

The American GARDENER

The Magazine of the American Horticultural Society

September/October 2000

Plan a Perfect Garden Path

*Light Up the Fall
Garden with
Toad Lilies*

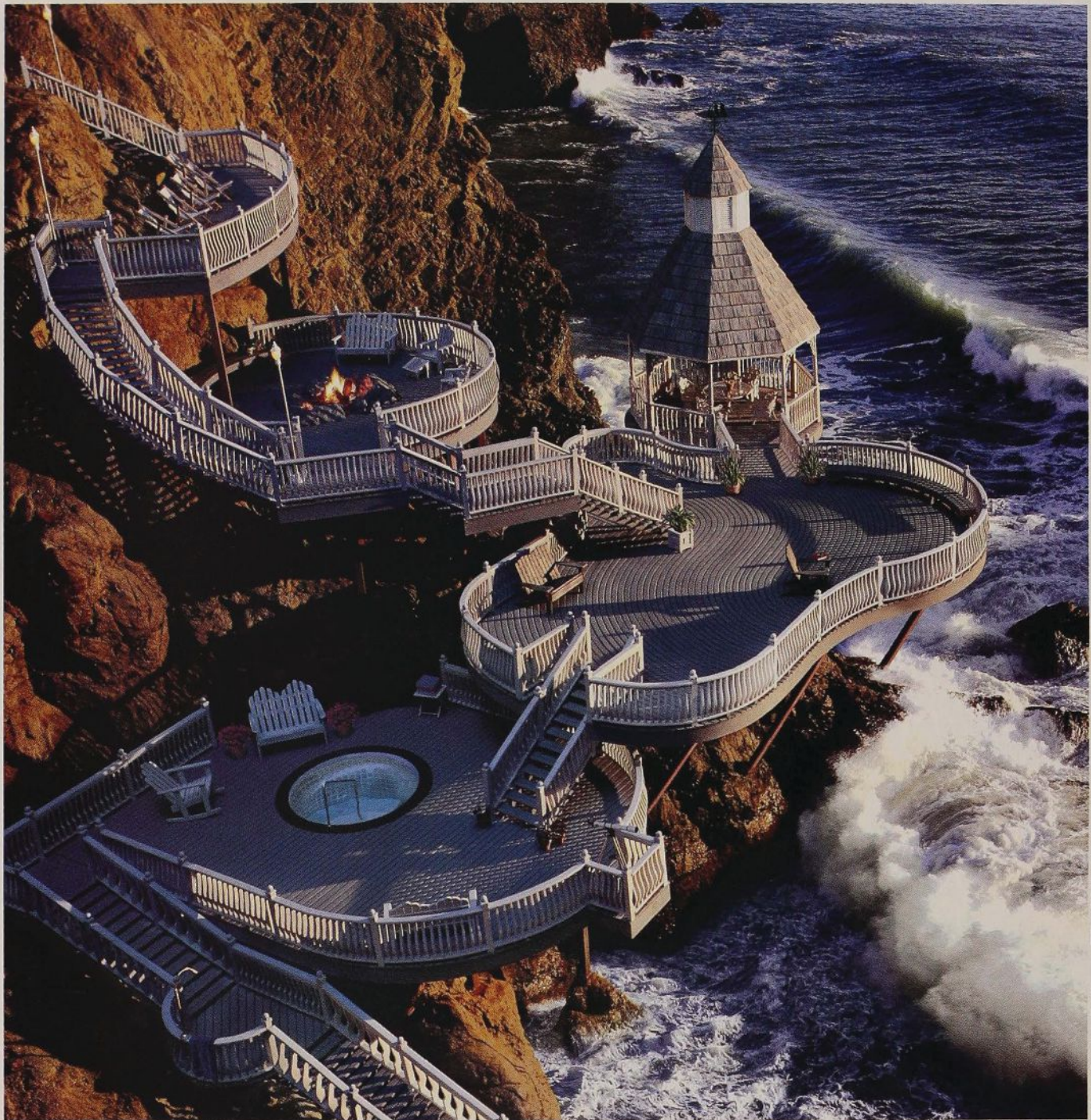
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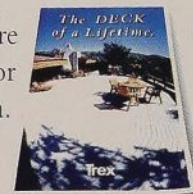


IT'S NOT THE View
SO MUCH AS THE Vision.



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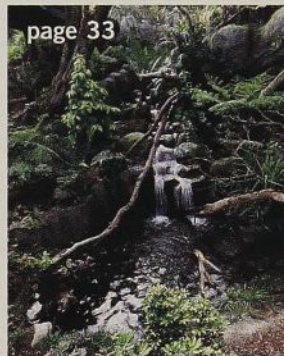
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ON THE COVER: The winding design of this simple packed-earth path at Bellevue Botanical Garden in Bellevue, Washington, creates an irresistible urge to peek around the next bend.

Photograph by Ken Druse.



AMERICAN HORTICULTURAL SOCIETY

7931 East Boulevard Drive Alexandria, VA 22308-1300
(800) 777-7931 fax (703) 768-8700

www.ahs.org

The American Horticultural Society (AHS) educates and inspires people of all ages to become successful and environmentally responsible gardeners by advancing the art and science of horticulture.

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To make a gift to the American Horticultural Society, or for information about a donation you have already made, call our development department at (800) 777-7931 ext. 127.

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Need help with a gardening problem? Call the AHS Gardeners Information Service at (800) 777-7931 ext. 131 or 124 from 10 a.m. to 4 p.m. Eastern time on weekdays. Or e-mail questions to gis@ahs.org anytime.

INTERN PROGRAM

To receive an application for the Society's Intern Program, write to Janet Walker, director of horticulture, at the address above or e-mail her at jwalker@ahs.org. Intern application forms can also be downloaded from the Society's Web site at www.ahs.org.

RECIPROCAL ADMISSION PROGRAM

The AHS Reciprocal Admission Program offers members free and discounted admission to flower shows and botanical gardens throughout North America. A complete list of participating shows and gardens can be found in this year's *Directory of Member Benefits* and also on the Web site at www.ahs.org.

TRAVEL STUDY PROGRAM

AHS members and friends can visit spectacular private and public gardens around the world through the Society's exclusive arrangement with the Leonard Haertter Travel Company. For information about upcoming trips, call (800) 777-7931 ext. 121 or view the tour schedule on our Web site.

WEB SITE: WWW.AHS.ORG

The AHS Web site is a valuable source of information about the Society's programs and activities. It is also an important resource for getting the answers to gardening questions, finding out about gardening events in your area, and linking to other useful Web sites. AHS members can reach the members-only section of the Web site by typing in this year's password: *clematis*.

YOUTH GARDEN SYMPOSIA

For information about the Society's annual Youth Garden Symposia (YGS), call (800) 777-7931, or visit the YGS section of our Web site.

The American GARDENER

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An Inside Look

"Autumn is...a time gardeners desperately seek flowering plants to fill the color void."

MISS PEACH (Ellen S. Ewell, our second granddaughter) took me by surprise when she observed recently that she wanted to lead a life like mine, except that she would work with animals rather than with plants. Her family is encouraging her to follow her dreams by exposing her to a wide range of experiences—including books, videos, and camps—relating to animals.

After reading the article by Karan Davis Cutler in this issue of *The American Gardener*, it occurred to me that perhaps there's a way Miss Peach can have the best of both worlds and work with plants *and* animals. Cutler gives us a behind-the-scenes look at how zoo horticulturists are meeting the challenges of designing realistic habitats for animals from areas as climatically and geographically varied as the arctic and the equator. Many zoos now include plant displays that rival those of botanical gardens.

Fall is the best time to gather and plant seeds of many hardy plants, so be sure to read tree expert Guy Sternberg's article on how to grow native American nut trees from seed. Because some of these American classics are difficult to transplant once their roots develop, they are often unavailable from nurseries.

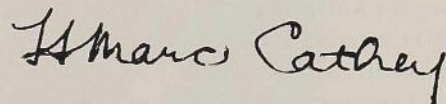
Autumn is also a time gardeners desperately seek flowering plants to fill the color void. Garden writer and landscape designer C. Colston Burrell profiles toad lilies (*Tricyrtis* spp.), a little-known genus of herbaceous perennials with jewellike flowers perfect for brightening moist, shady areas of the garden in late summer and fall.

Fall and winter are the perfect seasons to think about garden projects, so you will no doubt enjoy garden designer Barbara Blossom Ashmun's article about how to create paths to complement all kinds of garden styles. Or you can read about a garden project of a more lavish nature in Catherine M. Brown's description of the challenge Frederick Law Olmsted and Calvert Vaux faced in their 1865 design of New York City's Prospect Park. This renowned urban landscape continues to serve as a backyard for the countless "gardenless" residents of that great metropolis.

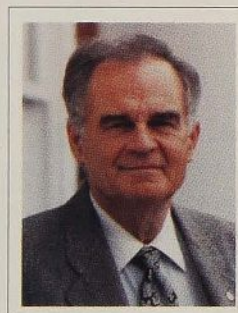
In our Millennium Focus section, we examine the role genetic engineering is playing in the breeding of ornamental and agricultural plants. Advances in both genetic and classical plant breeding techniques hold forth the promise of disease- and pest-resistant plants, new flower colors, and more nutritious vegetables.

