject, and many lists comparing specific plants on their ability to filter airborne toxins. Before you breathe easy though, notice that these lists don't always agree on which species to grow and are vague at best about the science behind their claims.

What do we really know about the air-cleaning abilities of indoor plants, and how can this inform your selections? As it turns out, the situation is much more complex than growing a few houseplants and expecting them to make a big difference.

IN THE BEGINNING

One of the first investigations into the notion that indoor plants can clean the air was conducted by the National Aeronautics and Space Administration (NASA) in the 1980s. At the time, NASA was tasked with building an international space station and long-term air quality inside the completely sealed environment was a concern.

Bill Wolverton, who was a research scientist in the Science and Technology Laboratory at Stennis Space Center, Mississippi, proposed using plants as a natural air filtration system in imitation of their role on Earth. "Since man's existence on Earth depends upon a life support system involving an intricate relationship with

plants and their associated microorganisms," Wolverton wrote in the final 1989 report, "it should be obvious that when

he attempts to isolate himself in tightly sealed buildings, away from this ecological system, problems will arise."

And indeed, problems did arise: many common building materials, such as plastics and particle board, were known to release pollutants into the air. Some of these chemicals had been linked to health problems including chronic headaches, asthma, and skin irritation. NASA scientists began studying various plants to see if they could reduce or eliminate these toxins in conditions simulating those in a space station.

FAVORABLE RESULTS

In the earliest studies, a variety of indoor plant species were sealed, one at a time, in Plexiglas® chambers measuring between 15 and 32 cubic feet. For a sense of scale, a 2013 Toyota Prius has about 22 cubic feet of trunk space. So, these chambers were fairly compact. After NASA scientists injected high concentrations of benzene, trichloroethylene, and formaldehyde—common indoor air pollutants—into the chambers, they found

that if a potted plant was present, the air was significantly cleaner after 24 hours.

That sounds very promising, but as Wolverton, who is now an environmental consultant, points out, these results should not be taken out of context. "The small Plexiglas chamber studies gave us the ability to control all test parameters and to introduce a single chemical at a time," he explains. NASA "never intend-



A number of common houseplants are widely touted as natural air purifiers, but does research bear this out?

BY AMY GEORGIANNA MCDERMOTT

ed for a single plant to clean a large space such as a home or office.”

To expand upon these initial experiments, NASA built a “closed ecological life support system” called the BioHome at the Stennis Space Center. At 45 feet long by 16 feet wide, it looked a lot like a space-age doublewide trailer. Inside, a kitchen, sleeping area, and bathroom were flanked by a large plant room to test the ability of various species to clean recycled air and raw sewage in a closed loop.

The BioHome allowed Wolverton and his colleagues to conduct “real-world tests, as opposed to a single plant in a small test chamber.” They found that human occupants of the BioHome, who initially report-

out, may actually be doing the heavy lifting—for more on this see box, page 21). It wasn’t long before those now-ubiquitous lists of best plants for improving indoor air quality started popping up.

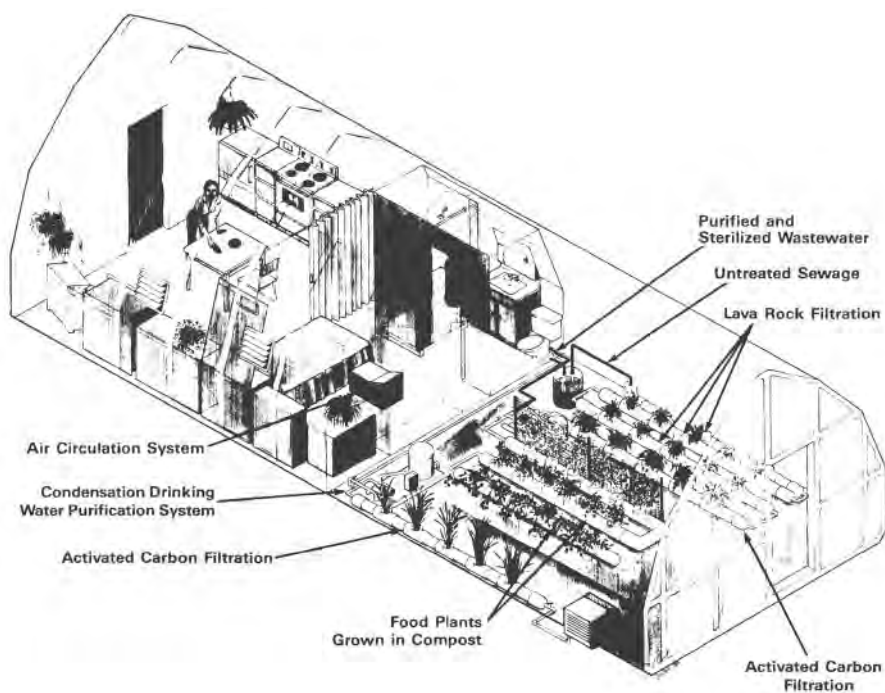
FIELD TESTING

While laboratory tests were an informative first step, they were never meant to model the complexity of real homes and offices. “In science there is always a need for complementary studies in the real world and in laboratory chambers,” says Margaret Burchett, an adjunct professor at the University of Technology in Sydney, Australia, and a coauthor of one of the few experimental field studies testing the

CHALLENGES TO THE RESEARCH

But when it comes to our homes and office spaces, do these lab and field studies tell us anything definite? John Girman, former director of the Indoor Environments Center for Analysis and Studies at the Environmental Protection Agency (EPA), says no.

In 2009, while working with the EPA’s Indoor Environments Division, Girman coauthored the first critical review of the indoor air phytoremediation research. Published in the *Proceedings of Healthy Buildings*, the report was coauthored with Tom Phillips, an air pollution specialist in the Indoor Air Quality Program of the California Air Resources Board, and Hal Levin, a research architect and head of the



Built in the late 1980s at NASA’s Stennis Space Center in southwest Mississippi, the BioHome, shown in the photo above and as a schematic on the left, housed some of the earliest experiments testing whether indoor plants could remove pollutants from the air and from sewage.

ed symptoms of exposure to air pollution, could comfortably live in the unit once the plant filtration system was in place.

After NASA reported its intriguing findings, other labs began their own experiments. Most of these studies were similar to Wolverton’s initial Plexiglas chamber experiments—a rotating roster of houseplant species placed in small test chambers and exposed to one or two common indoor air pollutants. A glut of research published between the late 1980s and early 2000s confirmed NASA’s findings: the concentration of pollutants significantly decreased over time in the presence of plants (and their associated soil microbes, which, as it turns

effect of indoor plants on air quality in office buildings, published in 2007. “Field observations and sampling give us information on correlations between air/soil/water factors and plant behavior.”

To test plants in the “real world,” the Australian researchers conducted a series of trials in three separate office buildings over a nine-week period. Similar to the lab-based chamber studies, the researchers found that spaces with plants had significantly lower concentrations of air pollutants.

“We found that three plants per office were enough always to reduce total [air pollution] below health risk levels,” says Burchett.

Building Ecology Research Group, a California consulting firm based in Santa Cruz.

Overall, the review took issue with the small size of experimental test chambers, the scarcity of field studies, the unrealistic treatment of pollutants, and other methodological issues. On the results of Burchett’s 2007 field study, for instance, the critique pointed out that “variations in ventilation may have been responsible for any apparent pollutant reductions,” and that individual pollutant “concentrations did not appear to be reduced” in the study. Furthermore, it noted that the five-minute duration of the weekly air sampling was “insufficient to characterize indoor concentrations.”

One of the most glaring problems the review raised was the use of small, sealed test chambers in laboratory studies. In them, one plant takes up a larger relative

volume than it would in a typical home or office. You would need a small forest of indoor plants—Girman estimates 680—to replicate the results of the chamber studies in a 1,500-square-foot home.

“There are many variables as to how many plants would be needed to improve indoor air quality,” Wolverton agrees. That’s because people don’t live in sealed Plexiglas houses or NASA-style BioHomes. For example, the ventilation rate of your space is just one variable that’s much harder to control in the real world than in a lab setting. And in the very few field studies that have tested the effects of indoor plants on air quality in office buildings, ventilation rate was considered, but never quantifiably mea-

Resources

Critical Review: How Well Do House Plants Perform as Indoor Air Cleaners?

by J. Girman, T. Phillips, and H. Levin. *Proceedings of Healthy Buildings* (Vol. 23, pp. 667–672, 2009). <http://nepis.epa.gov> (publication number: 402-F-92-003).

How to Grow Fresh Air by B.C. Wolverton. Penguin Books, New York, NY, 1997.

Plants: Why You Can’t Live Without Them by B.C. Wolverton and Kozaburo Takenaka. Roli Books, New Delhi, India, 2010.

sured. “If [polluted] outside air is constantly introduced, conditioned and distributed, it would overwhelm any benefit from plants or any other type of air filter,” says Wolverton. Burchett agrees that ventilation can and does overwhelm the benefits of indoor plants, particularly in “newer buildings with stronger air conditioners,” she says.

Then there’s the issue of the pollutants themselves. The lab studies introduced very high concentrations of airborne chemicals. The change in concentration was then measured over time. But in reality, some pollutants are emitted continuously in relatively small quantities, not in high concentrations all at once. The review notes that the slow, continuous release of toxins into the air could eventually overwhelm a plant’s ability to remove them in a way that sudden high concentrations do not.

Our dwellings also tend to be contaminated with a cocktail of chemicals, giv-



Red-margined dragon tree (*Dracaena marginata*) is often listed as an indoor plant that can help remove airborne pollutants, based on results of studies NASA conducted in the 1980s.

en off by everything from carpeting and furniture to paint and cleaning solvents. Stanley Kays, professor emeritus in the Department of Horticulture at the University of Georgia, measured upwards of 180 different airborne compounds in a survey of several houses in Athens, Georgia (for a list of common indoor air pollutants, click on the web special linked to this article on the AHS website at www.ahs.org).

Rather than replicating a mixture of all those chemicals, most existing experiments

only test one or two common pollutants as “models” of reality. Approximating the real world through models is good standard practice in science. Model organisms like *Arabidopsis* plants and fruit flies have taught us volumes about our own human genetics for example. But in the case of these air quality experiments, a few proxy chemicals do not necessarily reflect reality.

That’s a problem for two big reasons, says Kays. First, “we don’t have very good information on the maladies that you can

PLANTS VERSUS MICROBES

Even from the earliest experiments, researchers knew plants weren't alone in those chamber studies; they were rooted in potting soil that was rich in bacteria, fungi, and other microscopic organisms. Scientists saw air pollutant levels dropping, but they didn't know for sure how much could be attributed to the plants and how much to the microorganisms.

So research groups began probing the question directly. In one 2006 study, for instance, scientists found that soil could keep cleaning the air in a Plexiglas chamber even after a plant had been uprooted and removed. Curiously, virgin potting mix didn't have the same effect.

Because of these results and those from similar studies, Margaret Burchett, an adjunct professor at the University of Technology in Sydney, Australia, believes that "the microorganisms of the potting mix are the primary agents of [pollutant] removal." The plants "exude goodies to attract and multiply the bacteria," she explains. "The microbes are capable of utilizing [pollutants] as food, even down to amazingly low concentrations."

However, there's still no consensus among researchers on whether plants are primarily responsible for removing pollutants, or whether bacteria, fungi, and other decomposers are doing most of the work. —A.G.M.

expose yourself to"—we have little idea how a lot of these chemicals could influence human health, let alone plant metabolism, or at what concentration they might become dangerous. And second, chemicals can interact to create synergistic effects.


Considering that billions of possible chemical combinations can occur, it's clear that researchers have barely scratched the surface so far. Based on the limited existing studies, Girman's review ultimately concluded that "indoor plants have little, if any, benefit for removing indoor air [pollution] in residential and commercial buildings." The official stance of the EPA is similarly bleak: "[T]here is currently no evidence that a reasonable number of houseplants will remove significant quantities of pollutants in homes and offices and consistently improve indoor air quality."

For Kays, the jury is still out. "In theory it works, but the bottom line is there just isn't enough research that's been done," he says.

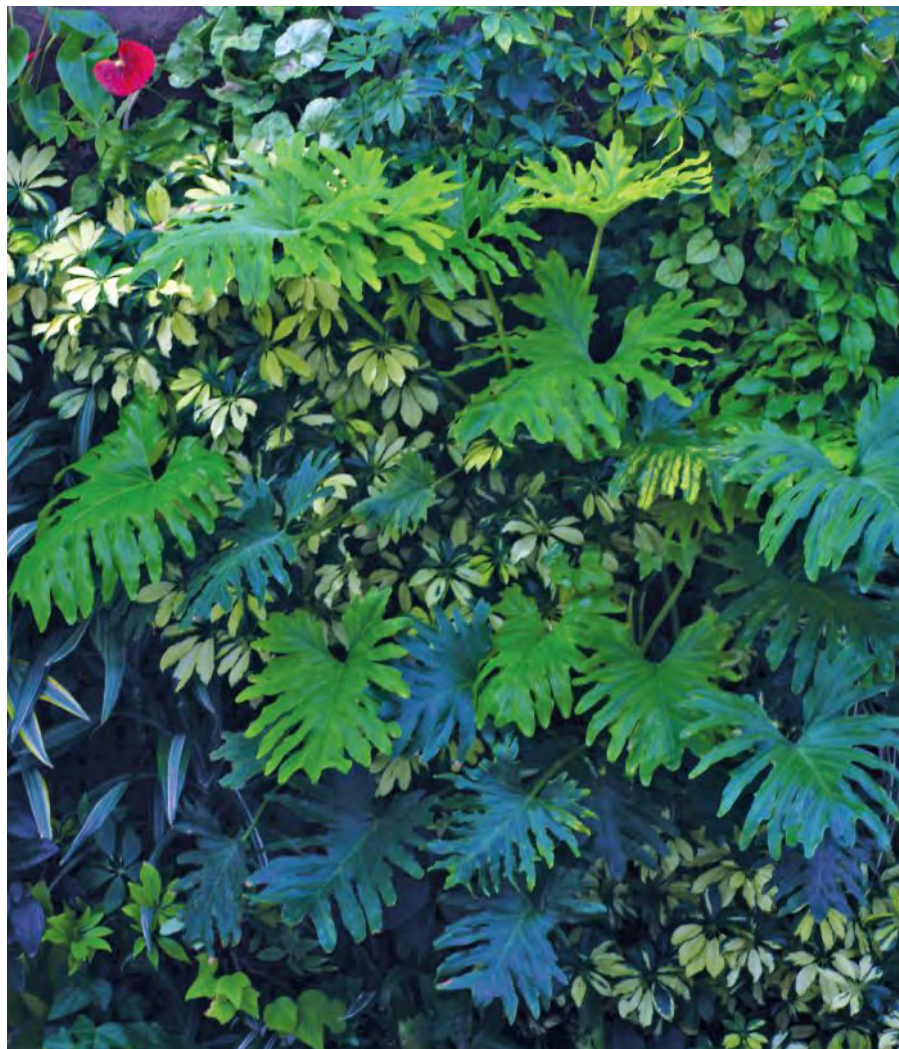
THE BOTTOM LINE

So now what? Should you compost your good-for-nothing spider plant? Are your palms and philodendrons a waste of space? Definitely not! It's likely that indoor plants (in sufficient numbers) do have a positive effect on the air you breathe. We just don't yet know to what extent.

Regardless, you can be sure that indoor plants offer other positive benefits. More and more research indicates that indoor greenery can improve mood and boost performance of creative tasks, and even accelerate the recovery of hospital patients. While these studies are ultimately just as limited as the air quality research, they do dovetail with a larger sensibility that anyone who gardens will agree on: plants just make us happy.

So enjoy your indoor plants, and maybe even find room to grow a few more. As Wolverton advises, "I always recommend a variety of plants and as many as one can reasonably maintain." Appreciate them for the beauty and sense of well-being they bring to your space. And if you want to capitalize on their tentative potential to filter your air, don't limit yourself to the top species on those popular lists because it's simply too soon to judge. 

Amy G. McDermott is an editorial intern for The American Gardener and founder of Hawkmoth magazine.



More research is needed to determine how much of a difference indoor plants make to air quality, but growing a diverse array like in this living wall most likely has some positive effects.

John Fairey

plantsman extraordinaire

A visionary garden creator and plant explorer, John Fairey has had a significant influence on the plant palette and design aesthetic of southern gardens.