Think of the glorious things Miss Peach will learn to do in this brave new world of the 21st century. Join her, and us, in embracing the challenges and opportunities that lie ahead.

Ever in green and purple,



—H. Marc Cathey, AHS President Emeritus



Members' Forum

IN SEARCH OF BEETS

I read with great delight Nancy McDonald's article "Flavorful Flower Beds" in the July/August issue of the magazine. As I have an edible garden that I change each year, I was particularly interested in what she had tried. I have grown many of the plants she wrote about but have had a hard time finding a source for one she mentioned, 'McGregor's Favourite' beets. I have seen them growing in display gardens and in the Boston Flower Show, and they are a wonderful foliage accent. Do you know of a source for this red-foliaged beet?

Ellen McFarland
Westwood, Massachusetts

EDITOR'S NOTE: *Nancy McDonald reports that she found seeds for 'McGregor's Favourite' beets at Chiltern Seeds. To order from Chiltern's, visit its Web site at www.edirectory.co.uk/chilternseeds/ or request a catalog by sending \$5 in cash to: Chiltern Seeds, Bortree Stile, Ulverston, Cumbria, LA12 7PB, England. If you send a note with your catalog request stating that you learned about Chiltern's in The American Gardener, the company will include a voucher worth \$5 off an order of more than £10 (about \$16).*

SOIL SIFTING

The discussion of soil sifters among the members of the Society's listserv group (reported in the July/August "Gardeners Information Service" page) caught my attention. During most of the 40 years I have been gardening, I used a homemade A-frame sifter. It always seemed to me that I was doing a lot of excess work moving the soil from place to place. So finally I created a sifter that eliminates a lot of that extra soil movement.

I removed the metal safety grids from both ends of an old window fan and made a box frame using two-by-fours, with the four-inch width as the sides. I

then attached the grids to one face of the box with three-quarter-inch galvanized netting staples. This made the sifter so rigid that no other support is necessary. Using my wheelbarrow, I can now move the sifter around the garden at will.

Greg Heirman
Northville, Michigan

EDITOR'S NOTE: *That's a great idea! If other readers have found creative ways to construct soil sifters, please share them with Members' Forum*

AHS Photo Contest

Garden shutterbugs, get your cameras ready! As part of the ongoing SMARTGARDEN™ program, the American Horticultural Society is sponsoring a contest for the best photographs of gardens that reflect a sense of identity with the climate, native vegetation, and architecture of different regions of North America. The six winning photographs will be published in *The American Gardener* and on the Society's Web site, along with information about each photographer and garden. The winning photographers will receive a one-year AHS membership (or extension of existing membership) and an AHS-logo shirt.

To participate in the contest, click on the SMARTGARDEN™ PHOTO CONTEST link on our Web site (www.ahs.org). After reading the contest instructions, download an entry form and submit the completed form with your image—slides are preferred, but prints will be accepted—to SMARTGARDEN™ Photo Contest, AHS, 7931 East Boulevard Drive, Alexandria, VA 22308. Include a stamped, self-addressed envelope if you want your photographs or slides returned. **All entries must be received by October 31, 2000.**



GARDENING FOR SENIORS

I was pleased to read Rita Pelczar's article, "Maturity in the Garden," in the May/June issue. As a trained horticultural therapist, I contract to retirement and assisted living homes, working with the residents in gardening and related activities such as flower arranging and local garden tours. Most of the residents who participate in these activities had a garden of their own at one time and have many memories of those gardens.

Some residents who participate in no other activities at their facility participate in the gardening activities because they can always do *something*, such as filling pots with soil or using tools to loosen the soil in raised beds. These gardening and related activities—which are adapted to the physical abilities of the participants—provide residents with increased socialization opportunities and a feeling of accomplishment and ownership in their living environment. I am always thrilled to get gardening advice from these experienced gardeners.

I wanted to point out one correction to the box "Where to Look for Ideas." The Enid A. Haupt Glass Garden is at the Howard A. Rusk Institute of Rehabilitation Medicine, in the New York University Medical Center. The garden is a wonderful oasis in the midst of a busy hospital and city, and its horticultural therapy program is a model program.

Diane Burgess
Bloomin' Well
Renton, Washington

WRITE US! Do you want to voice an opinion or share some gardening information? We'd like to hear from you. Letters to the editor should be addressed to Editor, *The American Gardener*, 7931 East Boulevard Drive, Alexandria, VA 22308, or you can e-mail us at editor@ahs.org. Letters we print may be edited for length and clarity.

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AHS—Disney Kids' Garden at Epcot

THE AMERICAN Horticultural Society once again lent its expertise and support as a sponsor of the seventh annual Epcot International Flower & Garden Festival, held from April 28 to June 11 this year at Walt Disney World's Epcot Center in Lake Buena Vista, Florida. As a complement to Disney's yearlong "Millennium Celebration" theme of creativity and children, several gardens at this year's festival were created especially for children. The Kids' Garden, sponsored in part by AHS, was a huge hit at the festival among both the young and young-at-heart. AHS assisted with the conceptualization and design of the garden, which nestled on a quarter-acre site between the France and Morocco pavilions in Epcot's World Showcase.

Inspiration for this innovative garden came during a design charette, or roundtable planning session, held last October at Epcot, in which members of the AHS staff and National Youth Garden Advisory Panel participated. Once the master plan was created and approved, Disney's fine-tuned horticulture services team did all the work of magically transforming the design concept into three-dimensional reality. Divided into five separate but interconnected mini-gardens, the Kids' Garden featured color, music, and multi-sensory gardens, as well as a Florida swamp garden and a "plant discovery zone" that included interactive exhibits and computers.

Visitors gave the Kids' Garden—built just for the duration of this year's festi-

val—such good ratings that Disney planners are considering the possibility of building a permanent Kids' Garden somewhere on the Epcot grounds. "The Kids' Garden worked exactly as we'd hoped, with parents and kids in there dis-



The Kids' Garden at Epcot, above, included whimsical topiary, left.

covering things together," says Carla Shuman, a Disney landscape architect. "I often saw adults and seniors in there by themselves," she

adds, "which was wonderful because our intention with the garden's name—kids' versus children's—was to convey that it was for kids of *all* ages!"

AHS Has "Final Answers" for Regis

THE FACT-CHECKING team for ABC television network's runaway hit game show "Who Wants to Be A Millionaire," hosted by Regis Philbin, has been relying on AHS as a resource for

answers to horticulturally related questions. Over the course of the summer, AHS confirmed the answers to several questions later used on the show. The not-so-difficult questions ranged from asking where cranberries are normally found growing (bogs or marshy ground) to whether aloes have herbal or medicinal uses (they do).

Contribute to AHS at Work

ANOTHER EASY way to contribute to the American Horticultural Society's national education programs is by assigning a portion of your Combined Federal Campaign (CFC) donations. Our designated CFC number is 2961.

Save Those Seeds

IT'S TIME ONCE again to share seeds from your garden with other members of the Society by participating in the annual AHS Seed Exchange Program. If you haven't been involved in this popular member program before, we urge you to participate this year.

All you have to do is collect ripe seeds from one or more specific plants that have produced fairly large quantities of seeds. For each type of seed you collect, fill out a copy of the donor form you will find in this magazine (on the card between pages 8 and 9) or on our Web site (www.ahs.org), and mail the cleaned, individually packaged seeds and attached donor forms to us. Seeds must be received here by November 1, 2000, in order to be used in the program.

A list of all the seeds available to members will be published in the annual *AHS Directory of Member Benefits*, which will be sent to you in early January.

SMARTGARDEN™ — Mulch

Why, when, and how much

Mulching a garden is one of the easiest and most beneficial maintenance techniques that you can practice. The right material, applied at a proper depth and at the appropriate time protects plant roots from extremes of heat and cold, helps retain soil moisture, prevents soil crusting and run-off, and inhibits weed growth. As a physical barrier between plant foliage and soil-splashing rain, mulch also helps prevent the spread of soil-borne diseases. In vegetable gardens, mulch keeps the fruits of plants—tomatoes, squash, cucumbers, melons—clean, preventing their direct contact with the soil, where fruit-rotting organisms likely lurk. Add to these benefits the visual appeal of a neatly mulched bed and the question of “Why mulch?” becomes “When should I mulch?”

TEMPERATURE MODERATOR

Organic mulches don't warm or cool the soil; rather, they moderate the temperature changes. This influence is accomplished by shading the soil from the hot sun during the day, and by retaining moisture. Because water changes temperature more slowly than air, the higher the soil moisture content, the slower the rate of temperature changes around a plant's roots. By preventing surface evaporation and suppressing the growth of thirsty weeds, mulched soils retain more moisture. This is an important concept to embrace. Often, winter damage occurs to the roots of plants not because of the low temperature to which they are subjected, but because rapid freezing and thawing causes plants to heave out of the soil, exposing their roots to the ravages of cold, dry air.