ARTICLE AND PHOTOGRAPHS BY BILL NOBLE

IT'S HARD TO pigeonhole John Gaston Fairey. He's probably best known for Peckerwood Garden, the internationally acclaimed oasis he created over the last 40 years on an old farmstead in Hempstead, Texas, some 50 miles northwest of Houston. But over the course of a diverse career, the 84-year-old Fairey has also made a name for himself as an artist, college professor, conservationist, nursery founder, and plant explorer with a particular interest in Mexico's flora.

Through the unique array of trees, shrubs, woody lilies, and perennials from Texas and Mexico trialed at Peckerwood and distributed through public gardens and Yucca Do Nursery—a specialty mail-order nursery Fairey cofounded in the 1980s—Fairey has expanded the palette of plants available to gardeners throughout the American South.

"John has truly been a pioneer in finding and popularizing plants from Mexico," says Tony Avent, proprietor of Plant Delights Nursery in Raleigh, North Carolina. "While John certainly wasn't the first American to botanize Mexico, his broad interest in plants other than cacti, the sheer number of trips, and his mail-order nursery outlet allowed a huge array of John's finds to be distributed far and wide—something that many prior collectors failed to do."

Acknowledgment of Fairey's accomplishments has come in the form of numer-



Over the course of his long career, John Fairey has created a significant legacy in plant exploration, conservation, new plant introduction, and garden design.

ous awards, most recently with the Scott Medal and Award from the Scott Arboretum of Swarthmore College in Pennsylvania in 2013. He has also been recognized for his teaching, earning a National Teacher's Award from the American Institute of Architects. Fairey and his former partner at

Yucca Do Nursery, Carl Schoenfeld, received the American Horticultural Society's Commercial Award in 1996 for their work.

SOUTHERN ROOTS

Fairey's straightforward explanation for his passion is, "I garden because I want someplace wonderful to live." He grew up gardening on his family's farm in rural South Carolina and recalls weeding his mother's garden in the mornings. Visits to Brookgreen Gardens near Murrells Inlet, South Carolina, as a youngster, along with exposure to a lively community of gardeners set him on a course that eventually found its greatest expression in Peckerwood Garden, one of the most ambitious and beautiful gardens and arboreta in Texas.

As a young adult, Fairey moved to Philadelphia to study painting and pursue a career as an artist. Eventually he made his way to central Texas to teach design to architecture students at Texas A&M University in College Station.

It was while exploring the byways of this section of southeast Texas that Fairey's career took a radically different route.

PECKERWOOD'S EARLY DAYS

No one who witnessed Peckerwood's humble beginnings in 1971 could have predicted that the garden would have a far-reaching influence on gardeners and garden designers in Texas and beyond. A realtor showed Fairey the property surrounding a neglected farmhouse in rural Hempstead and he



An extended porch roof shades the veranda of Fairey's house in Hempstead, Texas, above, and provides a restful place to listen to the rustling of palm fronds and view the sculptural forms of agaves and related plants in Peckerwood's dry garden, top.

glimpsed its raw potential. "The site with its clear, spring-fed brook reminded me of magical places in South Carolina where I grew up," says Fairey. "What began innocently, as a pursuit of a sense of place, fast evolved into a passion."

After the back-breaking labor of clearing weeds, briars, vines, and broken fences, a characteristically Southern garden gradually emerged, stocked with traditional plants such as camellias, azaleas, and surprise lilies (*Lycoris* spp.). Fairey brought some of these plants back from visits to South Carolina; others were passalongs from local gardening friends such as Mary "Mame" Kempner.

The artist in Fairey shaped yaupon holly (*Ilex vomitoria*) and azaleas into cloud shapes floating beneath the high canopy of native pines and oaks. Inspired by Kempner and the companionship of his dog, Beauegard, Fairey dubbed the property Peckerwood after the Georgia plantation



Azaleas and ground-covering herbaceous perennials thrive in the shade of Peckerwood's woodland garden.

in the novel *Auntie Mame*, as well as for the many resident woodpeckers.

In 1983, a tornado destroyed or badly damaged many of the pines that shielded the garden from the Texas sun. Overnight, the garden's aspect changed from protected and shaded to open and sun-drenched.

With the character of the garden radically altered, Fairey was forced to adjust his approach. Needing plants that tolerate the intense heat, he began to seek out regionally native plants, aided by a 25-year friendship with Texas native plant pioneer Lynn Lowrey. According to Fairey, joining Lowrey on a 1988 botanizing trip to northern Mexico was a life-altering experience, opening up a whole new realm of plants and an appreciation for the country's botanical, ecological, and cultural riches.

HUNTING MEXICO'S FLORA

Over the next 25 years, Fairey made nearly 100 trips to Mexico, often teaming up

with horticulturists and botanists from universities, public gardens, and nurseries. During these experiences, he learned how plants adapted to their specific ecological conditions in scrublands, pine-oak forests, rainforests, and alpine meadows. He observed how magnolias could thrive beneath the high canopy of pine-oak forest in one location as well as how agaves could benefit by protection from the hot western sun on the other side of the mountain.

Traveling in isolated mountain areas required a sense of adventure and the ability to overcome obstacles such as broken-

down vehicles, hazardous terrain, and unexpected health issues. Despite these challenges, Fairey relished each trip.

Naturally, the knowledge acquired on these expeditions, along with the plants collected on them, found their way into the newly emerging garden at Peckerwood. As Fairey explained in an article published in *Pacific Horticulture* several years ago, "Because the garden is on the edge of three biogeographic regions, the piney woods, the coastal plains, and the post-oak savannah, geography provides as much variety as weather does for growing conditions. Vital to our mission is a trial garden for plants from areas that share similarly demanding conditions."

Plants and seeds from the expeditions also were shared with a wide array of public gardens, including the University of California-Berkeley, Harvard University and Smith College in Massachusetts, North Carolina State University (NCSU) in Ra-

Visiting Peckerwood

Currently the garden is open to the public for select spring and fall open days, or by appointment for groups. For information, visit www.peckerwoodgarden.org or call (979) 826-3232.



During nearly 100 plant-hunting expeditions to Mexico, Fairey collected cuttings and seeds from many promising garden plants, including Chihuahuan orchid tree (*Bauhinia macranthera*), top, blooming at high altitude in the mountains. Above: In the evenings, Fairey and fellow travelers such as Mark Bronstad of Doremus Wholesale Nursery in Warren, Texas, took inventory of each day's finds and bagged them for later propagation.

leigh, the University of California–Santa Cruz, the Chollipo Arboretum Foundation in Korea, and the Royal Botanic Gardens at Kew in the United Kingdom.

In the early 1990s, NCSU horticulturist J.C. Raulston distributed more than 7,000 plants grown from seed collected on Fairey's Mexico expeditions. Marco Stufano, former director of horticulture for Wave Hill in New York recalls the "golden years" of these distributions to public gardens. "We at Wave Hill were fortunate to receive many of his introductions through the legendary generosity of the late J.C. Raulston, who accompanied John on many of his expeditions," says Stufano. "Those were heady moments when we unpacked John's latest finds."

Fairey put his plant-hunting skills to work for the American Cancer Society (ACS) in 1991, when he and Schoenfeld were asked to lead a Harvard University expedition to locate *Taxus globosa*, a rare form of yew native to Mexico. The ACS was interested in extracting a compound called taxol from the plant to test it for effectiveness in treatment of ovarian cancer.

In 1987, Fairey founded Yucca Do Nursery in partnership with Schoenfeld, a former Texas A&M student who had helped with the restoration of Peckerwood following the tornado. The mail-order nursery, originally located next to Peckerwood, served as a means to propagate and share some of the more promising discoveries from the trips (for more on plant introductions, see sidebar, page 26) with gardeners. Schoenfeld later became sole owner of Yucca Do and has since moved the nursery to Giddings, Texas.

THE ART OF THE GARDEN

Peckerwood has been likened to painting and to sculpture. Fairey approaches the making of the garden with equal parts intuition and practicality. "The constant pursuit of new plants for the garden design has kept us aware of the need to evolve the garden continuously. With each addition and change, new problems arise to be solved, resulting in the evolution of the garden both visually and conceptually."

Along the way, Fairey observed that some plants from northern Mexico were actually better suited to cultivation in Texas gardens than their native Texas relatives. For instance, in a planting of syc-

JOHN FAIREY'S PLANT INTRODUCTIONS

John Fairey's expeditions to Mexico have yielded scores of plants that over time have become garden standards in the South and beyond. Many were originally released through Yucca Do Nursery, but others have been selected, trialed, and introduced through public gardens and other nurseries.

Among them are many agaves and related plants such as yuccas, dasyliirions, Mexican lilies (*Beschorneria* spp.), and hesperaloes. Fairey's introductions include *Beschorneria septentrionalis* (USDA Hardiness Zones 7–10, AHS Heat Zones 10–7), which bears drooping clusters of pinkish-red flowers with green tips on a four-foot flower



Zephyranthes LaBufa Rosa Group



Magnolia tamaulipana

er spike, and *Agave gentryi* 'Jaws', a four-foot-tall agave named for the sharktoothlike spines on its leaves.

Fairey has a soft spot for rain lilies (*Zephyranthes* spp.), a genus of bulbous plants with grasslike evergreen foliage that bloom in response to seasonal rainfall. He has collected and grown dozens of selections, but a pink-and-white-flowered one with variable patterning, called LaBufa Rosa Group, is probably the most prominent of these introductions.

Among Fairey's tree finds is an unusual and rather tender magnolia called *Magnolia tamaulipana* 'Bronze Sentinel' (Zones 8–9, 9–7) that grows to 30 or 40 feet tall and bears creamy-white flowers in spring. Its new foliage has a purple-bronze hue that matures to deep green.

Peckerwood has instituted a seed distribution program to ensure that the rare and worthy plants growing in the garden continue to be available to researchers and gardeners. Plants are also sold at the garden's onsite nursery.

—B.N.

mores that were subjected to a deep freeze, only the one from the Mexican state of Nuevo Leon survived.

Fairey also developed specific planting techniques to cultivate plants capable of withstanding the assaults of excessive moisture, drought, heat, cold, and rapid swings in temperature, all of which are characteristic of the continental Texas climate.

A good example of this is his dry gardens, which are mounded and mulched with gravel—a trick Fairey learned from Lowrey—to get the plants above the difficult native soil and to provide excellent drainage. Agaves, beschornerias, dasyliirions, yuccas, palms, and other plants from arid regions thrive in these beds, which also provide protection from the region's

temperature extremes. These techniques have informed gardeners in similar situations throughout the South.

Fairey tells his art students that light "is a free commodity and should be used all the time," and he has adapted that advice for his placement of plants in the landscape. In northern Mexico, he observed agaves and other woody lilies thriving under oaks, so at Peckerwood, accordingly, direct light is filtered through the highest canopy of oaks and pines to become dappled light playing off horizontal branches and vertical shafts of the understory trees and shrubs such as magnolias and summersweets (*Clethra* spp.). Light ricochets off the swirling fronds of palms and spherical spikes of yuccas and agaves before finally being absorbed by the more saturated colors of perennial foliage and flowers near ground level.

Many shades of blue pervade the garden, in its palms, agaves, yuccas, nolinias, and dasyliirions, providing a cooling respite in sunny dry areas as well as in the woodland. Fairey reminds his visitors that blue is psychologically cooling and that the movement of leaves is equally soothing to the soul.

Fairey also pays particular attention to space, placing plants so they form a series of intimate areas, some created with undulating forms, others with abstracted divides, each a part of a series of experiences. Plants are shaped to frame a vista or left protruding beyond the frame, requiring the visitor to slow down and gently pull the branches apart in order to proceed. "I think of gardening as an aesthetic experience involving all the senses," says Fairey. "You are forced in this garden to touch and feel and smell, whether you want to or not."

Visitors also note the contrasting areas of the garden, with the north side of the house wooded and dark and the south side dry and sparse, with a minimum of easy-to-maintain plants. Three *Nolina nelsonii* are lined up by the pump house with their slender spiky leaves playing off the vertical ribbing on the Galvalume siding, inspired by vernacular buildings fast disappearing from the rural Texas landscape. The house, designed by architect Gerald Maffei, one of Fairey's colleagues at Texas A&M, faces south to catch the winter sun and features a deep porch roof that shields the house and veranda in the summer.

The view from the veranda features palms constantly in motion from the prevailing Gulf breezes, the rustle of their leaves, helping to screen the house and garden from the sounds of the nearby road.

A SOLID FOUNDATION

The original seven-acre property has grown to 19 acres and the nonprofit Peckerwood Garden Foundation, which Fairey established in 1999, has acquired another 20 acres that was formerly the site of the nursery. The added acreage will be crucial to the garden's future for a number of reasons, including as the site of an arboretum

Sources

Plant Delights Nursery, Raleigh, NC. (919) 772-4794.

www.plantdelights.com.

Woodlanders, Inc., Aiken, SC. (803) 648-7522. www.woodlanders.net.

Yucca Do Nursery, Giddings, TX. (979) 542-8811. www.yuccado.com.

tween Mexico and the United States and to raise awareness on both sides of the border about the richness of the flora of northeastern Mexico. He also wants to

It is the art and science, as much as the beauty and conservation value of Peckerwood that has encouraged organizations like the Garden Conservancy to take an interest in the garden's long-term preservation. The Peckerwood Garden Foundation is helping plan for a future that will not only share Fairey's artistic vision but develop research and education programs to introduce plants that can enrich gardens and public landscapes in the region as a changing climate and diminishing resources intensify the challenges for people and plants.

"Peckerwood is a laboratory garden testing a wide range of 'new' plants," says



The gap created by a large oak felled by a tornado in 1983 made an opening for Peckerwood's first dry garden. A slashing blue wall, inspired by the hues of painter Frida Kahlo's house in Mexico City, created a backdrop for a garden that features the plants and stimulating visual culture of Mexico.

for its expanding collection of oaks. Mexico is the epicenter for oak distribution in the world and about half of the 230 oaks in the garden are Mexican species. The garden's staff has grown along with the garden, rising to four full-time employees and aided by scores of dedicated, enthusiastic volunteers.

One of Fairey's goals with Peckerwood is to provide a cultural bridge be-

draw attention to overgrazing and other economic pressures that are threatening the already fragile ecosystems.

Fairey's horticultural legacy encompasses plant exploration, conservation, garden design, and the introduction of a new palette of plants for American gardeners, yet for him the culmination of all these activities are reflected in his vision for Peckerwood.

Fairey. "It is a garden with a mission to encourage other gardeners to see a beauty in landscape that is consistent with our plants and climate. It is a garden that looks to the future, not to the past." 🌿

Formerly director of preservation with the non-profit Garden Conservancy, Bill Noble is a garden designer, consultant, and freelance writer based in Norwich, Vermont.

how to grow a truly “Green” Lawn



You don't need to use synthetic fertilizers or pesticides to have a healthy, attractive lawn.

BY KRIS WETHERBEE

The organic lawn of this private residence in Redmond, Washington, is professionally maintained by In Harmony Sustainable Landscapes, which limits the use of herbicides to spot-treatments as needed.

THOUGHTS OF cartwheels and walking barefoot on a bed of lush, green grass always take me back to my childhood days. Even now, when I see an inviting patch of grass or attractive lawn, it's tempting to act like a child once again. Okay, maybe not the cartwheels, but there's still nothing quite like the feeling of the cool blades between your toes, especially on a warm summer's day. However, unless I know that the grass hasn't been treated with lawn chemicals, I'm likely to keep my shoes on.

Many conventional lawns are maintained by the use of synthetic herbicides and pesticides that can cause harm to humans, wildlife, and the environment. In its most

recent report on pesticide use issued in 2011, the Environmental Protection Agency noted Americans apply more than 65 million pounds of pesticides, herbicides, and other toxic chemicals to their yards each year.

Synthetic fertilizers also have a downside. If overused or applied incorrectly, their components, particularly phosphorus, can be washed into stormwater systems and eventually contribute to downstream pollution. In Minnesota, Illinois, Washington, Michigan, Virginia, New York, Maine, New Jersey, Vermont, Maryland, and Wisconsin, there are now restrictions on the use of phosphorus-based lawn fertilizers.

However, you don't need an arsenal of synthetic lawn chemicals to turn up the

green factor on your own home turf. By fortifying the soil, choosing appropriate turfgrass varieties, and fertilizing, mowing, and watering properly, you can achieve a healthier and attractive lawn with family appeal.

GO UNDERGROUND

A healthy green lawn begins with good soil. “The biggest mistake I see is lack of soil preparation prior to planting, particularly in new home constructions,” says Casey Reynolds, an Extension turfgrass specialist at Texas A&M University in College Station. “In most cases, the turfgrass sod gets laid down on compacted subsoils with little to no native organic matter. This means it can often take years for the grass roots to penetrate the top four to five inches of soil. No one would ever plant a tomato plant in compacted, untilled soil and expect it to thrive, yet that’s exactly what we do with our perennial turfgrasses.”

Healthy soil is alive with earthworms and beetles as well as microorganisms that improve soil structure, recycle nutrients into a plant-friendly form, and can supply all the nutrients plants need. A well-balanced soil rich in beneficial microbes helps reduce plant stress and disease. Using pesticides can dramatically disrupt this balance.

Three elements are essential to supporting a healthy soil environment: organic matter, adequate moisture, and air. Ideally, your soil should contain a minimum of three percent organic matter.

Good sources of organic matter for lawns include compost, aged manure, and grass clippings. If you’re starting from scratch, work organic matter as deeply as possible into the soil before seeding or laying sod. For existing lawns, a thin layer of screened compost (half an inch or less) applied as a top-dressing once or twice a year in spring or fall will help support soil critters and maximize turf health. High-quality compost tea is also a good option for encouraging beneficial soil organisms, and some lawn care companies are now offering this service.

CHOOSE THE RIGHT GRASS

Garden plants flourish when they are matched to the region and growing site. Lawns are no different. Turfgrasses fall into two main groups: cool-season types and warm-season types. Most grow best where they get four to six hours of sunlight a day.



A healthy lawn starts with healthy soil, which can be encouraged by incorporating organic matter such as compost or leaf mulch.

Cool-season grasses are more suited to the northern regions of the country, growing best in spring and fall and then slowing down in hot weather. Cool-season grasses become dormant and can turn brown during dry summers unless watered on a regular basis. Once fall returns and moisture is replenished, these lawns will typically green up once again. Fescues are pretty heat- and drought-tolerant, with tall fescue getting by on up to 50 percent less irrigation than Kentucky bluegrass; many fescues also tolerate some shade.

Perennial ryegrass stands up well to wet soil and heavy foot traffic, though it’s not as drought-tolerant as the fescues.

Warm-season grasses grow best during the warmer temperatures of late spring, summer, and early fall, and go dormant once cold weather arrives. These include bermudagrass, which is quite drought-tolerant and will withstand a lot of foot traffic, though it is the least shade-tolerant among the group. St. Augustinegrass does well in shade and is great for coastal areas but doesn’t handle foot traffic well. Zoysiagrass tolerates heat, drought, and a moderate amount of shade, and is quite cold-tolerant for a warm-season grass.

The type of grass you choose depends on your climate, lifestyle needs, and the characteristics of your site—in some regions, blends or mixtures of grasses are recommended for lawns. A blend is composed of two or more cultivars of the same grass species; a mixture is made up of two or more different species. (See page 33 for suggested grasses for different regions of the country.)

LET YOUR LAWN BREATHE

Soil aeration is a critical component of promoting root growth and turfgrass health. Loosening the ground under the turf allows air, water, and nutrients to penetrate deep into the soil and reach grass roots. Aerating the lawn will also help reduce thatch—a



This lawn in suburban New Jersey is largely planted in zoysiagrass, a warm-season grass that is still dormant in early spring, with patches of cool-season perennial ryegrass.

buildup of decomposing plant material between the lawn base and the soil surface.

“Most lawns have a natural thatch layer of one-eighth to a quarter inch, but when it builds up to more than half an inch high, it impedes water and nutrients,” says Ladd Smith, co-owner of In Harmony Sustainable Landscapes, a Washington-based lawn and garden care company.

How frequently you aerate depends on where you live, soil and turf type, and the level of traffic on the lawn. If a screwdriver cannot be easily inserted into the soil, it's time to aerate. For a small lawn, a manual core-type aerator may do the trick, but rent a power aerator for tackling large areas.

FERTILIZING FUNDAMENTALS

Fertilizing needs will be minimal on grass grown in healthy soil alive with microorganisms and other soil denizens. “Turfgrasses for the home lawn don't need as much input as most people think,” says Paul Johnson, turfgrass expert and head of the department of Plants, Soils, and Climate at Utah State University in Logan. “Nitrogen is the primary nutrient needed in most of our soils for decent turf growth, and there are plenty of natural organic sources.”

Before deciding whether to fertilize or amend your lawn, perform a soil test.

Sources

Espoma, Millville, NJ. (800) 634-0603. www.espoma.com.

Gardens Alive!, Inc., Lawrenceburg, IN. (513) 354-1482. www.gardensalive.com.

Peaceful Valley Farm & Garden Supply, Inc., Grass Valley, CA. (888) 784-1722. www.groworganic.com.

Planet Natural, Bozeman, MT. (800) 289-6656. www.planetnatural.com.

Resources

The Gardener's Guide to Common-Sense Pest Control by William Olkowski, Sheila Daar, and Helga Olkowski. Taunton Press, Newtown, CT, 2013.

Lawn Care Without Pesticides by Frank Rossi. Cornell University Press, Ithaca, NY, 2005. [Download at <https://ecommons.cornell.edu/handle/1813/3574>]

Lawns Natural and Organic by Don Williamson. Lone Pine Publishing, Auburn, WA, 2006.

The Organic Lawn Care Manual by Paul Tukey. Storey Publishing, North Adams, MA, 2007.

Reimagining the California Lawn by Carol Bornstein, David Fross, Bart O'Brien. Cachuma Press, Los Olivos, CA, 2011.

(Check with your local Cooperative Extension service for assistance.) The preferred soil pH range for most grasses is between 6 and 7. If the pH is not in that range it can limit the amount of nutrients available to your grass.

Natural fertilizers from plant or animal sources—such as blood meal, aged animal manure, fish emulsion, or corn gluten meal for nitrogen—can be applied

according to your lawn's needs. You can also use a natural fertilizer blend.

In general, spread no more than one pound of actual nitrogen per 1,000 square feet at any one time, with no more than four pounds per season. For instance, 20 pounds of fertilizer with five-percent nitrogen will deliver one pound of actual nitrogen. Use a slow-release fertilizer with a nitrogen-phosphorus-potassium (NPK) ratio suited to the needs of your lawn, as determined by a soil test. For most established lawns, there is little benefit in adding phosphorus or potassium because both are often naturally present in quantities that can support plant growth, so nitrogen is the only nutrient that may need to be supplemented.



A power aerator, left, is useful for loosening thatch and compacted soil in large areas. The machine pulls up plugs, above, that open up the root zone of turfgrasses to air, water, and nutrients.



Although some people consider clover weedy, it returns nitrogen to the soil and can be integrated as a component of a healthy lawn.

Having a chemical-free, water-thrifty lawn sounds great, right? Clint Waltz, turfgrass Extension specialist at the University of Georgia at Griffin, has seen homeowners start off enthusiastic about the idea, only to switch back to a conventional lawn once the lawn starts turning brown during a summer dry spell. “People’s expectations can be inconsistent with what the grass can do,” he says. “Most of our warm-season grass are drought-tolerant and can survive 21 to 28 days without water by going dormant, but folks want a green lawn.”

“With organic fertilizers,” Waltz adds, “we have to accept they don’t work as quickly as most synthetic products. Pest management will also be more of a challenge with organic means.”

In parts of the country where prolonged summer drought has necessitated water restrictions, a shift in attitude has already begun. “In Oregon,” says Alec Kowalewski of Oregon State University in Corvallis, “it is more acceptable to let your

lawn go into summer dormancy—turn brown—rather than irrigating to maintain the green color.” Kowalewski cautions, however, “Homeowners should note that while you are saving water, the lawn will be more susceptible to drought-tolerant weeds, which could translate to more frequent herbicide use.”

Another potential problem to be aware of with using less water is that any pest injury that may occur will often be more severe when coupled with drought stress, so the affected lawn will take longer to recover. Casey Reynolds, an Extension turfgrass specialist at Texas A&M University in College Station, says, “Several turfgrass insect pests—Southern chinch bugs and fall army worms, for example—often impact lawns in the South during hot, dry summers and can be quite destructive if not treated. It is up to individual homeowners to determine how much damage they are able to withstand and what their treatment threshold will be.”

—Mary Yee, *Managing Editor and Art Director*

THE REALITY OF THE ORGANIC APPROACH

The best time to fertilize depends on when your grass is actively growing. Cool-season grasses should be fertilized in early spring and fall, whereas warm-season grasses are best fed in late spring to early fall.

WATER WISELY

As the adage goes, things are best in moderation. This holds true when it comes to watering your lawn. Too little or too much

can stress plants and reduce populations of beneficial soil organisms. And soggy soil also inhibits vital oxygen, leading to anaerobic soil conditions that encourage disease.

Watering deeply but infrequently encourages development of a deeper, healthier root system that will help a lawn endure periods of heat and drought. Your lawn’s specific irrigation requirements will depend on your soil type, variety of grass,

and mowing practices, but about one inch of water a week during active growth is a good guideline. As a guideline, if you can see your footprints after walking on your lawn, and the grass doesn’t spring back, then it’s usually time to water.

MOWING MANAGEMENT

When it comes to a turf that’s more resistant to weeds, disease, drought, and sum-

mer heat, the key is to mow high and mow often, cutting no more than one-third of the total height in one mowing. Taller grass allows for better photosynthesis, resulting in a deeper root system and overall healthier turf. Giving your grass a higher haircut saves you time and money since the tall blades shade out weeds, and the deeper root system ultimately makes grass more disease and drought resistant.

How high to mow depends, once again, on your turfgrass variety. As a rule of thumb, mow at about two-and-a-half to four inches for cool-season grasses, and at one to two inches for warm-season grasses like bermudagrass and zoysiagrass.

Cutting the grass with sharp blades also helps power up the “lush” factor on your lawn. A dull blade rips grass rather than cutting it, making your lawn more susceptible to diseases, weeds, and drought. Mower blades should be sharpened at least twice each season, more often when mowing on sandy soils.

When you mow, leave those mulched grass clippings on the lawn whenever possible. They add organic matter and provide a natural source of nitrogen that can reduce your fertilizing requirements.

COPING WITH WEEDS

When it comes to lawn weeds and organic maintenance, tolerance or changing your expectations is the order of the day.

“The best defense against weeds is a healthy lawn,” says Reynolds. “Planted in the right environment—shade-tolerant species under shade, cold-tolerant species in regions with cold winters—with adequate rooting depth, turfgrasses often do a great job of outcompeting weeds, especially when coupled with sufficient irrigation and proper mowing.” Many common lawn weeds—such as ground ivy or creeping Charlie (*Glechoma hederacea*), a notorious garden weed in the eastern United States—thrive where grass is cut too short. Mowing frequently also deters annual weeds because it reduces the chances of the weeds being able to flower and set seed.

When you have a thick stand of turfgrass, most weeds that do pop up can easily be controlled by hand-pulling or using one of the many mechanical tools on the market.

The only organic herbicide that won’t kill an existing lawn is corn gluten meal (CGM), a pre-emergent that must be applied before



For optimal results, make sure mower blades are sharp and set at an appropriate height.

weed seeds germinate to be effective. CGM is the active ingredient in commercial products such as Concern Weed Prevention Plus and WOW. It works well controlling a variety of annual weeds, including crabgrass (*Digitaria* spp.). It requires a drying period of two to three days after application and it is most effective when applied one week before seed germination. At 10 percent nitrogen (by weight), it also makes an excellent lawn fertilizer. Just be sure not to apply it at the same time you are seeding your lawn, because it will prevent grass seed from germinating.

If you decide to use a synthetic herbicide, choose the least-toxic product



Cutting grass too short encourages the growth of weeds like ground ivy.

and skip the “weed and feed” products, which cover the entire lawn with herbicide. Instead, go for spot applications of herbicide early in the season when the weeds are still small. “The goal is to get the maximum effect with minimal product,” says Smith.

PUTTING A DAMPER ON PESTS AND DISEASES

Lawns growing in a balanced soil ecosystem are more naturally resistant to turf diseases and pests. Common pests such as lawn grubs (most are the larvae of Japanese beetles) can be controlled by using biological controls such as beneficial nematodes or milky spore powder—a naturally occurring bacterium available at lawn and garden stores.

If you decide to use a conventional pesticide, seek out one that addresses the specific pest rather than a broad range.

PEACE OF MIND

It is possible to have an attractive lawn without relying on toxic chemicals. Whether your lawn needs minimal maintenance or a major renovation, just remember: Any lawn worth wiggling your toes in begins with healthy soil. 🌿

Freelance writer Kris Wetherbee organically maintains her lawn in Oakland, Oregon. This is an updated and revised version of an article originally published in the September/October 2006 issue of The American Gardener.



LAWN GRASSES RECOMMENDED BY REGION

Because the United States encompasses so many different climate zones, the best way to find a suitable turfgrass for your yard is to consult your local Cooperative Extension service (visit <http://nifa.usda.gov/partners-and-extension-map> to find an office near you). Here we asked the following turfgrass experts across the country for some guidelines on grass selection.

WEST

Paul Johnson, Utah State University, Logan

“In the cool-arid region of the West, the primary challenges are water, heat, and sometimes salt. Plus, urban areas in the west are getting warmer and more humid.”

■ **Recommended** “For a high-use area, Kentucky bluegrass is best because it is durable and well adapted. Blue grama and buffalograss require the least amount of water to remain green in summer but don’t grow actively in early spring and fall. The most drought-tolerant cool-season species is tall fescue, but only if it can root deeply. Fine fescues work well in low-traffic lawns that have some shade. Some of the wheat grasses can work in areas where no irrigation is possible or desired.”

PACIFIC NORTHWEST

Alec Kowalewski, Oregon State University, Corvallis

“The Pacific Northwest receives its rainfall in the fall, winter, and spring months. It is very dry from late June to early September, making drought stress an issue. In winter, turfgrasses that are susceptible to cool weather fungal pathogens will struggle, due to the wet weather we receive during these months.”

■ **Recommended** “Tall fescue and bentgrass (colonial, highland, and creeping) do very well in our dry summers without irrigation. However, tall fescue is very susceptible to cool-weather pathogens. Perennial ryegrass does well in irrigated areas west of the Cascade Mountains because of its resistance to winter pathogens. East of the Cascade Mountains, Kentucky bluegrass is preferred because it tolerates the very cold and dry high desert winters, but it requires significant amounts of summer irrigation.”

SOUTH

Casey Reynolds, Texas A&M University, College Station

“Water is our big challenge. Many of the warm-season turfgrasses are well-adapted to heat and drought, but in many urban areas, rooting depth can be limited due to the impacts of home construction on soil health, so lawns will need supplemental irrigation to maintain growth during the summer months.”

■ **Recommended** Bermudagrass, buffalograss, St. Augustinegrass, and zoysiagrass. “Buffalograss doesn’t perform well where there is higher average annual rainfall, and St. Augustinegrass can’t tolerate cold winters. St. Augustinegrass and zoysiagrass are two of our most shade-tolerant species.”

SOUTHEAST

Clint Waltz, University of Georgia, Griffin

The biggest environmental challenge is water use.

■ **Recommended** Drought-tolerant grasses such as bermu-

dagrass and centipedegrass. “Our breeders [at the University of Georgia] are working diligently on improved drought tolerance,” says Waltz. He notes that UGA recently introduced a bermudagrass being marketed as ‘Tiftuf’ that requires much less water than other bermudagrasses and stays green instead of going dormant.

NORTHEAST

Frank Rossi, Cornell University, Ithaca, New York

“The Northeast has very cold winters and very warm summers. Lawns can often do well for much of the year, then suffer from an extreme winter or thin from persistent warm temperatures. While many areas have been very dry in the Northeast, there are also many that have gotten twice the normal rainfall. Wet conditions for turf in our region is a major problem.”

■ **Recommended** “The cool-season grasses do well in the Northeast. The typical Kentucky bluegrass, perennial ryegrass, and fine fescues have been the standard grasses. However, as the climate has warmed, we have seen a sea-change in the performance of turf-type tall fescue that seems to be holding up very nicely from the southernmost part of the region to the northernmost.”