SEASONAL APPLICATIONS

In regions with cold winters, mulching to provide winter protection is most effective when applied after the ground has frozen. Mulching too early can delay normal hardening off of growth for winter, as well as be an invitation to rodents that may be looking for a safe haven as temperatures begin to cool. By waiting until the ground is cold, rodents will likely have sought refuge somewhere other than near the base of your prized trees and shrubs, where their nibbling can be very destructive. Many perennials will benefit from a winter mulch after they have died back. This helps prevent the frost heaving mentioned above, especially with new plantings. Mulch needs to be pulled back from perennials in early spring to allow new growth to emerge, and to prevent a buildup of excessive moisture around stems, which can lead to disease.

Summer mulches are particularly important for weed control and soil moisture retention. But wait until the soil has had a chance to warm up a bit before you apply

it, or new growth may be slow. Give herbaceous perennials time to emerge before mulching flower beds.

A HAPPY MEDIUM

How much mulch should you apply? This is an important question, because too much will impair plant growth by suffocating roots and preventing moisture from reaching the soil. But too thin a layer will not sufficiently suppress weed growth or retain moisture. In general, a two- to two-and-a-half-inch layer of organic mulch is appropriate. Always keep mulch away from the crown or stems of plants to prevent disease. Around permanent plantings, mulch can build up from year to year, so avoid creating a deep layer of mulch that obstructs water from reaching plant roots. In vegetable gardens and annual beds, organic mulch can be incorporated into the soil at the end of the season, where it will improve soil structure and fertility.

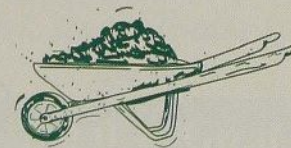
A VARIETY OF MATERIALS

The mulching material you select depends on availability, personal taste, and the type of garden. Straw works well in the vegetable garden, but can look messy and contribute unwanted weed seed to a perennial border. Black plastic is often used to mulch melons and cucumbers—they benefit from the heat captured by the plastic in addition to a virtually total suppression of weeds. Attractive organic mulches, such as shredded bark, pine straw, or cocoa hulls are a better choice for flowerbeds, trees, and shrubs. But they are not suitable for every garden. Rock gardens and beds of cacti and succulents generally require drier conditions, and may resent the moisture retained under a layer of shredded bark. A gravel or stone mulch is probably the best solution for such gardens.

During decomposition, soil microorganisms consume nutrients in the upper layer of the soil as they break down organic mulches. As a result, plants may temporarily suffer from malnourishment. Eventually the decomposing organic matter will release nutrients back into the soil where they will be available to plants, but you may need to fertilize your plants in the meantime. This nutrient drain can be minimized by starting off with partially composted organic mulch. Organic mulches can also affect the pH of your soil over time; test your soil every year or two to be sure it remains in the proper range.

Plants themselves can serve as mulch, shading the soil from the heat of the sun and crowding out weeds. Particularly in gardens with abundant moisture, living mulches may be your most effective choice.

Rita Pelczar, Associate Editor

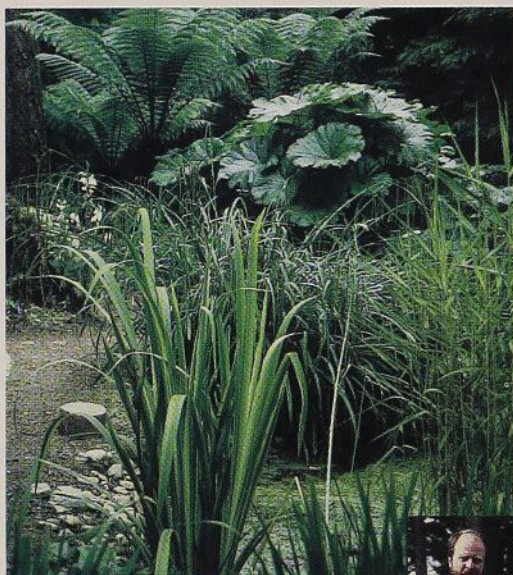


Gardener's Notebook

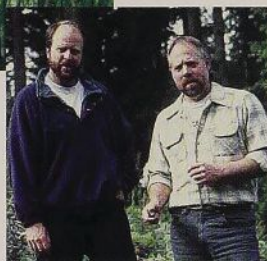
Horticultural News and Research

BURPEE AND HERONSWOOD MERGE

COLLECTORS OF unusual garden plants are likely to find selections easier to obtain in coming years as a result of a recently announced merger between two giants in the mail-order plant industry and seed industry, respectively. Heronswood Nursery in Kingston, Washington, co-owned by Dan Hinkley and Robert Jones, is teaming up with W. Atlee Burpee & Company, headquartered in Warminster, Pennsylvania, to increase the availability of Heronswood's rare and unusual plant offerings to gardeners.



Heronswood nursery's owners Dan Hinkley, right, and Robert Jones are looking forward to spending more time working on their display gardens, above.



The merger of these internationally respected companies will afford the globe-trotting Hinkley more time to devote to plant exploration, evaluation, and breeding. Burpee, the first American seed company to sell seed coast-to-coast, will provide assistance with propagation and distribution of the specialized inventory of trees, shrubs, vines, and herbaceous perennials for which Heronswood is

known. "This will allow us greater flexibility in evaluating the plants and getting sufficient numbers built up to offer to a broader audience," says Hinkley. Many of Heronswood's current offerings are the fruits of Hinkley's expeditions to a variety of sites in Asia, Central and South America, and North America.

For the legions of gardeners who have come to regard Heronswood's voluminous catalog as one of the rites of spring, Hinkley says there is no reason to worry about major changes. "We're going to continue to run the nursery here on our own as we always have. As far as the catalog and the breadth of offerings go, I don't think people will find noticeable differences," he says. "Ultimately, they will be more satisfied, because with the benefit of Burpee's expertise in retail sales and an expansion in production here, we'll be able to fulfill more orders."

What Hinkley envisions is a gradual streamlining of the Heronswood catalog. "We'll have the same mix that we've had thus far—strong in herbaceous perennials, along with a large listing of shrubs, trees, and grasses," he says. "Over time, there will probably be a reduction in the total number of plants we sell," he notes, "but the quality will improve."

"Robert and I are excited by this because it will allow us to relax and live our lives a little bit," notes Hinkley. "We've been so overwhelmed by the growth of the nursery in the last 10 years, and this agreement will allow us time to develop the nursery and display gardens here."

According to George Ball, Burpee's president and CEO, discussions with Heronswood on a cooperative arrangement have been in the works for a couple of years. He describes the relationship between the companies as symbiotic. "It's very much in the spirit of a partnership," he says.

Ball frames the merger as part of a

back-to-the-future movement for Burpee, which will celebrate its 125th anniversary next year. "A company is constantly evolving," he says. "Burpee used to have a very extensive range of plants by mail—if you go back to 1880s, we were offering all kinds of transplants and bare-root plants."

Though some Heronswood plants—principally hellebores—are listed in Burpee's catalog this fall by prior arrangement, Ball stresses that both companies will be taking a slow and methodical approach to the merger and customers are unlikely to see immediate changes in either catalog.

The merger with Heronswood also expands Burpee's regional network of plant testing facilities. Currently Burpee has two trial farms in Delaware and access to testing facilities through subsidiaries in the Midwest and Southeast. "With the addition of a testing and growing area in the Northwest, we're developing a strong regional constellation," Ball says.

A HULL OF AN IDEA

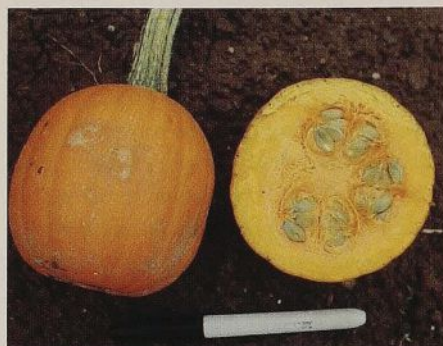
AFTER 20 YEARS of research, Brent Loy, plant biology professor at the University of New Hampshire in Durham, hit on something that could make a big splash in the lucrative world of snack food. Loy's pumpkins produce hull-less seeds that can be popped in an oven or microwave to become a delectable, bite-sized snack that is nearly 40 percent protein. The seeds contain no cholesterol, and their oil is highly unsaturated. "Consumer acceptance of the product is excellent," reports Loy.

The hull-less trait was first documented in 1934 in an Austrian publication, but Loy suspects it may have been known since the late 19th century. Early hull-less varieties did not appeal to gardeners, however, because they produced low yields and/or small seeds.

Loy's first release, 'Snackjack', was offered by several seed companies, including Harris Seeds and Stoke Seeds, last

year. 'Snackjack' is a compact bush-type pumpkin, so it fits well into backyard vegetable gardens. The flesh of its attractive fruit is "pie quality," and each pumpkin produces between 500 and 600 seeds.

Loy continues to work on new varieties of hull-less pumpkins that are more resistant to fruit rot and produce still more and larger seed. "Although I expect 'Snackjack' to be popular among home gardeners because of its compact growth and attractive



'Snackjack' pumpkin has hull-less seeds.

ornamental pumpkin," he explains, "some of my newer hybrids are geared more to the commercial industry." For commercial production, he is striving to develop a hull-less pumpkin that lends itself to mechanical harvest. Loy hopes to have another variety released within a year.

EPA ANNOUNCES CHLORPYRIFOS PHASE OUT

CITING THE protection of children's health, the federal Environmental Protection Agency (EPA) announced in June its intent to phase out or eliminate certain uses of the organophosphate pesticide chlorpyrifos, a compound found in Dursban and many other popular home and garden pesticides. Chlorpyrifos is one of the most widely used organophosphate pesticides in the United States; currently, it is used on more than 40 different agricultural crops as well as in homes, office buildings, and schools, where its varied applications includes uses as a lawn and garden treatment, a termiticide, and in pet flea collars.

In August 1999, the EPA began a critical review of chlorpyrifos, as part of its effort to ensure that such older pesticides meet the tough safety standards established by the 1996 Food Quality Protection Act (FQPA), a law designed in large

part to protect children from the toxic effects of pesticides. Based on its findings, the EPA determined that chlorpyrifos, which belongs to a group of organophosphate pesticides that can affect the functioning of the nervous system, poses a health hazard to children.

"This has been coming for a long time," says Scott Aker, head of integrated pest management at the U.S. National Arboretum in Washington, D.C. "The FQPA is forcing a re-examination of our old standby pesticides. We'll have to look for other options," he says.

Fred Whitford, coordinator of pesticide programs for Purdue University's cooperative extension service in West Lafayette, Indiana, is more dubious. "The EPA doesn't normally take products off the market due to misuse," he says. "Note that chlorpyrifos has only been taken away from public use—the one market lacking a strong voice to argue that this product is important to meeting its needs," he adds.

Under the agreement with the manufacturer, Dow AgroSciences, the production of chlorpyrifos for use in and around homes and other areas where children may be exposed will be gradually phased out. Retail sales of chlorpyrifos products in the United States will be allowed until December 31, 2001.

"The potential benefit is that a huge market could open up when smaller manufacturers see opportunities to market their pesticide products, particularly in soaps and oils. Right now there's only a handful of big players," says Whitford. Aker agrees. "Chlorpyrifos is in dozens of products, so this will have a fairly major effect on what we see on store shelves," he says. "It'll take some trial and error—and a smarter consumer—to find less toxic products that will be as effective."

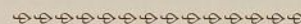
Chlorpyrifos will remain available for various nonresidential uses, such as in ornamental nurseries, as well as for all crop uses in the United States except tomatoes. The agreement also includes restrictions in agricultural applications on apples and grapes, fruits regularly eaten by children.

For more information on chlorpyrifos, including a list of registered chemical alternatives, check the EPA's announcement on its Web site at www.epa.gov/pesticides.

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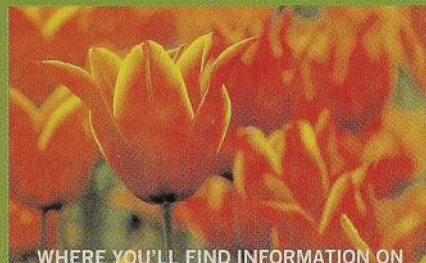


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Offshoots

Aristocrats and Others

By Lucy Fuchs

WHEN MY FRIEND WINNIE asked me the name of the new bold-leaved plant she spotted in my garden, I declared proudly, “*Kirengeshoma!*” It was a distinct pleasure to roll that exotic name off my tongue—and to add with significance, “It comes from Japan, you know.” Intrigued, she promised to come back to see it when it bloomed later in the season. Excellent, I thought. Another opportunity to

experience a flush of pride, for I am a member of that fiercely devoted group of gardeners who grow perennials. We love our plants passionately and call ourselves “plantsmen,” to distinguish ourselves from gardeners who do not get intoxicated by particular and individual plants, but, instead, go in for masses of color, drifts, accents, color charts, and what not.

I started growing perennials when I was a young homeowner and new to gardening. At that time, it seemed more thrifty to buy plants and shrubs that come up every year than those that bloom for a single season and have to be replaced. I did not know then that I was joining the ranks of plant devotees who look askance at annuals—some even going so far as to think them *declassé*. Over the years, however, I have become committed to perennials for reasons beyond either thrift or snobbery. After all, plantsmen are right in appreciating perennials for their beauty, variety, and natural look in gardens. They also inspire romantic feelings and poetry. Think of William Wordsworth’s “host of golden daffodils,” Walt Whitman’s “when lilacs last in the dooryard bloom’d,” and poems and songs without number about roses. No one, I think, has ever written an ode to a zinnia or marigold.

I confess, vanity *has* crept into my garden. I blame it on exposure to talk by the gardening elite and the (mostly English) garden books I have read. Vita Sackville-West, an English writer who gardened on the grounds of her 14th-century castle, was so exclusive about plants that her husband once wrote in his diary, “Vita only likes flowers which are brown and difficult to grow.” Of course, we all know she later found a certain cachet in white gardens,

but I suspect her white flowers were equally rare and difficult to grow.

As much as I cherish my perennials, though, I cannot fully join the ranks of the gardening aristocrats, for there are some annuals I can’t resist. White impatiens, for instance. I love them for their simplicity and innocence, and for the brightness their flowers bring into the



dark corners of my shade garden. I know, I know—the aristocrats say that informed gardeners don’t need bloom, that the impressive foliage of the hellebores and the delicate fronds of ferns ought to be enough. “*Not need bloom?*” I say. That renunciation of pleasure is as alien to me as the asceticism of those saints who sat naked in the desert. No, I luxuriate in my white impatiens and do not mind that they—like marigolds and zinnias—grow everywhere and flourish without much skill or labor on the gardener’s part.

I am not alone in my divided loyalties. Winnie, a master gardener, is like me: She loves unique plants, but she practices democracy in her garden. We do not care what Vita Sackville-West or her compatriots say about a plant. If we

love it, it finds a place in our gardens.

The other day, Winnie gave me a heliotrope, which I immediately planted in the garden. The plant had dark purple, velvety flowers—it was certainly regal, a thing of splendor. I told Winnie that next year I might place it near the silvery artemisia.

“*Next year?*” she said. “Not unless you grow it from seed or winter it indoors—it’s an annual, you know.”

“So,” I thought, “annuals have their aristocrats, too!”

And in looking through the latest mail-order catalogs, I discovered that a prestigious nursery was for the first time offering annuals—surely evidence that plants should not be shunned merely for belonging to a certain category. And wonder of wonders that among the stunning photographs in this nursery’s catalog was one of heliotrope! I can only hope that in time it will also offer white impatiens.

For my part, I continue to hunt through specialty nursery catalogs for beguiling perennials with unusual leaves and challenging growing requirements. At the same time, I know that I will also buy those cheerful pots of primroses from the local supermarket next spring.

Last winter, after going to the trouble of ordering a lacecap hydrangea for spring from another state, I found some lighting up the winter gloom with their flowers in the same supermarket, so I bought another one there. Now both hydrangeas are flourishing without regard to origin in my garden—reminders that if our hearts are open, beauty can be found in many places.

Lucy Fuchs is a free-lance writer living in Ambler, Pennsylvania.



Gardeners Information Service

RELOCATING AN ORIENTAL LILY

I would like to move an Oriental lily to a new location in my garden. Should I do it now—when it has finished flowering but the leaves are still green—or should I wait until after the foliage has completely died down? How deep should I plant it, and what should I add to the soil? I live in USDA Zone 4.

—K.P., CHENANGO FORKS, NEW YORK

The foliage of your plant should have turned brown and died back by fall, which is the best time for moving and planting lilies. Dig up the bulb and cut back the old stem to just above the point it emerges from the bulb. To prevent the bulb from drying out, have the new site ready beforehand so you can transplant your bulb immediately.

Lilies grow best in a well-aerated, neutral to slightly acidic soil, preferably a deep sandy loam. Add organic matter—well-rotted manure, compost, or leaf mold—to the soil and work it in thoroughly prior to planting. Plant the bulb at a depth of three to four times its length—base to tip—water generously, and apply mulch to prevent damage from rapid freezing and thawing in winter.

CARING FOR AN ASPARAGUS BED

I have a new asparagus bed and have let the plants grow and go to seed. How long should I wait before cutting the foliage back?

—J.S., HAMLIN, NEW YORK

The development of the fernlike foliage of asparagus is an important part of its life cycle; it is the photosynthetic part of the plant that feeds the roots for next year's crop. It is important, therefore, not to cut the plants back until the stems and leaves have turned brown.

Some asparagus growers suggest cutting the foliage back in fall; others prefer waiting until early spring. There are advantages to either timing: fall cutting removes potential

overwintering pests, yet leaving stalks until early spring may provide some winter protection. If you elect to cut them back in the fall, wait until after you have had a few frosts, then mulch the bed for winter.