MIDWEST

Jared Hoyle, Kansas State University, Manhattan

“Winters are very cold and summers are very hot and dry, which makes it difficult to grow turfgrass.”

■ **Recommended** Most turfgrasses used in the Midwest are cool season species such as creeping bentgrass, Kentucky bluegrass, and fine fescues. Warm-season bermudagrass, zoysiagrass, and buffalograss, are sometimes grown. Hoyle says, “Choosing the right variety of cool- or warm-season turfgrass is essential. For example, gardeners who want to grow zoysiagrass need to choose a variety called ‘Meyer’, which has great cold tolerance and suits the Kansas environment.”

SOUTHWEST

David Kopec, University of Arizona, Tucson

The environmental challenges of the Southwest are low levels of precipitation and high levels of salinity in the soil.

■ **Recommended** Bermudagrass is the best choice for lawns here, but Kopec notes it “will not persist adequately in shade.” It will grow when initially planted on new properties, but it will experience “a slow decline process as trees and shrubs increase in size, creating more shade.” Overseeding or reseeding with other varieties is often necessary.

—Mary Yee, Managing Editor and Art Director



Growing Good Kids

ALL OF US who garden or work with plants are familiar with Master Gardeners. We've encountered them at farmer's markets or during a call to a local Cooperative Extension service. To become a Master Gardener, individuals complete an accredited training program administered through state Extension services and then apply their horticultural knowledge to help their community.

Less well known, but equally important, is the International Junior Master Gardener Program (JMG), which provides kids in the United States, Canada, Latin America, and South Korea the opportunity to learn and grow through gardening, while giving back to their community. It aspires not only to help kids develop healthy minds and bodies, but to encourage them to be-

The International Junior Master Gardener Program takes an integrated approach to improving children's lives through plants.

BY VIVEKA NEVELN

come leaders, thinkers, and caretakers of the earth. This may sound like a tall order, but JMG is well equipped for the challenge.

INTEGRATED APPROACH TO LEARNING

Developed by the Texas A&M AgriLife

Extension Service, JMG got its start in 1999 as a 4-H project to "promote a love of gardening, develop an appreciation for the environment, and cultivate the mind." Its core curricula focus on topics such as science, math, health, and nutrition, and service to others through hands-on gardening activities. From basic techniques to enjoying an edible harvest, students gain a broad range of horticultural knowledge while practicing important skills such as problem-solving and critical thinking.

The JMG curricula have been implemented successfully in a wide variety of settings, including public and private school classrooms, as well as youth groups, camps, clubs, botanic gardens, and other organizations involved with youth development. And although these curricula were designed for third through eighth graders, "the les-



through Gardening

sons and activities are adaptable, depending upon which curriculum a group is using,” notes Texas AgriLife Extension project specialist Caren Walton. Preschoolers to high schoolers of all abilities have benefited from the JMG Program.

What makes the JMG curricula so effective, says Mary Helen Phillips, youth education chair for the Comal Master Gardeners in Comal County, Texas, is that the lessons and activities “engage the students in learning in a way that is interactive and fun. No one is ever bored!” A retired educator, Phillips has been volunteering in various elementary schools in her region for the last several years. “I find students retain the information learned through the JMG activities, are more confident in their knowledge, and are open to asking questions to expand their knowledge,” she adds.

NEW DEVELOPMENTS

JMG has continued to evolve over the years, based on feedback from education professionals about what works and where improvements may be made. “We have so much respect for teachers,” says Randy Seagraves, JMG curriculum coordinator. “We know they are extremely busy and time is tight.” Not surprisingly, surveys and other research reveals that keeping things simple, while also providing robust resources to support the curriculum, is key to success.

Plus to the inexperienced, gardening can seem daunting. “Many teachers get

Left to right, kids harvest and help prepare produce they grew to sample in recipes, and work together to tend gardens they design as part of the International Junior Master Gardener Program.

overwhelmed trying to understand basic points like what materials they need to start a garden, where it should be placed, what they can plant, and how it would be maintained,” notes Seagraves. In response to these needs, JMG announced its new curriculum, Learn, Grow, Eat & GO! (LGEG) this July at the American Horticultural Society’s National Children & Youth Garden Symposium that took place in Austin, Texas.

This new curriculum “had early beginnings with the success of a previous JMG curriculum (Health & Nutrition from the Garden) that was shown to increase students’ consumption of fruits and vegetables,” explains Seagraves. “With the expansion and major redevelopment of that earlier project, along with additional reshaping from evaluation of



Left: Students follow instructions in the JMG's Learn, Grow, Eat & GO! curriculum to construct raised beds for a new school garden. **Above:** Classroom lessons complement the garden's hands-on activities.

a five-year research study, the Learn, Grow, Eat & GO! curriculum represents the best of what we know works.”

WHAT WORKS BEST

That five-year, randomized, controlled study of 28 Texas schools, conducted through a partnership between several Texas institutions, examined the efficacy of garden, nutrition, and physical activity programs—such as JMG—in reducing childhood obesity. The results indicated a measurable improvement in student health in terms of increasing the amount of fresh fruits and vegetables consumed and daily exercise. But as Seagraves points out, school performance is not measured on how healthy students are, so any gardening curriculum must also tie into education standards. And this is exactly what LGEG is designed to do.

“Created by teachers, alongside content experts, LGEG is presented in a linear, classroom-friendly format,” says Seagraves. “Each of the LGEG curriculum 20 lessons and featured components have been intensely evaluated, and creatively presented to maximize academic gain and encourage students to make healthier choices.”

Involving students in the decision-making process and their families in supporting roles can greatly facilitate these outcomes. For example, kids decide the rules and schedules they will follow for the garden they create as part of the LGEG curriculum. During field testing, teachers saw that giving students ownership through various responsibilities increased engagement when learn-

ing about the garden. It also helped them to cooperate with each other and work as a team toward a common goal. And when parents were enlisted to reinforce the weekly lessons and activities at home, they reported that this often resulted in healthier family meals and exercise habits.

To maximize the involvement of parents, school staff, and community volunteers such as Master Gardeners, the LGEG curriculum includes robust resources like letters to parents explaining each week's lessons, and a sample volunteer schedule with pos-



Participants in the Junior Master Gardener Program design and decorate gardens like this one featuring a mix of edible plants.

sible tasks. The program's website, www.jmgkids.us/lgeg, offers a wealth of printable handouts, recipes, instructional videos, and lots of other resources for teachers, parents, and volunteers.

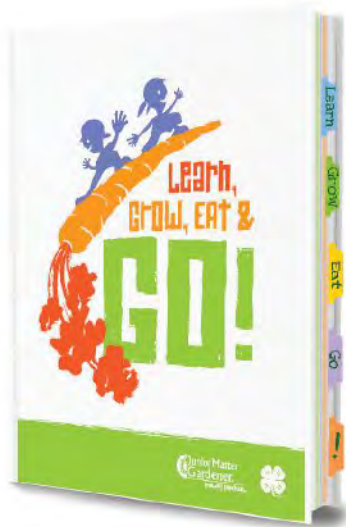
COOPERATIVE CONNECTIONS

In the volunteer department, the JMG program has a significant advantage over most other garden-based curricula and programs currently available. As a program administered through the Cooperative Extension network, JMG has a built-in, national support system that includes Master Gardeners.

“Master Gardeners support JMG programs within their respective counties in various ways,” explains Walton of the Texas AgriLife Extension Service. “Many host teacher workshops, conduct onsite demonstrations for schools and organizations who have JMG programs, and provide support to those who are interested in starting a JMG program.”

Knowledgeable volunteers like Master Gardeners can ensure an educational garden succeeds, especially when school budgets are already stretched tight and teacher schedules are jam-packed. Programs such as JMG and its new LGEG curriculum are proof positive that such gardens are well worth the effort, considering the enormous dividends they can yield when it comes to the minds and bodies of kids of all ages.

Viveka Neveln is associate editor of The American Gardener.



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It's Time to Divide Herbaceous Perennials

by Scott Aker

IN MY GARDEN, late summer to early autumn is the time I take a close look at the perennial beds and borders to assess improvements I need to make next season. The success or failure of the plants I grow is fresh in my mind, and gaps in the landscape are easy to identify.

New gardeners sometimes think perennials don't need care after they've been planted. While some herbaceous perennials, such as peonies, sedums, and hostas, are happy left undisturbed if they are situated in the right place, others need to be divided from time to time for renewed growth. For the majority of perennials, dividing and replanting are best done in late summer and early autumn.

At this time of year, perennials that have already flowered are in the part of their growth cycle when they are ready to develop new roots and—for some—a low rosette of foliage that will endure winter's cold. Nights are cooler, and days are shorter. Hot weather is less persistent; moisture in soil is more persistent. Under these conditions, roots establish quickly, even when top growth has died to the ground, so newly planted divisions generally recover quickly.

GROWTH PATTERNS DICTATE STRATEGIES

Knowing what needs to be divided and when best to do it may seem complicated, but all you really need to do is look carefully at the seasonal growth pattern of your perennials.

Pioneer species—such as yarrow (*Achillea* spp.), beebalm (*Monarda* spp.), and Shasta daisies (*Leucanthemum ×superbum*)—are programmed to invade disturbed soil and spread quickly, often by creeping underground stems called



Fall is a great time to divide many herbaceous perennials, such as these daylilies.

rhizomes. The oldest parts of these plants tend to decline and die, so they benefit greatly from division and replanting every three or four years. Non-rhizomatous perennials—such as peonies, hellebores (*Helleborus* spp.), torch lilies (*Kniphofia* spp.), and coneflowers (*Echinacea* spp.)—grow by slowly increasing the size of the clumps, so they don't recover quickly after being divided. Many can be left alone for a decade or more.

Resources

The Well-Tended Perennial Garden by Tracy DiSabato-Aust. Timber Press, 2006.

The Perennial Care Manual by Nancy J. Ondra. Storey Publishing, 2009.

The key to determining when best to divide is the bloom time. Flowering is the culmination of growth aimed at seed production for all flowering plants. Even if you deadhead your perennials, they still go through the same cycle of growth. After the flowers have faded and seeds have formed, the plant once again shifts its energy to preparing for flowering next year. Spring bloomers often postpone growth until the worst of the summer's heat is over, and some—such as oriental poppy (*Papaver orientale*) and bleeding heart (*Dicentra* spp.)—enter a state of dormancy. This is an effective strategy to cope with potential drought and heat stress. These perennials are telling us that in all but the coolest climates, summer is a difficult time for reestablishment.

It is best to postpone dividing spring-blooming and summer-blooming perennials until the weather has cooled.

With late bloomers such as asters (*Symphotrichum* spp.) and mums (*Chrysanthemum* spp.), wait until they have finished blooming in late autumn to divide them in mild climates. In cold climates, they are best divided in early spring. (See the sidebar on the opposite page for how to divide perennials.)

OTHER REASONS FOR DIVIDING

You may need to dig and replant frequently to keep overzealous species such as Japanese anemone (*Anemone hupehensis*, syn. *A. ×hybrida*), obedient plant (*Physostegia* spp.), and beebalm in their intended space. Consider moving them to a different space with leaner soil or drier conditions to limit their growth.

If you've been battling weeds, pests, or diseases, division is an opportunity to hit

the reset button. Once you have dug up the afflicted plants, you can remove infected leaves, snails, insect eggs, and perennial weeds such as bindweed (*Convolvulus arvensis*) and wiregrass (*Cynodon dactylon*) that may have intermingled with your plants. You can till the soil and leave it exposed for a time during re-establishment or move plants to a new location with soil free of pests and diseases. If your garden is heavily infested with weeds or diseases, you can move divisions to a nursery bed and use solarization or herbicides to kill weeds and disease spores before replanting. This approach requires careful planning and an early start with digging and dividing.

Before you start the job, be sure you have enough time to plant the divisions and water them before you are done for the day. The task may be more manageable if you break it up into three rounds to be done in late summer, early autumn, and late autumn.

CREATE A GAME PLAN

Dividing is also a good time to add compost, rotted manure, or other decayed organic matter to your soil or incorporate lime or fertilizer that newly planted divisions will utilize for many years. Have these amendments on hand before digging. If you are dividing different varieties of the same species, make labels for each division.

To make dividing easier, use a stout digging fork—the kind with tines thick

Gardening Q&A with Scott Aker

PLANTING SPRING BULBS IN LATE SUMMER

I dug up some daffodil bulbs in August that I want to plant in other parts of the garden. I know that I'm supposed to plant them in October in my zone, but I will be gone most of October and November. Can I plant them before I leave, or is it better to wait until I return in December and hope the ground isn't frozen?

You can plant them now. Most spring-blooming bulbs can be dug up, divided, and replanted anytime after their foliage has withered. They will remain dormant in the soil until the temperatures drop, when root growth will begin. The only reason these bulbs are not marketed earlier in the season is that they are still growing through the first part of summer in the cool climates of places like the Netherlands where they are commercially grown. —S.A.

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

enough to resist bending. A spade with a straight, sharp edge is essential for dividing ornamental grasses with thick, matted roots. Sharp pruners will help you quickly cut foliage, rhizomes, and stray roots.

To make cleanup easy, I park a wheelbarrow on top of a tarp and place each clump to be divided into the wheelbarrow so I don't have to stoop as I work. After dividing each clump, I toss the trimmings of foliage and roots onto the tarp. The soil remaining in the wheelbarrow can be returned to the hole from which the plant was extracted. The debris on the tarp can be dragged to the compost pile.

When you're dividing perennials, be ruthless. The objective is to produce clean,

healthy pieces. Although it may seem that plants will be back to full size sooner if you plant large divisions and avoid disturbing the roots, the opposite is true. Look for the most vigorous growth, typically around the outside of the clump you have dug up. In most cases, you only need four or five vigorous buds and a few healthy roots on each division. Even after you discard the oldest and weakest parts of the clump, you are likely to have more divisions than you need. These can be composted, or better yet, you can share them with gardeners in your neighborhood. ♪

Scott Aker is a horticulturist in the Washington, D.C., area.

HOW TO DIVIDE PERENNIALS



1. Dig up the entire clump with a sharp spade and set it on its side. Slice through the clump with the spade to cut it into desired portions. Discard unhealthy or weak parts.



2. To reduce transplant stress, trim broken roots and cut back the stems of your new plants prior to planting the divisions.



3. Replant the divisions, setting them no deeper than they were originally growing. Firm the soil around the roots to remove air pocket and water well.



Kale—A Vegetable Superstar

by *Karan Davis Cutler*

KALE HAS been making waves in the culinary world the last few years. In 2012, a salad of baked kale leaves, Crispy Kale Salad with Lime Dressing, was designated “Dish of the Year” in *Bon Appétit*. It’s the sole subject of several dozen cookbooks, National Kale Day is October 7, and there are hundreds of thousands of videos on YouTube demonstrating how to make everything from kale chips to kale smoothies.

The current popularity of kale—the result of celebrity chefs discovering it at the same time health-food evangelists noticed its nutritional benefits—is all the more amazing because it is a relatively primitive plant that is not far removed from its wild ancestor. This non-heading leafy biennial in the cabbage family has been cultivated for millennia in the Mediterranean and western Europe, where it is native.

Because kale scores near the top of the list of commercially produced vegetables most likely to contain residual pesticides, it’s an ideal vegetable for the home garden.

GROWING GUIDELINES

Kale is easy to grow, but the trick is timing your crop so it matures in cool weather. Its leaves turn bitter when the mercury rises but sweeten with a touch of frost. You can seed

PLANTING BASICS

Getting Started Where winters are cold, plant in early spring or late summer. Where winters are mild, plant September through March.

Spacing Sow seeds a half-inch deep, five inches apart; thin to 15 inches in all directions.

Days to Maturity Most direct-seeded kales mature in 50 to 70 days—two or three weeks sooner from transplants—but young leaves can be picked at about 30 days.



‘Vates’ is a popular compact variety of curly or Scotch kale with a slightly bitter flavor.

directly in the garden or set out transplants. Seeds take five to 18 days to germinate and will sprout in soil as cold as 40 degrees Fahrenheit, although 50 to 75 degrees is ideal. Gardeners with early, hot summers and mild winters can usually sow between September and March. The rest of us can start kale either in early spring or late summer, planting seeds outdoors two to four weeks before the last spring frost or 10 to 12 weeks before the first fall frost.