CURIOUS ABOUT MILKY SPORE

I recently read a reference to milky spore disease as an organic remedy for grubs. What is it, and how effective is it?

—L.J., SALEM, OREGON

Milky spore is a disease of certain beetle grubs that has been used to control their populations, especially the Japanese beetle. It is caused by a bacterium—*Bacillus popilliae*—that does not harm beneficial insects. Although it is organic in the broad sense of the term, it is more accurately referred to as a biological control. Although it works slowly—taking two or more years to reach peak effectiveness—it is very effective for control of Japanese beetles, especially when applied on a community-wide basis. Once the bacterium is established in the soil, it provides long-term control.

Milky spore is available from hardware stores and Gardener's Supply Company (888) 833-1412; www.gardeners.com.

OVERWINTERING COFFEE

I have had a coffee plant for several years now and bring it indoors during the winter. I live in Virginia Beach, Virginia, and was wondering if it might survive the winter here outdoors. Also, do you have any suggestions for its care?

—L.S., VIRGINIA BEACH, VIRGINIA

A large shrub or small tree in its tropical habitat, *Coffea arabica* is hardy only in USDA Zones 10 and 11; it would not survive the winter where you live (Zone 7). In the United States, coffee plants are primarily grown as house plants. They will do best where daytime temperatures range from 70 to 75 degrees, with

nighttime temperatures about 5 degrees cooler. Indoors, provide bright indirect light. Feed the plant with a mild liquid fertilizer, and keep it evenly moist during the growing season. Pinch stems to keep the growth compact. Reduce both fertilizer and water during winter.

SHEDDING FIGUS

About two months ago, I purchased two ficus trees—one variegated and one solid green. They were potbound, so I repotted them using a commercial potting soil with a handful of compost mixed in. The solid one has some leaf drop, but it seems to be sprouting as many leaves as it is losing. The variegated one, however, has some new growth at the bottom and the top but is naked in the middle. Both trees are in a room with bright, indirect light, and I mist them at least every other day. What could be the problem?

—A.D., HOUSTON, TEXAS

Ficus trees are well known for going into shock and losing their leaves when they are moved or transplanted. Since yours were moved and transplanted recently, you will probably be picking up their fallen leaves for some time, but don't be too alarmed; the lost leaves should gradually be replaced with a thinner set of smaller leaves until they are acclimated to their new environment.

Because light levels begin to diminish at this time of year, provide as much direct, natural light as possible. A water soluble, balanced fertilizer can be applied every four weeks until winter, when fertilizer should be withheld until spring. Ficus trees really fill out when placed outdoors in a semi-shady location over summer, but they will likely lose their leaves again when they are brought back in the house. ☞

William May, Gardeners Information Service, and Marianne Polito, Gardeners Information Service Manager

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Natural Connections

Living Harmoniously with Lady Beetles

by Margaret T. Baird

OKAY, WE KNOW that lady beetles are good for our gardens. And you've got to admit that even for insects, these voracious aphid-eaters are cute as buttons. Until the autumn weather turns chilly, that is, and you discover them invading your attic in droves, congregating on your back deck, or crawling by the dozen on windowsills. That's when the lady beetle cuteness quotient takes a serious dive.

Depending on which region of the country you live in, you may be part of the increasing group of homeowners driven to distraction in recent years by the appearance of large numbers of lady beetles both inside and outside your home during the fall and spring months. Although their presence may alarm you, it's best to resist all-out pesticidal warfare on these good guy—er, lady—predators. By coping with their overwintering habits, you may reap rich horticultural benefits over the long term.

A Gardener's Ally

Though most commonly referred to as “lady bugs” by the general populace, lady beetle is actually the most correct name for these familiar members of the order Coleoptera—the beetles, as opposed to Heteroptera, the order of true bugs—and is recognized as their official common name by the Entomological Society of America. In Europe, where lady beetles are called “ladybirds”, they have been viewed as tokens of good luck and abundant harvest for hundreds of years.

Like all beetles, lady beetles develop through a life cycle process termed a complete metamorphosis, which includes four stages: egg, larva, pupa, and adult. The last stage—shiny, dome-shaped appearance, reddish color, and spotted wing covers—is the one most of us are familiar with. Great variety exists, however, among species—and even between members of the same species—in both the number of spots and in coloration, which may range from solid black to shades of red, orange, and yellow.

In North America alone, more than 350 species of lady beetles have been described, while the worldwide count stands at more than 4,000. Common North American species include the fifteen-, twelve-, nine-, seven-, and two-spotted lady beetles—named for the spot count on their wing covers—and the convergent lady beetle (*Hippodamia convergens*), which is iden-



Left: An aggregation of convergent lady beetles. **Above:** The multicolored Asian lady beetle is easily identified by the black W-shaped marking behind the head.

tified by the converging white lines on its body just behind the head. These are the beetles most often sold commercially as a biological strategy for dealing with garden pests. They are easily field collected by the thousands in California's Sierra Nevada, where they migrate after aphid populations in the state's Central Valley drop in the summer.

Aggregating in massive colonies at these high elevation sites year after year, convergent lady beetles spend the winter in semi-hibernation. When the weather warms in March, the beetles then fly back down to the valley to consume their favorite prey. The reason for this aggregating behavior is still a mystery. “It might have something to do with predator avoidance, but no one knows for sure why they do it,” says Mark Hardin, an entomologist in the horticulture services division of the Smithsonian Institution.

Spotty Reputation

While most lady beetles co-exist peacefully with humans, the species that has earned a reputation in recent years as a “beneficial nuisance” in North America is the multicolored Asian lady beetle

(*Harmonia axyridis*). Native to eastern Asia, Asian lady beetles are important predators of scale insects and aphids on their home continent and were originally introduced in California—and subsequently nationwide—in the early 20th century as a biological control for pecan aphids. Asian lady beetles have since distributed throughout much of North America.

“Aphids are definitely not as serious a problem now as they were in the past,” says Scott Aker, head of integrated pest management at the U.S. National Arboretum in Washington, D.C. Indeed, so well have Asian lady beetles controlled aphid populations in this country that many entomologists speculate they may be displacing populations of native lady beetles. “Asian lady beetles have eclipsed what people thought they’d do in terms of aphid control, to the point where there is some concern about possible detrimental effects on the natural levels of those prey species, as well as on native lady beetles,” says Hardin. “In the urban habitat, Asian lady beetles are now the predominant lady beetles we find.”

Just like convergent lady beetles, multicolored Asian lady beetles seek out sites to aggregate and hibernate for the colder months, generally in October. “In their native habitat, Asian lady beetles overwinter in light-colored, rocky areas in the mountains, but here they tend to pick man-made structures,” says Hardin. Asian lady beetles appear to be most attracted to light-colored buildings and tend to congregate on the sunny, southwest side. Once there, they look for cracks and crevices in which to overwinter—often inadvertently making their way inside.

Coping With Beetlemania

Preventing lady beetles from entering your living spaces should be your first line of defense. Since they can fit through spaces less than one-eighth of an inch wide, loose screens and gaps under doorways invite lady beetles to amble indoors for the winter. Install weather stripping, caulk cracks and crevices around windows and doors, and seal or install fine mesh around vents and other potential entry points to keep them out.

If lady beetles do get into the house, experts encourage homeowners to put up with these accidental visitors, since they don’t reproduce indoors, won’t bite humans or pets, and won’t eat your food, clothing, or furnishings.

If co-existence is not possible, the intruders will have to be removed. Unless your home is heavily infested with lady beetles—in which case the use of pesticides may be warranted—most experts recommend vacuuming or good old-fashioned sweeping as the most effective removal techniques; be sure to sweep the beetles up gently to avoid crushing them. When agitated, lady beetles sometimes exude an orange fluid as a defense mechanism. This fluid can stain fabrics or walls and has an unpleasant odor.

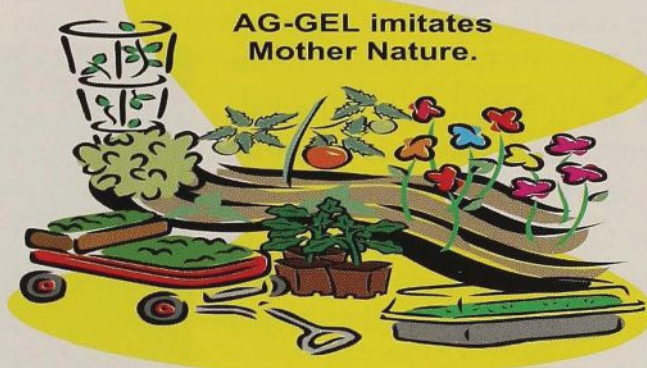
Aker recommends vacuuming them up after installing a clean bag in your vacuum cleaner. “That way, if you don’t want to kill them, you can store them in that same bag in your garage over the winter,” he says. “It’s exactly what they’re looking for—a dark, secluded space to overwinter in. Then in March, release them outdoors near a food source.”

Margaret T. Baird is communications assistant for The American Gardener.

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The Plains Garden: Denver Botanic Gardens

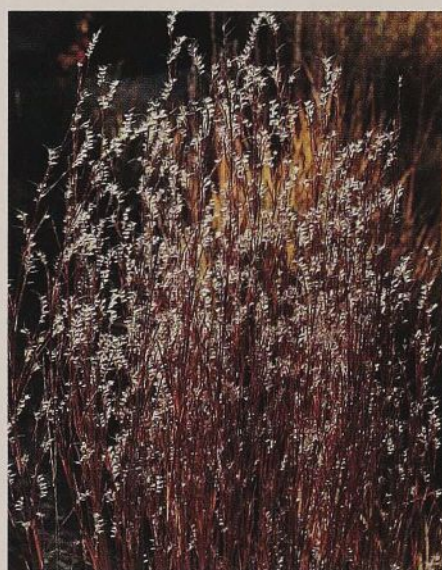
by Kenneth Slump

NAMED IN TRIBUTE to the mother of one of the garden's founders—a pioneer who traveled by covered wagon across the Great Plains and arrived in Denver in 1860—the Laura Smith Porter Plains Garden at Denver Botanic Gardens was conceived as a naturalistic representation of seven different plains habitats or prairie types.

Since the “Mile-High City” is located on the high plains at the eastern slope of the Rocky Mountains, a naturalistic planting conveying the spaciousness and serenity of the open prairie was an obvious choice for Denver's 23-acre public garden. As a contrast to most of the metropolitan Denver landscape—which through the miracle of irrigation often resembles that of the American Midwest and Northeast—it has proved to be particularly instructive to Colorado's urban dwellers, few of whom appreciate the sort of habitat from which their verdant cities were claimed.

“When I first started to work here,” notes Dan Johnson, the native plant specialist who oversees the Plains Garden, “it was not unusual for visitors to ask when we were going to get around to developing this weedy section of the Gardens.”

Johnson accepted the challenge of renovating the one-acre garden shortly after his arrival at Denver Botanic Gardens in July 1997. Serendipitously, the walkways through the sloping site were scheduled to be renovated anyway, which necessitated removing some sections of the garden that were the weediest and most difficult to maintain. The garden still includes representations of various



Above: Prairie coneflower (*Ratibida colum-nifera*) and blazing star (*Liatris punctata*) add late-summer color to the Plains Garden. Left: As fall approaches, grasses such as little bluestem add to the show with glittering silver seedheads atop burnished gold stems.

regional habitats, but Johnson has given heavier emphasis to interpreting the short-grass prairie habitat.

Despite the goal of having the Plains Garden appear as natural as possible, Johnson acknowledges that it is still just an interpretation of a natural biome—many ecological factors, such as grazing bison, are missing from the picture. Still, in order to replicate the ecology of the plains, portions of the garden are burned in late winter or early spring every two to three years to simulate prairie wildfires. These burns help to remove thatch, recycle nutrients, and enable some types of seeds to germinate. A permit is required to conduct burns, which can only be done in the early morning hours of low-pollution days.

Johnson also provides irrigation for the first couple of seasons to help new plantings become established. These sections are the only parts of the garden that receive water over and above the average 15 inches per year that Denver's semi-arid climate offers.

Late-Season Splendor

In late summer and fall, when many other types of gardens are beginning to look worn out, the Plains Garden reaches its climax. As some forbs—herbaceous perennials—are flowering, others produce attractive seed or fruit, and many grasses begin to take on their autumnal hues.

One of the most attractive grasses at this time of year is big bluestem (*Andropogon gerardii*), which turns shades of red, orange and rust. Switch grass (*Panicum virgatum*) provides lemon or golden hues to the fall palette and little bluestem (*Schizachyrium scoparium*) turns a rusty red before yielding to a pinkish hue that holds all winter. Blue grama (*Bouteloua gracilis*), the dominant species of the short-grass prairie, produces light-colored "eyelash" seed heads from midsummer through fall.

Outstanding flowers of the season include blazing star (*Liatris punctata*) and plains aster (*Machaeranthera canescens*). Other late-bloomers include butterweed (*Senecio spartioides*) with its lemon yellow flowers and silvery seeds, and ten-petal mentzelia (*Mentzelia decapetala*), a lightly fragrant night-blooming biennial with a flower that resembles a creamy star with a gold center. These four-inch blossoms buzz with honeybees on late-summer evenings.

A few appropriate evergreens, cacti, and woody plants add important sculptural elements to this style of garden. Johnson includes plants such as soapweed (*Yucca glauca*), cholla (*Opuntia imbricata*), and sand sage (*Artemisia filifolia*).

Easy Maintenance, Resilient Beauty

Johnson credits the Plains Garden renovation with bringing a new awareness and appreciation to that section at Denver Botanic Gardens and feels some people are now viewing it as a viable garden alternative. "Once established, such gardens are definitely easier to maintain than some traditional types," says Johnson, "and they withstand the stresses of our climate better as well."

He likes to tell about a severe hailstorm that swept through the area in early August a couple of years ago. In the aftermath, many of the plantings at Denver Botanic Gardens were shredded, yet the Plains Garden weathered the storm virtually unscathed.

While Johnson has no misconceptions that prairie gardens will ever replace all of Denver's irrigated lawns and Eastern-style plantings, he notes that they are much more common throughout the region than they were just a few years ago. Gardeners are finding that such plots are good alternatives for hard-to-maintain locations and at perimeter and transitional areas of the landscape where less maintenance is desired.

"I'd like visitors to realize that we have attractive native plants that will thrive in local gardens with minimal care," says Johnson. "These plants are not just for horticultural fanatics; they're moving into mainstream gardening as well."

Kenneth Slump is a horticultural writer and consultant living in Denver, Colorado.

TIPS OF THE TRADE

For those thinking of creating or renovating a garden in the style of a plains or short-grass prairie habitat, Dan Johnson recommends starting with the cleanest site possible. He suggests clearing the area in early spring, allowing weeds to sprout, and then eliminating them—by physically removing them or spraying with an herbicide—before planting. Cultivate the soil minimally during planting, because weeds quickly germinate in disturbed soil.

Johnson suggests planting a grid of grasses first, then filling in with appropriate flowers and shrubs. "Strive to plant species in drifts or groups so they will then be more likely to be pollinated and produce seed," he advises.

According to Johnson, the biggest challenge in establishing or replanting such a garden is weed control. He says it is crucial to eliminate invaders before they mature or go to seed. In the Plains Garden, Johnson schedules extra time for weeding during the first months for sections of the garden that have new plantings.

The first warm spring weather in the year following the planting of a prairie garden often promotes the germination of many weeds. Perennial weeds such as field bindweed (*Convolvulus arvensis*) typically become a greater problem than annual types in such gardens because the ground is not routinely cultivated. The presence of downy brome (*Bromus tectorum*) and similar annuals can be greatly reduced in a single season if they are rogued out regularly before they go to seed.

While prescribed burns are illegal in most residential areas, Johnson says gardeners can achieve almost the same effect by mowing the garden in late winter or early spring, removing the clippings, and fertilizing lightly. —K.S.

Resources

For more information on Denver Botanic Gardens, visit the gardens' Web site at www.denverbotanicgardens.org.

Sources

High Country Gardens, Santa Fe, NM. (800) 925-9387. www.highcountrygardens.com. Catalog free.

Plants of the Southwest, Santa Fe, NM. (505) 471-2212. www.plantsofthesouthwest.com. Catalog \$3.50.

Prairie Nursery, Westfield, WI. (800) 476-9453. www.prairienursery.com. Catalog free.

Western Native Seed, Coaldale, CO. (719) 942-3935. www.westernnativeseed.com. Catalog free.

Breeding Plants for the Future



A sunflower developed by USDA research geneticist Jerry Miller, left, produces a cooking oil, marketed as NuSun™, with health benefits comparable to those provided by olive oil.

IN 1856 AN AUSTRIAN monk named Gregor Mendel began a series of experiments with garden peas. Systematically crossbreeding plants that displayed visibly distinguishable traits, Mendel followed the offspring through several generations, observing and recording the incidence of these traits. His findings unlocked the secrets of plant inheritance. Fast-forward almost 150 years: Today's plant geneticists work with traits that the eye cannot detect—at the molecular level—and have successfully transferred genes between unrelated organisms. Astounding advances in plant breeding have been realized in the past one and a half century; some of these pose as many questions as they do answers.

The Changing Goals of Plant Improvement

Producing better plants has always been the goal of plant breeders, but exactly what constitutes improvement has changed over time. One hundred years ago, resistance to chestnut blight was not considered an essential trait for the robust species that dominated eastern forests. But American chestnuts have all but disappeared from our woodlands and landscapes. If—or perhaps we should say when—a gene is discovered that imparts resistance to the fungus that causes the blight, an American treasure might be restored. Today's ornamental plant breeders

seek varieties that display tolerance to such modern afflictions as air pollution and acid rain; these traits were not a concern 50 or 60 years ago.