I often start kale indoors in individual cells filled with a potting mix. When the seedlings have at least three true leaves, I transplant them to the garden.

A garden site that is protected from wind and has well-drained, fertile soil is ideal, but kale will do fine with less. Give plants some diluted manure tea or fish emulsion when they are about half grown. Kale needs a good supply of nitrogen, but too much produces sappy, frost-sensitive leaves. Plants

do best in slightly acidic soil but aren’t fussy about pH. Similarly, they prefer full sun but tolerate some shade, and are grateful for it when sweltering weather arrives.

Provide kale with even moisture, about an inch of water per week—more if it’s hot. Mulch with compost or straw to keep the roots cool, conserve moisture, and discourage weeds. When freezing temperatures arrive, mulch thickly with straw to extend the harvest.

PESTS AND DISEASES

Kale is generally trouble-free, especially when grown in cool weather. Planting in healthy soil and practicing regular crop rotation will deter fungal diseases such as damping-off and black rot. Remove discolored leaves if they appear, and clean up all plant debris when the harvest is over.

Use floating row covers to protect kale from whiteflies, flea beetles, aphids,

caterpillars, and other common pests. If an insect infestation occurs, hand-pick caterpillars or spray the plants with a strong stream of water or an insecticidal soap. Since pollination isn't an issue with kale, you can leave the covers on all season.

SELECTED VARIETIES

Botanists place kales in two species, *Brassica oleracea* (Acephala group) and *Brassica napus* (Pabularia group), but gardeners and gastronomes differentiate selections by leaf shape. All the varieties listed below can be harvested between 50 and 65 days after planting.

■ Curly, or Scotch, kales have tightly ruffled leaves and are variously colored from light green through blue-green to purple; their flavor is slightly bitter.

'**Ripbor**' is a blue-green hybrid that grows 12 to 24 inches. Unlike many kales, its lower leaves resist yellowing.

'**Vates**' is a compact variety growing 12 to 18 inches high with blue-green leaves that are ruffled on the edges.

'**Winterbor**' grows two to three feet tall. Its dark green leaves are intensely ruffled and it has good cold hardiness.

■ Dinosaur, or Tuscan, kales have long, deep blue-green, spearlike leaves that are puckered and pebbled; their flavor is sweeter and milder than curly types.



'Lacinato' is a mild-tasting Italian heirloom.

'**Lacinato**', a mild-tasting heirloom from Italy—also known as 'Tuscan' and 'Black Tuscan'—is not as hardy as other kales. It grows one to two feet tall.

'**Rainbow Lacinato**' bears dark leaves with red veins and grows two to three feet tall.

■ Siberian, or napus, kales have flat leaves with crinkled, toothed, or lobed edges, often with contrasting red or white stems, ribs, and veins; their flavor is mild and sweet with a slight nip. The following three heirloom varieties are among my favorites.

'**Improved Siberian**' has dark green leaves with sweet stems and grows just 12 to 15 inches.

Bolt-resistant '**Premier**', also known as '**Early Hanover**', is good for warmer regions. Its deep green leaves have white veins. It grows 12 to 18 inches tall.

The gray-green, oakleaf-shaped foliage of '**Red Russian**' sports magenta veins. Also called '**Ragged Jack**', this variety grows one to three feet tall and is extremely hardy. A white-veined version of this variety is known as '**White Russian**'.

HARVESTING AND STORAGE

Most varieties of kale taste sweeter and more tender after a light frost, but you can begin harvesting young leaves about a month after planting. In temperate regions, kale can be harvested into spring in the second season, when it will releaf briefly before flowering and dying. To harvest, begin picking individual leaves at the bottom of the plant and work your way up the stalk. Leave three or four leaves at the top to keep the plant producing. Alternatively, you can cut the entire plant—which may resprout—about two inches above the soil line.

To store, seal unwashed kale in a plastic bag—or rinse and dry the leaves, wrap in paper towels, and seal in plastic bags. Keep in the refrigerator for up to three days.

CULINARY USES AND HEALTH BENEFITS

Kale can be eaten raw in salads. If the leaves are on the tough side, they can be made more palatable by either cutting them finely or by scrunching the leaves—either plain or with oil and/or vinegar—in your hands a few times to soften the fibers. Raw kale can be pureed with olive oil and pine nuts to make a pesto with a twist. Kale can also be braised, roasted, sautéed, steamed, stewed,

Sources

Fedco Seeds, Waterville, ME. (207) 426-9900. www.fedcoseeds.com.

Johnny's Selected Seeds, Winslow, ME. (877) 564-6697. www.johnnyseeds.com.

Territorial Seed Company, Cottage Grove, OR. (800) 626-0866. www.territorialseed.com.

Southern Exposure Seed Exchange, Mineral, VA. (540) 894-9480. www.southernexposure.com.

West Coast Seeds, Delta, BC, Canada. (888) 804-8820. www.westcoastseeds.com.

ORNAMENTAL KALES

Some kales are grown primarily for their looks. Called flowering or ornamental kales, these varieties appear in fall at garden centers sporting shades of pink, purple, and red as well as cream and



white. The colors appear once night temperatures fall below 50 degrees Fahrenheit. Ornamental kales produce dense, flowerlike rosettes, with the leaves masquerading as flowers. They're also edible but tend to be tough and less sweet than their culinary cousins. —K.D.C.

baked, and fried. It's a main ingredient in the classic Irish mashed potato dish, colcannon, and in Portugal's national soup, caldo verde.

Raw or cooked, kale is packed with nutrients. One cup has only 33 calories and is an excellent source of calcium, vitamin C, vitamin A, and antioxidants. With all this going for it, kale deserves a place in every garden—and in every kitchen.

Karan Davis Cutler is a garden writer based in Bridport, Vermont.

McCrorry Gardens: Hidden in Plain Sight

by Amy G. McDermott



'The Prairie is My Garden' sculpture greets visitors at the parking lot to McCrorry Gardens.

THERE IS A little-known oasis in the heart of Brookings, South Dakota. Just across from the city's busiest intersection, McCrorry Gardens sprawls across 70 acres of the South Dakota State University (SDSU) campus. It boasts a 25-acre botanical garden, 45-acre arboretum, and a brand new education and visitor center.

McCrorry is particularly impressive when you consider it began as a humble strip of trial plants in the middle of campus. In the early 1960s, professor S.A. McCrorry, then head of SDSU's horticulture department, envisioned a formal botanical garden for the university. In 1965, his vision became a reality—and his little strip of plants grew into 12 acres of formal and research gardens, planted on the southeastern edge of the university's land.

This year marks the 50th anniversary of that move, formally celebrated at McCrorry's annual garden party last month. Expansion was always part of the plan, and the gardens have grown considerably in size and variety over the past five decades.

YEAR-ROUND OASIS

Given its urban location, it's surprising how wild McCrorry can feel. "What I find really engaging is we have such a natural flow out there," says Head Gardener Chris Schlenker. "There are paths everywhere. It's hard to believe that you can feel so immersed in nature, since we're right in the middle of town."

In autumn, the arboretum lights up in a sunburst of yellows, golds, and reds. "The fall color here can be spectacular," says Schlenker. "The maples alone are amazing as far as color. I've heard a lot of people from the city say it's pretty much a forest right here in the middle of town."

A GARDEN FOR ALL SEASONS

While parts of McCrorry offer visitors a walk on the wild side, it has a distinctly



McCrorry's waterfall garden showcases limestone quarried in South Dakota.

cultivated look, too. In spring, thousands of blooming tulips, daffodils, and alliums draw visitors and herald the change of season. "After a long winter, seeing those colors contrasting against the brown grass and dry leaves gets people pretty excited," says Operations Manager Heather Costello.

Come summer, more than 40,000 annuals, trees, and shrubs burst into life. In winter, ornamental cabbages and kale add color and interest. The frost-rimed trees and shrubs give home gardeners a feel for the "bones" of species they might consider for their own gardens.

SOMETHING FOR EVERYONE

As McCrorry has expanded, it has also diversified. In recent years a visitor center, waterfall, and cottage garden have been added to supplement the popular annual beds and the arboretum's seasonal interest.

The visitor center is "really the entry point into the gardens" says Costello. Opened in 2011, it features a welcome desk, small gift shop, banquet room, meeting room, and kitchen. The center is also silver LEED certified by the U.S. Green Building Council, for its sustainable design and low environmental impact.



The house for the whimsical Cottage Garden is a repurposed gas station building.

Additional Information

McCrorry Gardens, 631 22nd Ave, Brookings, SD 57007. (605) 688-6707. www.mccrorrygardens.com.

■ Formal Garden is open May 1–Sept. 30, Mon.–Sat. 9 a.m.–8 p.m., Sun. 12 p.m.–6 p.m. Open Oct. 1–April 30, Mon.–Sat. 9 a.m.–5 p.m. Arboretum is open sunrise to sunset year round.

■ Admission: Adults (\$4), youths ages six to 15 (\$2), children ages five and under (free).

McCrorry participates in the American Horticultural Society Reciprocal Admissions Program. AHS members who reside more than 90 miles from McCrorry receive free admission and free parking.

Other nearby sites to explore:

Children's Museum of South Dakota, Brookings, SD. www.prairieplay.org.

Dakota Nature Park, Brookings, SD. www.cityofbrookings.org.

South Dakota Agricultural Heritage Museum, SDSU campus, Brookings, SD. www.agmuseum.com.

Outside, the naturalistic waterfall, carved from South Dakota limestone, is located on the edge of the Rock Garden, which includes plants native to the Rockies and the state's Black Hills. The water feature adds to the gardens' sensory appeal. "People are drawn to that sound," says Schlenker. "It's fun to see them get excited and want to explore further into the garden."

A five-acre children's garden featuring a canopy walk in a stand of mature maple trees is currently in its design phase, but Schlenker is already looking forward to ground-breaking. "It might be a couple years out, but it's something people are excited about," he says.

Meanwhile, the gardens' staff will be planting more bulbs this fall in anticipation of an even showier spring season. "Next year we're going to have what we've loosely termed Tulippalooza," says Costello. No doubt the enhanced spring display will be the perfect antidote for visitors seeking relief from South Dakota's long winters.

Amy G. McDermott is an editorial intern for The American Gardener.

Horticultural News and Research Important to American Gardeners

SMITHSONIAN TO CATALOG GENETIC DIVERSITY OF WORLD'S PLANTS

As biodiversity plummets worldwide, the Global Genome Initiative (GGI) of the Smithsonian's National Museum of Natural History is attempting to preserve the planet's genetic resources before it's too late. In July the GGI, in collaboration with Smithsonian Gardens, the U.S. Botanic Garden, and the U.S. National Ar-



Biorepository nitrogen tanks at the Smithsonian Institution's Museum Support Center in Suitland, Maryland, can store millions of plant samples for future research.

boretum, launched a new effort focused on archiving plant genomes. In the next two years, these Washington, D.C.-based institutions—along with a worldwide network of scientific partners—aim to preserve half of all plant genera on earth.

It's a big task, requiring thousands of samples from all over the world. Luckily, botanic gardens can help. "Gardens are a slice of life," explains W. John Kress, the Smithsonian's interim Under Secretary for Science. "They are localized collections of global plant diversity," enabling scientists to sample across continents in an afternoon. Field collections are another important part of the initiative, especially for ecosystems that are under-represented in existing gardens.

Morphological and genetic analysis of samples will allow researchers to study the whole complement of a specimen's DNA—or genome—and to explore evolutionary relationships between plants like never before. Find out more on www.mnh.si.edu/ggi.

GALACTIC GARDENERS

In August, galactic gardeners aboard the International Space Station harvested and tasted the first lettuce grown in space, a red romaine variety called 'Outredgeous'. The greens were grown hydroponically on the station, bathed in the pink-red glow of LED lights. Though it was not NASA's first foray into gardening, it was the first space-grown harvest eaten in zero gravity.

"With the long-duration missions aboard the International Space Station, it has become clear that more emphasis needs to be placed on improving human habitability," NASA explained in a statement on its website. "The Vegetable Production System provides a means to supply crews with a continuous source of

fresh food and a tool for relaxation and recreation."

The 'Outredgeous' lettuce is part of an ongoing investigation into farming in space, with an eye toward sending astronauts further from Earth than ever before, particularly to Mars. To learn more, go to www.nasa.gov.

NEW BLACK-FRUITED BLUEBERRY

Nearly two decades of research and evaluation have culminated in 'Nocturne', a hybrid blueberry that the U.S. Department of Agriculture's Agricultural Research Service recently patented. This cold-hardy cultivar bears striking berries that are red when immature and nearly black when ripe. It is a slow starter in spring, remaining dormant longer than other cultivars and setting fruit later, thus allowing gardeners to extend their harvest season.

'Nocturne' includes genetic material from three different blueberry species, including rabbiteye blueberry (*Vaccinium virgatum*). It grows to five feet tall and is reliably self-fertile, although plant-



Onboard the International Space Station's Harmony node, NASA astronaut Steve Swanson harvests a crop of 'Outredgeous' romaine lettuce plants for analysis.



The abundant fruits of 'Nocturne' blueberries start out red and ripen to almost black.

ing with other varieties is always recommended for maximum yield. In New Jersey, where 'Nocturne' was developed, mature plants produced an average of 12

pounds of fruit per season, enough to make about four pies.

Because its ripe berries are softer than blueberries bred for commercial agri-

culture, "this variety is intended to be a specialty market plant for homeowner, landscape, and ornamental use," says ARS plant geneticist Mark Ehlenfeldt, who developed the plant. "'Nocturne' is especially notable for having a winter hardiness comparable to northern high-bush blueberry cultivars and being slow to break dormancy in spring, making it unlike any other rabbiteye blueberry hybrids currently available."

Don't rush off to buy 'Nocturne' just yet though. It's not slated to hit retail nurseries until 2017. Visit www.ars.usda.gov for more information.

CALIFORNIA NURSERIES ADAPT TO DROUGHT

As California's drought continues, home gardeners are increasingly abandoning thirsty palm trees and verdant lawns in favor of more drought-tolerant plants. While commercial agriculture gulps the largest percentage of California's water, these individual gardening choices also can have an impact, to the point where nurseries have changed their inventories to meet the increasing demand.



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The OXO Good Grips Trowel is constructed of high-grade 420 stainless steel for strength and durability. It features a soft, non-slip handle with a gel insert that flexes to provide cushioning when digging into tough and compacted soil. Easy-to-read markings provide clear and convenient depth measurement and serrated edges tear through tough soil and weeds.



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Niko Ferrandino, manager of Glendora Gardens in Glendora, California, says the drought “has affected us a lot of ways, obviously.” His nursery sprawls across 10 acres for both retail and propagation. “We found one of the biggest, inefficient users of water was growing annuals,” he explains. The nursery has scaled back on annuals in favor of low-water succulents, natives, perennials, trees, and shrubs. This year, they’ve carried more varieties and used 33 percent less water than in 2013.

In the high desert east of Glendora, Nicole Holland saw this coming. The owner of Cactus Mart, a water-wise nursery in the Morongo Valley, she says, “The high desert



Because many California gardeners are seeking water-wise plants, nurseries such as Glendora Gardens Nursery have greatly increased their offerings of cacti and succulents.

has been in a drought for so many years—we’ve always been on the cutting edge, long before it was popular.” She left a job in the low desert, horrified at the dominance of thirsty varieties before buying Cactus Mart in 2012. “I just couldn’t grasp why we’re in a desert and planting this stuff.” Part of the problem is a lack of education, she says. As California gardeners have wised up to the drought, Cactus Mart’s clientele has changed—more people are looking for water-wise options today.

But with another wet winter on the horizon—it’s an El Niño year for California—will nurseries be back to business as usual next season? Both Ferrandino and Holland expect some gardeners will return



Over a five-year period, thousands of plants were grown on the rooftop gardens at the Chicago Botanic Garden and evaluated for performance in the harsh environment.

to water-wasteful practices, but they don’t think the switch to drought-tolerant plants is going to be short-lived. “I think there’s going to be a place for both kinds of plantings,” says Ferrandino. “But these droughts have really started to open people’s eyes.”

GREEN ROOF PLANT EVALUATION

Seen from the window of an overhead airplane, the trial plantings on the huge Green Roof Garden at the Chicago Botanic Garden’s (CBG) Plant Conservation Science Center in Glencoe, Illinois, look like a patchwork of tiny farms. Their lovely shades of green, yellow, pink, and red, are more than aesthetic—over 40,000 individual plants from 216 varieties have been tested in the last five years as part of the largest green roof plant evaluation in U.S. history.