Increasing food production to accommodate an ever-growing world population has been a long-standing objective among breeders of food crops. Production can be boosted either by improving productivity of the land used to grow food, or expanding the amount of land in production. Both approaches have benefited from plant breeding, but since further increases in productivity will likely not be as dramatic as those resulting from the ad-

BY RITA PELCZAR

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Improving Vegetables

John Navazio, who breeds spinach, beets, and carrots for the Alf Christianson Seed Company in Mt. Vernon, Washington, considers improving resistance to diseases and the development of crops with increased nutritional quality as major objectives facing today's vegetable breeders.

DISEASE RESISTANCE

Protection from many important vegetable diseases has been obtained by incorporating a single gene that confers resistance. Vertical resistance, as it is called, has been accomplished both through classical breeding methods and genetic engineering by transmitting these single resistant genes. This resistance is absolute; the plant is completely resistant to the disease—or at least to a specific race of the disease. If the disease-causing organism mutates, forming a new race of the disease, the resistance does not hold up. "What this creates," says Navazio, "is the 'race race'—constantly breeding for the next race...thereby increasing happenstance mutations for pathogenicity of the disease organism. It's a boom and bust cycle."

Downy mildew is a serious disease of spinach for which vertical resistance was obtained in the early 50s. But the fungus that causes the disease has undergone several mutations, each requiring a new line of resistance. Today American spinach growers worry about race 6 of downy mildew, and in Europe, race 7. And the fungus that causes the disease *phytophthora* in soybeans has developed 28 races—20 of them in just the last 20 years!

A better approach, according to Navazio, is to breed plants that bear a broader, though not absolute, resistance. This is called horizontal resistance and it is controlled by multiple genes. It imparts "varying amounts of resistance to a disease in any situation," remarks Navazio.

Breeding for horizontal resistance begins by identifying plants that display a fairly high level of resistance to a disease—what farmers call field tolerance—and interbreeding them. Offspring are inoculated with the disease and survivors are inter-bred. The result is a stacking or pyramid affect of the desired traits, obtaining significantly raised levels of resistance, often in very few generations. These plants are equally resistant to any strain of the disease, including new strains. When coupled with cultural practices, horizontal resistance can reduce disease damage to a level that doesn't affect quality. According to Navazio, "This has huge implications for lowered pesticide use."



Territorial Seed's 'Doublerich' tomato contains a double dose of vitamin C.

BREEDING FOR NUTRITION AND HEALTH BENEFITS

Plant breeders have made great progress in increasing traditional essential nutrients—vitamins and minerals—in the vegetables we eat. More recently, they have been working to increase phytonutrients—compounds that enhance natural functions and promote a long and healthy life. "We have only begun to understand the role of phytonutrients in human nutrition," remarks Navazio. "It is a very ripe area of research."

Plant breeders have begun working with colleagues in the medical profession to develop varieties that contain higher amounts of natural compounds that may be important in maintaining human health. James Moore, professor emeritus of the University of Arkansas, cites the potential of anti-oxidants and isoprenoids—compounds found in plants that contribute to their distinctive flavors and fragrances—to suppress cancer and heart disease. "Studies on these compounds are new," states Moore, "but a few have been shown to suppress human cancer in cells in laboratory tests." Among these are limonene and lycopene—two isoprenoids common in tomatoes.

USDA plant researcher Phil Simon at the University of Wisconsin and Teddy Morelock at the University of Arkansas are both working on the phytonutrient lutein, which is critical in preventing age related macular degeneration, a condition that restricts vision. Lutein also possesses great anti-oxidant potential; it is capable of bonding with and deactivating free radicals—highly reactive molecules that have been linked to the development of certain cancers. Lutein is normally present in dark leafy greens, winter squash, and yellow and green summer squash, and researchers have discovered that the lutein content in vegetables is directly related to the depth of color. New varieties are now being selected for high lutein content.

Gardeners can sample vegetables that have been bred for increased nutrients and phytonutrients. High levels of beta-carotene are available from Johnny's Selected Seeds' carrot 'Sugarsnax', and Garden City Seeds' 'Vita Gold' tomato. Johnny's offers 'Raven' zucchini, which boasts a high lutein content. Health-minded gardeners may also select Territorial Seed Company's 'Nutri-Red' carrot which contains the anti-oxidant lycopene, and 'Doublerich' tomato which provides twice the normal level of Vitamin C. Many more varieties with improved nutritional value will be showing up in seed catalogs soon.

Plant breeders are adding considerable weight to Mom's chant of "Eat your vegetables!"

—Rita Pelczar

Genetically Engineered Plants

Genetic engineering is the process of introducing a foreign gene for a novel trait into a host cell. This can be accomplished in several ways; currently, the most efficient technique uses a tool known as a "gene gun." In a pressurized tank, microscopic DNA-coated gold beads are forced into the host plant cells. If successful, the cell will grow into a complete plant and all of the cells of this "transgenic" plant will contain the foreign gene and express the novel trait.

Transgenic plants that are resistant to fungi and bacteria have been produced by the introduction of chitinase and lysozyme genes from rice and viruses. These genes provide the genetic information necessary for creating enzymes that kill fungi and bacteria by digesting their cell walls. Rose plants containing a chitinase gene from rice have displayed up to a 43 percent reduction in the incidence of the fungus-caused disease, blackspot.

In one of the most amazing uses of genetic engineering, genes from arctic flounder have been used to develop frost-resistant plants. A flounder gene that triggers the production of a protein that inhibits ice crystal formation was introduced into tomatoes. In the resulting transgenic tomatoes, ice crystallization was inhibited. This gene is expected to help prevent freezing damage, and frost resistant plants could be available by the end of the decade.

Genetic engineering has also been used to modify plant growth and development. Hormonal genes from *Agrobacterium rhizogenes*, a bacterium that causes hairy root disease, were

used to enhance the rooting of rose cuttings by 300 percent by increasing the plant's production of auxin—a phytohormone that stimulates rooting. Another very successful application is in extending flower longevity. With the insertion of a gene that inhibits flower aging, carnations displayed a 200 percent longer vase life. The same gene introduced into wishbone flower (*Torenia* sp.) increased flower life in the garden by over 200 percent.

There are many examples of transgenic plants resulting in novel flower colors. A gene from petunia was responsible for producing violet-blue carnation flowers. A gene from corn was inserted into a petunia to create unique violet-red flecking, shown at left.



The holy grail for genetic engineers of ornamental plants is the blue rose.

It was relative easy to engineer a blue carnation; only a single gene was required. The difficulty in engineering a blue rose is that several different biochemical processes must be modified. In addition to modifying the pigment, cellular pH needs to be made more alkaline. Though not available today, the identification and isolation of genes that modify cellular acidity are anticipated within the next few years. Once such genes are available, it will be easier for breeders to create custom-colored flowers.

—Robert J. Griesbach

Plant breeder Robert J. Griesbach conducts genetic breeding research for the USDA's Floral and Nursery Plant Research Program at the Beltsville, Maryland, laboratory of the U.S. National Arboretum.

Continued from page 18

vent of hybrid varieties in the 20th century, the latter may be the focus in the future. Thus developing crops that will thrive on land now considered marginal or unusable for agriculture has become a critical goal of plant breeders, explains James Moore, professor emeritus of the University of Arkansas. "Changing the plant genotype [genetic make-up] through breeding," says Moore, "will be a key component in this technology."

The Improvement Process

Identifying the particular quality that will lead to an improved variety is the first step in a plant breeding program. The next is locating a source of that characteristic, and transferring it to a plant that displays all other desired attributes. Said fast, sounds

easy; in reality, this requires careful research, a thorough understanding of breeding techniques, a keen sense of observation, and the patience of Job.

It is the methods for obtaining the desired trait and transferring it to a specific plant that have changed most dramatically in the last 30 years with the development of biotechnology. Until recently, plant breeders developed new varieties by crossing and backcrossing parent plants—nearly always members of the same species—to obtain desired traits. Chance or induced mutations provided further sources of new characteristics. But until the advent of technologies such as tissue culture and gene splicing, transferring traits between plants depended on their sexual compatibility.

While advances in genetic engineering have made it relatively easy to transfer

genes between otherwise incompatible organisms, finding and isolating the gene responsible for a specific trait is still often a troublesome task for molecular plant breeders. Robert Griesbach, a plant breeder at the USDA laboratories in Beltsville, Maryland, notes that "it is relatively easy to physically introduce a foreign gene into a host plant, but difficult to identify the appropriate gene to introduce, and even more difficult to obtain that gene."

Mirroring the efforts of the Human Genome Project, which is attempting to map the entire human genetic code, plant geneticists have made great headway toward determining the complete DNA sequence of *Arabidopsis thaliana*, a modest meadow weed. *Arabidopsis* was selected for this purpose in part because it has the smallest number of genes of any known plant. "Once this sequence is obtained," Greis-

bach explains, "it will be much easier to identify and isolate genes, as well as understand the basic molecular processes that controls growth and development in higher plants."

Progress or Problems?

Bt potatoes. Roundup Ready corn. Terminator technology. The development of genetically modified organisms (GMOs) has stirred controversy among scientists and consumers. How safe are these crops? Are they the solution for world hunger? What effect will they have on the environment? These are just a few of the questions that have arisen since GMOs hit the market in the mid-1990s. The issue is complex, exemplified by the use of a gene from the bacterium *Bacillus thuringiensis* to produce Bt potatoes, followed by similarly pest resistant Bt corn and Bt cotton.