The study, titled *An Evaluation Study of Plants for Use on Green Roofs*, assessed each variety on its performance depending on location (north or south roof locale) and depth of the planting medium (four, six, or eight inches). Nine taxa received the highest rating overall of five stars. These include common pussytoes (*Antennaria dioica*), savory calamint (*Calamintha nepeta* ssp. *nepeta*), moss phlox (*Phlox subulata*), ‘Gro-Low’ fragrant sumac (*Rhus aromatica*), and prairie dropseed (*Sporobolus heterolepis*). Read the full study at www.chicagobotanic.org/green_roof.

IN MEMORIAM: BRUCE USREY

William Bruce Usrey, former president and CEO of Monrovia nurseries in Azusa, California, died July 7 at the age of 76 after battling cancer. A pioneering nurseryman,



Bruce Usrey

he worked with Monrovia for 47 years, starting in plant production and working his way up to president. During his tenure as the top executive, Monrovia expanded into new nursery sites in California and Oregon, and eventually acquired satellite nurseries in Georgia and Connecticut to better serve East Coast customers.

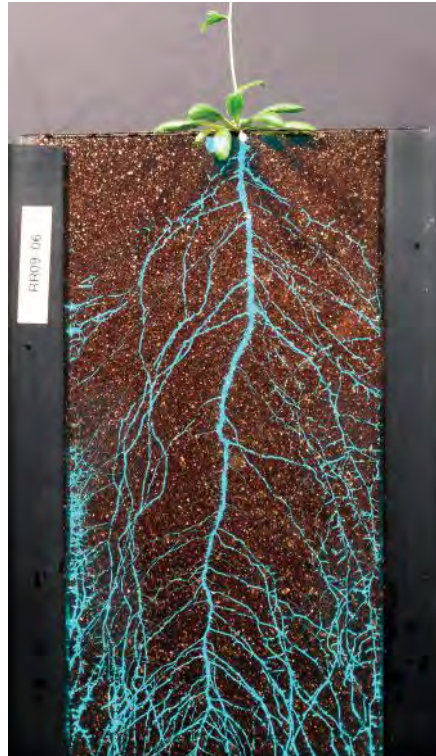
“Bruce was a businessman and horticulturist of rare caliber,” says American Horticultural Society Executive Director Tom Underwood. “He was instrumental in building Monrovia’s reputation as an innovator when it comes to research and new plant introductions, its focus on customers and education, and its commitment to the environment.”

Usrey is survived by his wife, Susie, who is vice president of customer service at Monrovia and a former chair of the AHS Board of Directors.

FIREFLY GENES SHED NEW LIGHT ON PLANT ROOTS

Extensive networks of roots help plants seek out needed resources to survive and grow. But because they are hidden underground, little is known about how roots respond to environmental cues such as drought. “Roots grow through a path-finding process—somewhat like neurons—and must make decisions regarding which direction to grow and when to branch. This is heavily influenced by soil quality and the location of water and nutrients,” explains José Dinneny, a biologist with the Carnegie Institution for Science at Stanford University in California, who heads an international team of scientists using special imaging processes to study the dynamic growth of root systems.

Excavating root systems to study them is laborious, time consuming, and doesn't shed light on how actively growing roots behave, but thanks to some firefly genes, researchers now can leave plants in place. Using plants bio-engineered to produce luciferase—the enzyme that makes fireflies glow—Dinneny's team developed an



Thanks to some firefly genes, the roots of this bio-engineered plant glow when viewed with a special camera.

imaging system called GLO-Roots (short for Growth and Luminescence Observatory for Roots) with cameras that detect bioluminescence to create images of living root systems. The scientists then could analyze root growth, root architecture, and the genes that control them in response to factors such as changing nutrient concentrations and moisture levels.

The team's findings, published in August in the online journal *eLife* (<http://elifesciences.org>) may give scientists a better understanding of how plants adapt to changing environmental conditions, particularly droughts. “Our study shows that roots have several tricks that enable efficient recovery of water from their environment,” says Rubén Réllan-Álvarez, an assistant professor at Langebio-Cinvestav, a genomics research facility in Irapuato, Mexico. Figuring out these “tricks” are important for establishing strategies for sustainable and drought-tolerant agriculture. To learn more, go to <https://carnegie.science.edu/node/1864>.

Amy G. McDermott, Editorial Intern

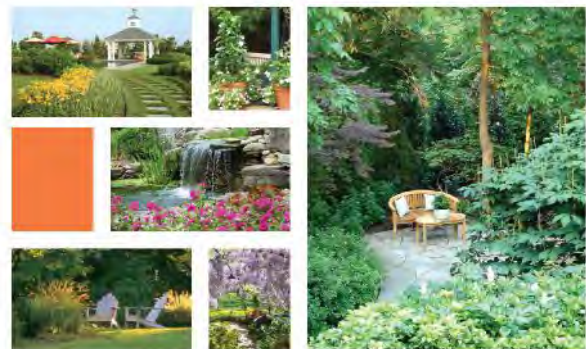
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Making Your Harvest Season Last Longer

by Rita Pelczar

ABUNDANT HARVESTS from the vegetable garden don't have to stop with the approaching chill of autumn nights and winter freezes. With a little planning, good crop and variety selection, and a few helpful products, you can extend your harvest season by weeks if not months. Some crops can be kept going throughout the winter. And in spring, many of the same tools and techniques can be used to get a jump-start on next year's garden.

Among the easiest ways to extend the harvesting season are successive plantings and appropriate variety selection. For example, by planting lettuce every two weeks in spring, I have a continuous fresh supply of leaves into summer. By selecting heat-tolerant Batavia lettuce varieties such as 'Nevada', 'Muir', or 'Cherokee' for late-spring plantings, the harvest often continues non-stop throughout summer. Late-summer sowings ensure fresh lettuce for fall salads. Other crops that lend themselves to successive plantings in both early spring and late summer include beets, peas, radishes, mustards, kales, arugulas, mesclun mixes, spinach, and scallions.

COLD FRAMES AND LOW TUNNELS

Harvesting fresh greens and root crops throughout the winter doesn't require a fancy, heated greenhouse. Cold frames and hoop houses are simple, unheated structures that protect plants from both winter winds and chilly temperatures. In the very early spring, they provide a multi-week head start on the new season.

This time of year in my North Carolina garden, I plant a variety of lettuces, mustards, kales, spinach, mizuna, radishes, cilantro, and claytonia—a very hardy green—in cold frames. It's important to get your crop growing in late summer because growth slows considerably as days

grow short and temperatures drop.

If you're interested in building your own cold frame, you will find a variety of plans online. The walls may be constructed of wood, cinderblocks, straw bales, or any material that will provide some insu-

maximum solar gain. Attaching the roof to the back with hinges facilitates lifting for ventilation, weeding, and harvest; a brace comes in handy to prop open the roof on sunny days, when interior temperatures can get too warm, even on a cold day.



lation and support the glass or clear plastic roof, which allows light to penetrate.

You can recycle an old window for the roof, but glass is heavy, and it can break. Given the heavy winds I experience at my hilltop site, I prefer translucent, rigid plastic. Most cold frame designs call for a back that is taller than the front so that the roof sits at a slant, which ideally faces south for

There are also several very good cold frame kits available. Gardener's Supply Company's **Cedar Cold Frame** is an attractive, well-constructed, and very sturdy option, which is designed to fit atop a two-foot by eight-foot raised bed to provide a deep, elevated planting space. It can also be seated directly on the ground. A lot of salad greens fit into its 16 square feet of growing space, and its relatively narrow profile affords easy placement at the edge of a garden or at the end of a driveway.

Both sides and ends are made of precision-milled, rot-resistant cedar; they fit snugly into sturdy aluminum corner pieces that are screwed in place through pre-drilled holes. I found it helpful to have a

Sources

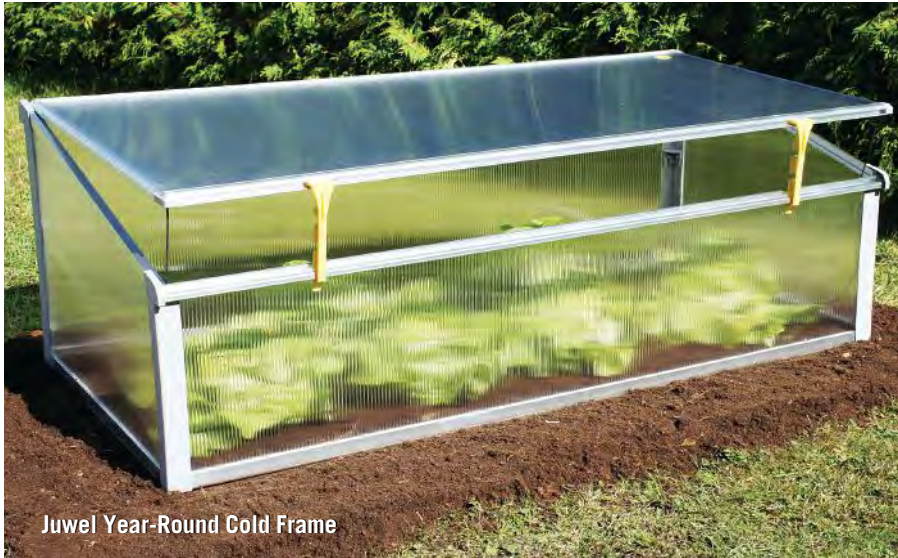
Charley's Greenhouse & Garden,
www.charleysgreenhouse.com.

Eartheasy, www.eartheasy.com.

Gardener's Supply Company,
www.gardeners.com.

second pair of hands to help with the assembly—one person to hold the pieces in place while the other secures the screws. The roof is constructed of polycarbonate panels that are designed to diffuse light and prevent burning of your plants.

Both the roof and sides of the **Jewel Year-Round Cold Frame** from Earth-easy are made of twin-walled polycarbonate, so it's lightweight but provides good insulation in cold weather. This kit has added usefulness in warmer weather:



Jewel Year-Round Cold Frame

the polycarbonate roof panel slides out to reveal a screen, so you can start your fall crops in the cold frame in summer when it's warm and pests are still about. The plastic panel can be inserted as the weather gets colder. This cold frame



Garden Clip Row Cover

measures approximately four feet by two feet, with a height of 16 inches in the back and 12 inches in the front.

An alternative to a cold frame is a low tunnel constructed of a series of hoops that support a protective covering. In summer, the hoops can be covered with fine netting or floating row covers to protect your crops from birds and insect pests; from late fall to early spring, a translucent plastic cover will protect plants from cold and wind.

I really like the **Garden Clip Row Cover** from Charley's Greenhouse because it is durable enough to stand up to heavy winds. The kit consists of four seven-foot-long poly pipe hoops that are sunk into the soil to support the sturdy greenhouse plastic film. Depending on the width of the row you cover, the height of the tunnel will vary: a 30-inch-wide row is 28 inches high, a 48-inch-wide row is 22 inches high. The plastic is fastened to the hoops with four-inch clips that snap onto the hoops to hold the plastic taut. For additional stability, I had rebar cut to 18-inch sections. I pounded these about halfway into the ground, then slotted the ends of each hoop onto the rebar.

MORE SEASON EXTENDING TOOLS

The **VegTrug™ Patio Garden** from Gardener's Supply Company is a raised bed that eliminates the need for bending over your rows. It comes in several sizes and is well suited for small yards, patios, and decks. The **Frame & Greenhouse**

Cover, companion to the VegTrug, expands the use of this raised planting bed considerably by creating an accessible microclimate. The 21-inch-high steel frame is easy to assemble and is held fast to the sides of the trug with screws. The cover fits over the frame and is attached to the frame bars with Velcro® tabs. Heavy-duty zippers afford easy access. Other coverings that fit over the frame make this a very adaptable unit. **VegTrug Insect Cover** is a fine mesh that keeps pests out, so it's great for starting seeds in late summer. With the onset of colder weather, you simply replace it with the Frame & Greenhouse Cover.

Grow-It Plant Protectors from Charley's Greenhouse are made to protect individual plants. These plastic cone-shaped cylinders, which come in



Grow-It Plant Protectors

11-inch and 18-inch sizes, conserve heat and moisture around the covered plant. Tops can be opened for venting. I have found these particularly useful for getting a head start with spring transplants.

So make your garden more productive with proper plant selection and the help of these season-extending devices. With a little effort and planning, you can enjoy fresh, homegrown vegetables practically year-round.

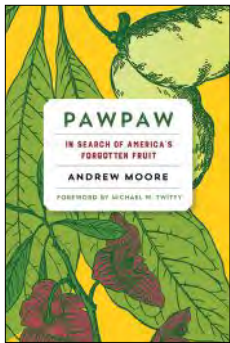
Rita Pelczar is a contributing editor for The American Gardener.

Recommendations for Your Gardening Library

Pawpaw: In Search of America's Forgotten Fruit

Andrew Moore. Chelsea Green Publishing, White River Junction, Vermont, 2015. 320 pages. Publisher's price, hardcover: \$26.

I'M ALWAYS eager to read a talented writer's first book. For one thing, it's full of the infectious passion for the subject that usually drives someone to write it in the first place. But more than that, authors devote to such books the kind of attention usually reserved for a firstborn child—they are scrutinized and fretted over to the finest detail.



Pawpaw, a heartfelt paean to a native North American tree with edible fruits, is just such a book. I have been growing pawpaws since 1970, but never realized how much I didn't know about the tree until reading Andrew Moore's book. A skilled storyteller, Moore delves deeply

into the world of pawpaws while managing to hold the reader's interest through detail after detail. History, folklore, biology, taxonomy, hybridization, and everything else from slave sustenance to biochemical research are blended here.

Seemingly no historical figure who ever encountered this little tree—from George Washington and Thomas Jefferson to Daniel Boone, Johnny Appleseed, and the Powatan and Potawatomi tribes—has been left out. Even the legendary Hatfield–McCoy feud in the late 1800s, during which three McCoy brothers were tied to pawpaw trees in West Virginia and shot by Hatfields, made the cut.

The Kentucky State University Germplasm Repository, famous among pawpaw growers but largely unknown to others, is spotlighted. So is the research at my old alma mater, Purdue, on use of pawpaw's chemical components to ward off mosquitoes, head lice, and cancer. In the section on how to cultivate pawpaws, I chuckled appreciatively at Moore's assertion that "there is no way to kill a pawpaw except transplant it and try to make it grow." That's for sure!

I only wish there had been room for more photos showing the tree in its natural habitat and fruits of some of the cultivars that have been introduced. I also would have liked the images to have been in the relevant chapters instead of bundled into one color signature section, but such consolidation keeps production costs down. However, I appreciated the detailed descriptions of cultivars in the appendices, along with a good list of sources, and, of course, a recipe for pawpaw ice cream.

—Guy Sternberg

Guy Sternberg is cofounder of Starhill Forest Arboretum in Petersburg, Illinois, which boasts a small collection of pawpaw trees.

Women Garden Designers: 1900 to the Present

Kristina Taylor. Antique Collectors Club Ltd., Woodbridge, Suffolk, England, 2015. 288 pages. Publisher's price, hardcover: \$69.50.

IF YOU ASK designers for the names of influential landscape architects, they would likely include people like Frederick Law Olmsted, Thomas Church, and Roberto Burle Marx. But women have also made significant breakthroughs in the field, and this book by garden historian and author Kristina Taylor profiles 31 of those women and some of their most important projects. Some, like Beatrix Farrand, Gertrude Jekyll, and Beth Chatto are quite well known, but others, like Japan's Haruko Seki, South Africa's Joane Pim, and Chile's Teresa



Moller, are less familiar, particularly to American designers.

Taylor's overarching theme is that women's designs are distinct from those of men because women view nature differently. As Taylor puts it, "...women, as gatherers and of a sessile habit because of their need to nurture infants over many years, may have a different understanding and knowledge." She notes that Farrand, an American, and Edna Walling of Australia were "ardent conservationists long before ecology was even part of our vocabulary." Similarly, American Isabelle Greene and Brazilian Isabel Duprat designed gardens "unfettered by theory and what was considered 'right.' Their designs emerge from what they observed and experienced around them as they explored nature, mountains, forests, and the coasts."

Taylor begins with designers Jekyll and Farrand, then moves through the 20th century to the present day. Each profile features a brief biography, including each woman's design philosophy and major projects. For example, Herta Hammerbacher, considered one of Germany's best female landscape designers, worked on over 3,500 projects and had a long collaboration with plantsman Karl Foerster, whose famed sunken garden she created in 1937.

Beautiful photographs throughout the book show gardens designed by women: Marian Coffin's long stairs to the ornamental swimming pool at Winterthur; the California garden of contemporary architect Frank Gehry by Nancy Goslee Power; sky gardens by Petra Blaisse at the Shenzhen Stock Exchange in China.

This is an insightful reference work you'll want on your garden bookshelf to page through for ideas again and again.

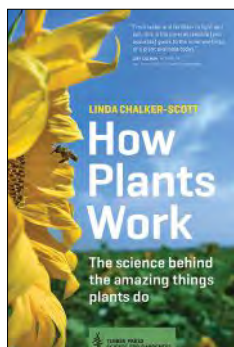
—Jane Berger

Jane Berger is a freelance writer and professional landscape designer who blogs on www.gardendesignonline.com.

How Plants Work: The Science Behind the Amazing Things Plants Do

Linda Chalker-Scott. Timber Press, Portland, Oregon, 2015. 235 pages. Publisher's price, softcover: \$19.95.

SWAPPING STORIES of triumphs achieved and disasters averted with a hand-me-down remedy or the latest elixir has long been part of gardening's charm. It can also be one of its shortcomings. In her previous books and on the popular blog "The Garden Professors™," Linda Chalker-Scott has become a champion for evidence-based horticulture by citing scientific studies to debunk gardening practices and products that simply don't work. In her new book, a primer on plant physiology, she uses real-life situations, explanatory color photographs and drawings, and her signature colloquial style to make the science of plant processes accessible to home gardeners.



Besides promoting a greater appreciation for how plants work, Chalker-Scott's discussions may lead readers to make more informed gardening choices. After she ably demonstrates her scientific credentials in the first chapter on cell structure, it's hard to doubt her in subsequent sections on, say, plant nutrition, where she blasts compost tea as "the ultimate green-washed product." An equal opportunity myth-buster, she calls out synthetic fertilizers, too. These, she opines, are a holdover from conventional agriculture, which strips the soil of nutrients to the point it requires regular infusions of water and fertilizer, "like an intensive care unit." Her prescription for home gardeners is to just use compost and let nature make its own tea.

Among this book's strengths is its integration of cutting-edge research on the interconnectedness of life underground. One reason to avoid excessive fertilizer, she writes, is because studies have found that it suppresses mycorrhizae—the beneficial fungi that colonize root surfaces. Mycorrhizae enhance plants' uptake of water and nutrients, and can link individuals and even species to facilitate the transfer of nutrients to those most in need; diminishing them invites all kinds of problems.

Chalker-Scott also delves into the research demonstrating plants' extraordinary capacity as biochemists. Among the arsenal of chemicals they deploy to defend themselves are anthocyanins, the pigments responsible for red, blue, and purple plant parts. These powerful antioxidants can protect us, too, if we eat red- and blue-colored fruits and vegetables.

To prevent scientific overload, Chalker-Scott throws in sidebars on topics such as why landscape fabric doesn't work, or a section on "nasty plants" such as tulips, whose flowers close at night (a phenomenon called nyctinasty), or mimosas, whose leaves fold up when touched (thigmonasty). So, along with providing a scientific foundation for more successful gardening, reading *How Plants Work* may also provide ammunition for your Scrabble game.

—Janet Marinelli

Janet Marinelli's most recent book, The Climate Conscious Gardener, published by the Brooklyn Botanic Garden, received a Garden Writers Association Silver Award of Achievement in 2011.



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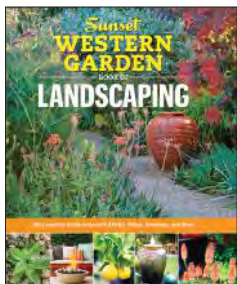
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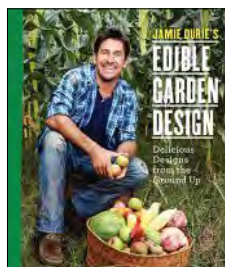
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Delightful Design

WHETHER YOU'RE planning a brand new garden or just looking to spice things up in an existing space, thoughtful design is key. But with so many styles and planting choices out there, it's hard to know where to begin. These recently published books will walk you through the design process from start to finish. Along the way, they'll provide plenty of inspiration for garden projects large or small.



Sunset Western Garden Book of Landscaping (Oxmoor House, 2014, \$29.95) brims with gorgeous photographs and easy-to-understand design ideas geared toward the West's varied climates. It begins with several chapters on garden style from natural to modern. The bulk of it, however, centers on selecting garden elements such as hardscaping, furniture, art, and plants. The final section on garden planning will help you to bring everything together.



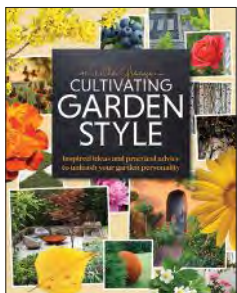
Want to get creative with your vegetable and fruit plantings? Jamie Durie's *Edible Garden Design* (Harper Design, 2014, \$29.99) contains a slew of fresh, practical, and beautiful ideas. This colorful book offers ideas for projects along with examples from urban farms, field-to-table restaurants, and backyards. The friendly tone, vibrant photographs, and simple suggestions will get you planting edibles in a whole new way.



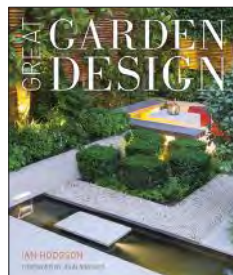
Whether you live in an urban apartment or a country cottage, *Garden Design: A Book of Ideas* (Firefly Books, 2015, \$49.95) by Heidi Howcroft and Marianne Majerus will help you effectively plan the space you have. You'll find guidance on everything from selecting plants for soil type and seasonality to materials for paths, walls, and garden art. A series of case studies further illustrates how to design your personal paradise.



Indoor gardens benefit from good design just as much as outdoor ones. *Rooted in Design* (Ten Speed Press, 2015, \$25) by Tara Heibel and Tassy de Give explores how to bring a rustic modernist vibe to your home's interior with plants. From wall-mounted displays to hanging baskets and windowsill containers, the book's sleek yet accessible suggestions make it an especially useful resource for jazzing up dorm rooms and small apartments.



In Rochelle Greayer's *Cultivating Garden Style* (Timber Press, 2014, \$35), each chapter covers one garden aesthetic, from retro to bohemian to modern industrial. Many of the sample gardens pictured may be beyond the average budget, but handy explanations of key elements make them adaptable to more modest price points. This book is also loaded with buying guides, DIY ideas, and plant suggestions for creating designs that reflect your personality and taste.



Ian Hodgson's *Great Garden Design* (Frances Lincoln Limited, 2015, \$40) begins with a broad-brush introduction to garden styles to help you identify your own aesthetic. Once you've got a sense of what you find most appealing, the book opens into a gallery of architectural elements, planting styles, and other important considerations for creating the look you want. Stunning photographs of case-study gardens effectively illustrate what each element contributes to the overall appearance of a landscape.

—Amy G. McDermott, Editorial Intern



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Harry P. Leu Gardens

with Katy Moss Warner and Robert Bowden, Orlando, Florida

Maine Gardens

with Jane Taylor, Cape Elizabeth, Maine

Morris Arboretum of the University of Pennsylvania

with Paul Meyer, Philadelphia, Pennsylvania

Riverbanks Zoo & Garden

with Andy Cabe, Columbia, South Carolina

San Antonio Botanical Garden

with Bob Brackman, San Antonio, Texas



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REGIONAL HAPPENINGS

Horticultural Events from Around the Country

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

RAP OCT. 1. **Sustainable Site Design Basics.** Class. Garden in the Woods. Framingham, Massachusetts. (508) 877-7630. www.newenglandwild.org.

OCT. 10. **Farm to Medicine Cabinet.** Tour and demonstration. UVM Horticultural Research and Education Center. South Burlington, Vermont. (802) 864-3073. www.friendsofthhortfarm.org.

RAP OCT. 15. **The Art and Practice of Saving Seeds.** Class. Arnold Arboretum of Harvard University. Boston, Massachusetts. (617) 524-1718. www.arboretum.harvard.edu.

OCT. 16–18. **Connecticut Orchid Society Show and Sale.** Van Wilgen's Garden Center. North Branford, Connecticut. (203) 488-2110. www.ctorchids.org.

RAP OCT. 18. **Harvest Fest & Pumpkin Patch.** Queens Botanical Garden. Flushing, New York. (718) 886-3800. www.queensbotanical.org.

RAP OCT. 23. **Introduction to Ecological Restoration Techniques and Methods.** Class. Coastal Maine Botanical Gardens. Boothbay, Maine. (207) 633-4333. www.mainegardens.org.

MID-ATLANTIC

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

SEPT. 26. **Celebrate Junior Botanists!** Children's festival. U.S. Botanic Garden, Washington, DC. (202) 225-8333. www.usbg.gov/events.

RAP SEPT. 26. **Hot! New! Plants!** Lecture, tour. U.S. National Arboretum, Washington, DC. (202) 245-4523. www.usna.usda.gov.

RAP OCT. 3 & 4. **Richmond Rose Society Show.** Lewis Ginter Botanical Garden. Richmond, Virginia. (804) 262-9887. www.lewisginter.org.

RAP OCT. 14. **Gift From the Garden: Bring Quince Fruit into the Kitchen.** Class. Winterthur Museum, Garden & Library. Winterthur, Delaware. (800) 448-3883. www.winterthur.org.

RAP OCT. 14. **Growing Native Plants**

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.ahs.org/rap.

from Seeds. Class. Mt. Cuba Center. Hockessin, Delaware. (302) 239-4244. www.mtcubacenter.org.

OCT. 16. **Perennial Plant Conference.** Scott Arboretum of Swarthmore College. Swarthmore, Pennsylvania. (610) 328-8025. www.scottarboretum.org.

OCT. 24.–NOV. 22. **Chrysanthemum Festival.** Longwood Gardens. Kennett Square, Pennsylvania. (610) 388-1000. www.longwoodgardens.org.

SOUTHEAST

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

RAP SEPT. 25. **Plant Propagation.** Class. Memphis Botanic Garden. Memphis, Tennessee. (901) 636-4128. www.memphisbotanicgarden.com.

SEPT. 26 & 27. **Orchid Show & Sale.** Kentucky Orchid Society. Louisville, Kentucky. E-mail: KYorchidsociety@gmail.com. www.kyorchidsociety.com.

SEPT. 27. **The Living Landscape.** Lecture. North Carolina Botanical Garden. Chapel Hill, North Carolina. (919) 962-0522. www.ncbg.unc.edu.

RAP SEPT. 29. **Sensational Succulents.** Workshop. Aldridge Gardens. Hoover, Alabama. (205) 682-8019. www.aldridgegardens.com.

OCT. 12–14. **Protecting Pollinators in Ornamental Landscapes.** Michigan State University Conference, North Carolina State University. Hendersonville, North Carolina. (888) 678-3464. www.ornamentalpollinators.org.

OCT. 17 & 18. **Orchids in the Garden.** Show and sale. Gainesville Orchid Society. Kanapaha Botanical Gardens. Gainesville, Florida. (352) 335-0715. www.kanapaha.org.

RAP OCT. 29. **Great Pumpkin-Carving Contest.** Atlanta Botanical Garden. Atlanta, Georgia. (404) 876-5859. www.atlantabg.org.

NORTH CENTRAL

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

SEPT. 26 & 27. **Mum Fest.** Lake Anna Park. Barberton, Ohio. (330) 848-6653. www.cityofbarberton.com.

SEPT. 27. **Pumpkinfest.** Walhalla, North Dakota. (701) 549-3939. www.walhalland.org.

RAP OCT. 10–NOV. 29. **Fall Flower Show.** Como Park Zoo and Marjorie McNeely Conservatory. Saint Paul, Minnesota. (651) 487-8201. www.comozooconservatory.org.

RAP OCT. 14–NOV. 18. **Growing the Midwest Garden.** Lecture series. Reiman Gardens. Ames, Iowa. (515) 294-1318. www.reimangardens.com.

RAP OCT. 18–21. **International Oak Society Conference.** Morton Arboretum. Lisle, Illinois. (630) 968-0074. www.mortonarb.org.

Looking ahead

NOV. 6–9. **ASLA 2015.** American Society of Landscape Architects Annual Meeting and EXPO. Chicago, Illinois. (866) 229-3691. www.aslameeting2015.com.

RAP NOV. 7. **Herb Faire.** Madison Herb Society. Olbrich Botanical Gardens. Madison, Wisconsin. (608) 246-4550. www.olbrich.org.

SOUTH CENTRAL

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

RAP OCT. 3 & 4. **Harvest Celebration & Antique Tractor Show.** Powell Gardens. Kingsville, Missouri. (816) 697-2600. www.powellgardens.org.

RAP OCT. 10. **BOOtanica.** Fall festival. Botanica, The Wichita Gardens. Wichita, Kansas. (316) 264-0448. www.botanica.org.

OCT. 15–18. **Capit-O-lize on Natives.** Symposium. Native Plant Society of Texas. Airport Hilton. Austin, Texas. (512) 385-6767. www.npsot.org.

OCT. 15–18. **Texas Rose Festival.** Tyler, Texas. (903) 597-3130. www.texasrosefestival.com.

RAP OCT. 18 & 25. **Landscape Design Studio I & II.** Class. Lady Bird Johnson Wildflower Center. Austin, Texas. (512) 232-0100. www.wildflower.org.

RAP OCT. 28. **Living Pumpkin Arrangement.** Class. Missouri Botanical Garden. St. Louis, Missouri. (314) 577-5100. www.mobot.org.

Looking ahead

RAP NOV. 6. **Family Flashlight Night.** Evening garden eEvent. San Antonio Botanical Garden. San Antonio, Texas. (201) 207-3250. www.sabot.org.

SOUTHWEST

AZ, CO, NM, UT

RAP OCT. 9–11. **Fall Plant Sale.** Desert Botanical Garden. Phoenix, Arizona. (480) 941-1225. www.dbg.org.

RAP OCT. 9–11. **Pumpkin Festival.** Denver Botanic Gardens at Chatfield. Littleton, Colorado. (720) 865-3500. www.botanicgardens.org.

RAP OCT. 10 & 11. **Bonsai Show.** Red Butte Garden and Arboretum at the University of Utah. Salt Lake City, Utah. (801) 585-0556. www.redbuttegarden.org.

OCT. 10–25. **Fall Plant Sale.** Boyce Thompson Arboretum. Superior, Arizona. (520) 689-2811. <http://arboretum.ag.arizona.edu/events.html>.

OCT. 24. **Full Moon Walk.** Living Desert Zoo & Gardens State Park. Carlesbad, New Mexico. (575) 887-5516. www.emnrd.state.nm.us.

RAP OCT. 24. **Pumpkin Walk.** Seasonal display. The Arboretum at Flagstaff. Flagstaff, Arizona. (928) 774-1442. www.thearb.org.

WEST COAST

CA, HI, NV

SEPT. 26 & 27. **Monterey Bay Area Cactus and Succulent Society Show and Fall Sale.** San Juan Bautista Community Hall. San Juan Bautista, California. (831) 758-6645. <http://mbsucculent.org>.

RAP OCT. 3. **Grapes & Hops Festival.** Las Vegas Botanical Gardens at the Springs Preserve. Las Vegas, Nevada. (702) 822-7700. www.springspreserve.org.

OCT. 23. **Defining a New Northern California Landscape.** Seminar. Lakeside Park Garden Center. Oakland, California. (510) 849-1627. www.pacifichorticulture.org.

Looking ahead

RAP NOV. 7 & 8. **San Gabriel Cactus and Succulent Society Show and Sale.** Los Angeles County Arboretum & Botanic Garden.

Isamu Noguchi Exhibit in Brooklyn

THIS YEAR, the Japanese Hill-and-Pond Garden at Brooklyn Botanic Garden (BBG) turns 100. To celebrate the garden's centennial, the BBG will display 15 works by the visionary Japanese-American artist and landscape designer Isamu Noguchi (1904–1988), in collaboration with the Isamu Noguchi Foundation and Garden Museum in New York. The exhibit, titled "Isamu Noguchi at Brooklyn Botanic Garden," will run from September 8 through December 13.



Isamu Noguchi's bronze sculpture, 'Strange Bird', is installed in the Japanese Hill-and-Pond Garden.

Opened in 1915, the Hill-and-Pond Garden "is one of the oldest and most important Japanese gardens in the United States," explains Jenny Dixon, director of the Noguchi Museum. Six of Noguchi's iconic works will be on view in the Japanese garden, guiding visitors through the rich evergreens, irises, maples, and cherries that characterize this traditional style. The remaining sculptures are placed throughout the BBG.

While the show officially ends in winter, visitors can continue the celebration into 2016 with garden tours and the annual cherry blossom festival next spring. "Isamu Noguchi took his inspiration from nature and created not only sculpture but also gardens, making this exhibition a particularly good fit for BBG," says Scot Medbury, BBG's president and CEO. "This remarkable show will give visitors a chance to see the BBG and Noguchi's work in a new light."

For more information, visit the BBG website at www.bbg.org.

Central South Native Plant Conference

FROM OCTOBER 29 TO 31, it's all about native plants during the biennial Central South Native Plant Conference at the Birmingham Botanical Gardens in Alabama. This year's event is titled "Native Plants—At Home and Afield. New Views and New Uses."

Whether you're new to natives or a confirmed nativophile, this conference has plenty to offer. Two pre-symposium workshops get things kicked off on Thursday October 29. The main event runs all day Friday and Saturday, with seminars on natives for wildlife and pollinators, foraging for wild edibles, designing native containers, and eco-friendly pest control, just to name a few. Conference speakers include writers, naturalists, horticulturists, and landscape architects such as Suzanne Langley, executive director of the Birmingham Audubon Society; Jeff Lowenfels, a garden columnist and author of *Teaming with Microbes*; John Manion, curator of the Kaul Wildflower Garden at Birmingham Botanical Gardens; and Janisse Ray, author of *The Seed Underground: A Growing Revolution to Save Food*.

In addition to workshops and a packed schedule of seminars, registrants also have the option to attend a variety of local field trips and, of course, purchase native plants from onsite vendors. Past attendees note that it's a great place to meet fellow ecologically-minded gardeners, and to find new ideas and resources to keep you busy all year long. For more information or to register, visit www.bbgardens.org/central-south.php.

—Amy G. McDermott, Editorial Intern

Art & Pumpkin Festival at Half Moon Bay

HALLOWEEN COMES early on California's Central Coast, with the return of the Half Moon Bay Art & Pumpkin Festival on October 17 & 18, now in its 45th year. The streets of this sleepy seaside town, just 45 minutes south of San Francisco, will turn orange, overflowing with vendors' tents and pumpkin everything.

Earlier in the week, on October 12, Half Moon Bay will host the much-anticipated Safeway World Championship Pumpkin Weigh-Off, crowning this year's world



Above: At last's year Safeway World Championship Pumpkin Weigh-Off, the winning gourd, which was grown by John Hawkey, weighed in at 2,058 pounds. Left: Master carver "Farmer Mike" Valladoa, who has been a fixture at the festival since 1986, will transform 'Atlantic Giant' pumpkins into works of art.

record holder for heaviest pumpkin (and awarding a whopping \$30,000 in prize

money). Over the weekend, the new world champion and top five runners-up will be on display for the festival crowds.

A traditional parade featuring marching bands, floats, antique vehicles, and costumed Halloween-themed characters will take place on Saturday, October 17. Live music, pumpkin patches, and public carving displays will top off the fun. Gorgeous garden art, fine art, and ceramics will be available from hundreds of local and regional vendors. A delightfully overwhelming selection of festive food and local brews are on offer too, with autumn edibles for every palate.

Admission to the festival is free. For more information and directions, visit pumpkinfest.miramarevents.com.

—Amy G. McDermott, Editorial Intern

Arcadia, California. (626) 821-3222. www.arboretum.org.

RAP NOV. 17. **Native Plant Care.** Workshop. Descanso Gardens. La Cañada Flintridge, California. (818) 949-4200. www.descansogardens.org.

RAP NOV. 21. **Holiday Plant & Craft Sale.** Lyon Arboretum. Honolulu, Hawaii. (808) 988-0456. www.manoa.hawaii.edu/lyonarboretum.

NORTHWEST

AK, ID, MT, OR, WA, WY

OCT. 1-4. **Portland Fall Home & Garden Show.** Portland Expo Center. Portland, Oregon. (503) 736-5247. www.otshows.com/pfhs.

RAP OCT. 1-31. **Scarecrow Stroll.** Scarecrow art display. Idaho Botanical Garden. Boise, Idaho. (208) 343-8674. www.idahobotanicalgarden.org.

RAP OCT. 8. **Preparing Your Vegetable Garden for Winter—and Spring!** Class. Bellevue Botanical Garden. Bellevue, Washington. (425) 452-2750. www.bellevuebotanical.org.

OCT. 9 & 10. **Research: Shaping the Horticultural Therapy Landscape.** Conference. American Horticultural Therapy Association. Portland, Oregon. (610) 992-0020. www.ahta.org.

OCT. 10 & 11. **South Central Washington Orchid Society Show and Sale.** Tri-Tech Skills Center. Kennewick, Washington. (509) 628-8184. www.sites.google.com/site/scworchidsociety/orchid-show-sales.

RAP OCT. 13. **Fall Color in the Arboretum.** Talk and tour. Washington Park Arboretum. Seattle, Washington. (206) 685-8033. www.depts.washington.edu/uwbg/index.php.

OCT. 21. **Trees for the Urban Garden.** Class. Elisabeth C. Miller Botanical Garden. Seattle, Washington. (206) 780-8172. www.millergarden.org.

Looking ahead

RAP NOV. 4. **Native Plants 101 Workshop.** Leach Botanical Garden. Portland, Oregon. (503) 823-9503. www.leachgarden.org.

CANADA

OCT. 2-4. **Central Vancouver Island Orchid Society Show & Sale.** Nanaimo North Town Centre. Nanaimo, British Columbia. (205) 748-8004. www.cvios.org.

RAP OCT. 24 & 31. **Advanced Pruning.** Course. Royal Botanical Gardens. Burlington, Ontario. (800) 694-4769. www.rbg.ca.



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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.

Abelia *x grandiflora* uh-BEEL-yuh
gran-dih-FLOR-uh (USDA Hardiness Zones 5–9,
AHS Heat Zones 8–5)

Acer *palmatum* var. *dissectum* AY-ser
pal-MAY-tum var. di-SEK-tum (5–8, 8–2)

Agave *gentryi* uh-GAH-vee JEN-tree-eye
(7–10, 10–7)

Amsonia *hubrichtii* am-SO-nee-uh
hew-BRIK-tee-eye (4–9, 9–5)

A. tabernaemontana A. tab-ur-nee-mon-TAN-uh
(3–9, 9–3)

Anemone *hupehensis* uh-NEM-o-nee
hoo-pee-EN-sis (4–8, 8–1)

Arbutus *menziesii* AR-byew-tus
men-ZEES-ee-eye (7–9, 9–7)

Bauhinia *macranthera* baw-HIN-ee-uh
muh-kran-THUR-uh (7–10, 10–7)

Beschneria *septentrionalis* beh-shor-NAIR-ee-uh
sep-ten-tree-o-NAL-is (7–10, 10–7)

Cercis *canadensis* SUR-siss kan-uh-DEN-siss
(4–9, 9–3)

C. occidentalis C. ahk-sih-den-TAL-iss
(7–10, 10–6)

Chionanthus *virginicus* ky-o-NAN-thus
vir-JIN-ih-kus (4–9, 9–3)

Crinum *bulbispermum* KRY-num
bul-bih-SPER-mum (7–10, 10–5)

Dracaena *marginata* drah-SEE-nuh
mar-jih-NAY-tuh (min. 50°F, 10–1)

Enkianthus *campanulatus* en-kee-AN-thus
kam-pan-yew-LAY-tus (4–8, 8–4)

Fothergilla *gardenii* fah-ther-GIL-uh
gar-DEN-ee-eye (4–9, 9–3)

F. major F. MAY-er (5–8, 8–5)

Geranium *macrorrhizum* juh-RAY-nee-um
mak-ro-RHY-zum (4–8, 8–1)

Ilex *vomitaria* EYE-leks vom-ih-TOR-ee-uh
(7–11, 12–7)

Leucanthemum *x superbum* loo-KAN-theh-mum
soo-PUR-bum (4–8, 8–1)

Lycoris *squamigera* ly-KOR-iss squah-MIJ-ur-uh
(5–9, 9–4)

Magnolia *tamaulipana* mag-NOLE-yuh
TAM-aw-li-pan-uh (8–10, 10–7)

Maianthemum *racemosum* my-AN-theh-mum
rass-eh-MO-sum (4–9, 9–1)

Nolina *nelsonii* no-LIE-nuh NEL-son-ee-eye
(7–10, 10–7)

Papaver *orientale* puh-PAH-vur or-ee-en-TAL-ee
(3–8, 9–1)

Viburnum *dilatatum* vy-BUR-num
dih-luh-TAY-tum (5–8, 8–5)

V. trilobum V. try-LO-bum (2–7, 7–1)

Xanthorhiza *simplicissima* zan-thoh-RIE-zuh
sim-plih-SISS-ih-muh (3–9, 9–3)



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Yellowroot Shines in Autumn

by Barry Glick

WHILE VISITING a friend's garden in the United Kingdom in autumn 1995, I noticed a small shrub that colonized under trees along his property line had attractive bronze-yellow fall foliage. I asked my friend its identity, and after his laughter subsided, I was reminded that the plant was yellowroot (*Xanthorhiza simplicissima*, USDA Zones 3–9, AHS Zones 9–3), which I had given him seven years earlier. Oddly, even though I had been growing yellowroot on my West Virginia farm for many years, I had never witnessed its full fall glory before.



Yellowroot comes into its own in fall when its foliage turns bronze-yellow, above. It bears sprays of small, star-shaped, maroon to plum-colored flowers in early spring, right.

although it will look best if watered during extended dry periods. It thrives in moderate to full shade in the southern part of its range, but can handle more sun exposure the further north you go. In my experience,



it doesn't appear to suffer from any significant pest or disease problems.

If you don't have ideal soil conditions to grow yellowroot, don't despair. At my nursery, I was able to establish a colony in a display bed by amending the soil. I mixed one part finely shredded leaves and one part play sand with an equal portion of the existing soil. If your soil tends to be neutral to alkaline, add a few scoops of elemental sulfur or a fertilizer for acid-loving plants to the mix.

Yellowroot is easily propagated by root division in spring, or can be grown from seed collected when ripe in the fall. Knowing how to propagate it is important; because it's such a good plant, you're going to want to share it with your friends. 🍂

Barry Glick is the founder of Sunshine Farm & Gardens, a nursery in Greenbrier County, West Virginia.

NATIVE TO THE EASTERN U.S.

A member of the buttercup family (Ranunculaceae), yellowroot is a low-growing deciduous shrub native primarily in the Appalachians from New York and Pennsylvania south to northwestern Florida and Alabama. In its favored habitat of moist woodland areas with free draining, acidic soils, it spreads slowly by root suckers to form dense colonies, making it an excellent groundcover. Usually it develops into clumps three to four feet in diameter, but it can spread even further under ideal conditions.

Different sources list yellowroot as growing one to three feet tall, but the clumps at my nursery have remained at a uniform 18 inches. Tiny star-shaped maroon or plum-colored flowers with yellow centers bloom on arching sprays at the top of the knobby, unbranched stems in early spring. The flowers are attractive when viewed up

The plant's common name is a direct translation of its Latin genus name: *xantho* means "yellow" and *rhiza* means "root." The horizontal roots are bright yellow.

CULTURAL REQUIREMENTS

Once established, yellowroot tolerates occasional flooding and drought equally well,

Sources

Forestfarm at Pacifica, Williams, OR. (541) 846-7269. www.forestfarm.com.

Sunshine Farm & Gardens, Renick, WV. (304) 497-2208. www.sunfarm.com.

Woodlanders, Inc., Aiken, SC. (803) 648-7522. www.woodlanders.net.



AMERICAN HORTICULTURAL SOCIETY

Members-Only SEED EXCHANGE

TIPS FOR COLLECTING SEEDS TO SHARE

Depending on the seed type, there are several methods you can use to separate the seeds from the plant. Most garden seeds fall into one of the three following categories:

■ Many seeds, such as those that form in pods, remain on the plant for a long time after maturity. Harvest them after they have dried on the plant, or cut off stalks or stems and bring them in to dry before removing the seeds.

■ Seeds of many ornamental annuals, herbaceous perennials, and herbs scatter easily when ripe. They should be watched closely for maturity and picked on a dry day. Separate the seeds from the plant by running them through a screen or shaking them in a paper bag. Another method is to tie a ventilated paper bag around the flower heads to catch seeds as they scatter.

■ Seeds encased in a fleshy fruit, like tomatoes, need to be separated from the pulp. With fruits that have many seeds, you may need to scrape out the seedy section, add some water, and let the mix sit for a day or two. Then put the mixture in a strainer and run water through it until the seeds are clean. Spread the seeds out on a glass or glazed ceramic plate and let them dry. Large seeds need about a week to dry; smaller seeds are usually dry after four days. Store the seeds in a well-ventilated, cool, dry place.



Share your favorite varieties!

You must be a current AHS member to participate. If you aren't already a member, or you need to renew your membership, visit www.ahs.org/join or call (800) 777-7931. See reverse for details.

Try something new!

AMERICAN HORTICULTURAL SOCIETY

2016 SEED EXCHANGE

Look for the AHS 2016 Seed Exchange List on www.ahs.org in mid-January!

A list of available seeds will appear in the January/February 2016 issue of *The American Gardener*. The full list of available seeds with descriptions will be posted on the AHS website (www.ahs.org) in mid-January. **AHS members who donate seeds get first pick from the entire list of seeds.** To be notified when seed ordering opens and to stay up to date on other AHS activities, we suggest visiting the AHS website to subscribe to the free AHS e-newsletter.

If you would like to receive a paper copy of the seed exchange list, send a self-addressed, stamped, business-size envelope to 2016 AHS Seed Exchange List Request, 7931 East Boulevard Drive, Alexandria, VA 22308.

Please note: *Due to Federal regulations, the AHS can only accept seed donations from, and send seeds to, members living in the United States.*

If you have seeds you would like to donate to the 2016 Seed Exchange Program, here's what to do:

- Seeds must be cleaned and dried as thoroughly as possible before packaging. (See "Tips for Collecting Seeds" on the other side of this page.)
- Collect enough seeds of each variety to fill a minimum of **50 orders**. For very small seeds, one order would be enough to fill the tip of a teaspoon; for large seeds, such as beans, it would be five to 10 seeds.
- Complete a Donor Information Sheet (below) for each type of seed donated. Photocopy as many sheets as needed.
- To help us with cross-referencing, also label each package of seeds with the common and botanical names of the plant.
- Mail seeds in a box or padded envelope marked **HAND CANCEL to: 2016 AHS Seed Exchange Program, 7931 East Boulevard Drive, Alexandria, VA 22308.**
- Seed donations must be postmarked by **November 14, 2015**. AHS members who have donated seeds according to these guidelines will receive first preference in getting their orders filled.

Due to insufficient supply or other reasons, not all donated seeds may appear in the catalog; these seeds are donated to nonprofit organizations and schools, upon request. If you would like to obtain seeds for your local school or organization, please contact us for availability.

2016 AHS Seed Exchange Program Donor Information Sheet

Please complete a sheet for each type of seed donated. Photocopy this sheet as needed.

Seed is: Annual Herb Tree/Shrub Vine Perennial Vegetable/Fruit

Common name: _____

Botanical name: _____

Mature height: _____ Flower color(s): _____

Growth habit: _____

Comments on germination, maintenance, appearance, and/or use:

Submitted by: _____

Street address: _____

City/State/Zip code: _____

Daytime phone: _____

E-mail: _____

I appreciate the AHS's efforts to reduce paper usage by making the seed list available online, but I prefer to have a copy mailed to my home. I've enclosed a self-addressed, stamped, business-size envelope.

Seed donations must be postmarked by November 14, 2015.

Please write the common and botanical names of the plant and your name, city, and state on each package of seeds.

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