Bacillus thuringiensis has long been used as a topical biological insecticide for control of the Colorado potato beetle. It produces a toxin that is lethal to the beetle, but it does not persist for long. Genetic engineers theorized that splicing the gene for the toxin directly into the potato plant would protect it from the pest without the need for sprays. Detractors of this gene transfer ask whether such plants are



USDA technician Christine Berry monitors genetically engineered peach and apple trees propagated by tissue culture in the laboratory.



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safe for human consumption, what effect will they have on non-target insects, will it lead to resistance to the pest, and what are the long-term ramifications of combining such genes from unrelated and sexually incompatible organisms? These questions, unanswered to the satisfaction of some consumers and environmentalists, spurred international reaction, especially when it was determined that many processed foods such as corn syrup, cereals, and potato chips were being produced from genetically altered crops.

In Europe, consumer concern over the use of genetically modified plants in foods escalated to the point that two food processing giants, Nestlé and Unilever, announced last year that they would no longer accept transgenic crops for their European foods. Two of Japan's largest beer makers, Kirin and Sapporo, followed suit, as did the largest tortilla maker in Mexico. The economic impact on growers of transgenic crops has been substantial.

In the United States today, genetically altered crops are used in many processed foods. Labeling to distinguish genetically altered sources from conventional sources is not required. The feared dangers of genetically modified foods have spurred research to confirm or deny the concerns.

Tradition and Technology

Insight into the debate regarding molecular genetics and its effect on the plants we grow can be gained by examining how it differs from traditional—classical—breeding methods. What does it offer that classical techniques do not?

Griesbach suggests that the difference between classical and molecular breeding lies in how a trait is defined. For example, flower color is defined as a color detected by the human eye in a classical breeding approach. In molecular breeding, however, flower color is defined as a series of chemical reactions leading to the biosynthesis of a pigment. While classical breeding relies upon selecting plants with different gross characteristics, molecular breeding relies upon selecting plants with different molecular characteristics.



Dan Heims, left, owner of Terra Nova Nurseries in Tigard, Oregon, uses tissue culture to bring new ornamental plants to gardeners much faster than can be achieved by conventional propagation techniques. Potential introductions derived from occasional mutations that occur during tissue culture are tested in Heims' trial fields, above.

Tom Leustek, associate professor of biotechnology at Rutgers University, says the difference boils down to one word: precision. He compares the methods using the analogy of finding a needle in a haystack. According to Leustek, classical plant breeding "is literally like searching straw by straw for the needle. Genetic engineering is analogous to knowing precisely where the needle is."

While he acknowledges that genetic engineering offers tremendous new possibilities, Mark Bridgen, professor of plant science at the University of Connecticut, notes that "it will take some time before these abilities will be fully realized because of legal issues, moral issues, and—probably more importantly as a breeder—the ability to find and incorporate these genes into plants." Bridgen adds, "If the protocols for incorporating genes are known, then the trait can be developed much faster [using molecular breeding techniques] than through traditional breeding. However, as a classical breeder, we can use traits

that have laid recalcitrant to produce beautiful plants—even if it takes longer."

Classical and molecular breeding researchers approach plants from different perspectives, according to John Navazio, vegetable breeder for Alf Christianson Seed Company in Mt. Vernon, Washington. "The notion that a plant breeder chooses only one trait worth improving and the rest of the genotype remains static is very foreign to classical plant breeders," he asserts. While molecular geneticists work with one single-gene trait at a time, Navazio says that "most successful classical plant breeders working on food or fiber crops are selecting for a minimum of eight to 10 traits simultaneously. You're working on a symphony of traits; you have to be the conductor that brings all those traits together." He further offers that most of the important traits in agriculture are determined by multiple genes.

Impact of Tissue Culture

Years ago, when a plant breeder developed a new daylily or hosta, it took years before

sufficient stock was produced to bring it to market. With the advent of tissue culture propagation—producing an entire plant from a few cells of the parent under controlled, sterile conditions—thousands of new plants can be vegetatively propagated in a matter of months, often at a significantly reduced cost. Orchids representing complex crosses that were phenomenally expensive to reproduce because they did not breed true from seed, are now being inexpensively “cloned” through tissue culture techniques.

Terra Nova Nurseries in Tigard, Oregon, specializes in tissue-culture-propagated perennials, many of which are the product of the nursery’s own breeding program. “It is the use of tissue culture that skyrockets the plant into sudden availability in a single year, whereas conventional propagation could take three to five years to produce the same number of plants,” says owner Dan Heims.

Cell mutations are common in tissue cultures; this can be frustrating to someone trying to reproduce a crop exactly, but it is grist for the mill of the plant breeder. It is from these mutations that many new varieties arise. Mutations that occur as a result of tissue culture are known as somaclonal variations, explains Bridgen, whose work focuses on hardy and fragrant Peruvian lilies (*Alstroemeria* spp.). For Bridgen, these variations have been the source of numerous useful traits including pest tolerance, variegation, height control, and double flowers. “You can take natural characteristics that have been ‘dormant’ for years,” he says, “and revive them [with the aid of] somaclonal variation.”

Cell Fusion

Cell fusion is a technique made possible through tissue culture. It involves the union of two non-reproductive (somatic) cells from different organisms to create a replicating cell that contains the genetic information from both of the unrelated parent cells. Though these wide crosses are rarely stable, they provide a means for genes of different species to come together, for use in further breeding operations. Such combinations are otherwise impossible. While this technology suggests enormous potential for breeding plants in the

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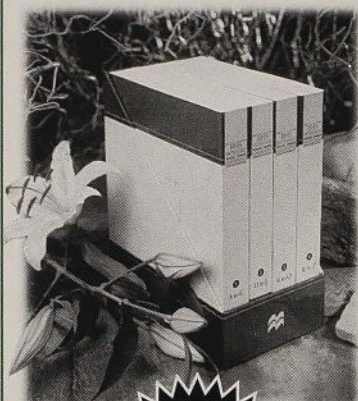
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future, some question both the morality and safety of the unnatural merging of genetic information that could potentially create new organisms.

Tagging the Trait

Mendel's groundbreaking research focused on visible, easily identifiable differences—tall or dwarf plants, smooth or wrinkled seed coat, yellow or green seeds—among his peas. Other characteristics that a breeder might strive to incorporate into a plant are not as easily perceived: a tomato resistant to fusarium wilt may look the same as one without resistance, at least until the disease strikes. By purposefully infecting test plants with a disease and selecting those that survive, researchers are able to identify those containing the resistant trait.

At the University of Arkansas' vegetable sub-station near Alma, vegetable breeder Teddy Morelock tests his spinach crosses on a nursery plot that has been used for growing the crop for 24 years. This "cess pool of spinach diseases" harbors nearly

every disease known to infect spinach in North America. By cropping breeding lines through this nursery, disease-susceptible plants are easily eliminated.

Many gardeners select the seed of their best plants to save for next year's garden. Perhaps one plant demonstrated a greater tolerance to heat, produced larger crops or bigger flowers, or bore fruit with better flavor than nearby plants of the same type. By saving its seed and planting it the following year future crops are more likely to exhibit the quality observed in the original plant. Selecting seed from plants that display specific traits is a long-standing technique that continues in breeding programs today.

But technology has made the process of selection faster and more exact. Plant breeders can now determine the presence of a desired—or undesired—trait using a method called marker-assisted breeding. This technique, says Leustek, "relies on the fact that traits are linked to specific DNA (gene) sequences, which can be used as markers. Breeders use the markers

to identify whether a trait has been transferred to progeny of a breeding experiment." This takes much of the guesswork out of selection and eliminates the need to grow the plant to maturity to determine if the cross was or was not successful. This is particularly important when working with trees and shrubs that may require eight to 10 years of growth before the success of a breeding effort can be effectively evaluated.

Merging Methodologies

Biotechnology has much to offer the field of plant improvement, particularly when combined with classical breeding methodologies. "Molecular genetics is a far bigger discipline than just genetic manipulation across species boundaries," states Navazio. "The information about the workings of DNA," he continues, "is incredibly important to classical geneticists like myself."

Biotechnology provides the means for the transfer of specific alien genes into a plant when natural barriers make

Resources

Applications of Plant Cell and Tissue Culture edited by G. Bock and J. Marsh. John Wiley and Sons, New York, New York. 1988.

Breeding Ornamental Plants edited by Dorothy J. Callaway and M. Brett Callaway. Timber Press, Portland, Oregon, 2000.

Breeding Your Own Vegetable Varieties: The Gardener's and Farmer's Guide to Plant Breeding and Seed Saving by Carol Deppe. Chelsea Green, White River Junction, Vermont. 2000.

Plant Propagation: Principles and Practices edited by Hudson T. Hartmann. Prentice Hall, New York, New York. 1996.

Plants for the Future: A Gardener's Wishbook by Jerome Malitz. Timber Press, Portland, Oregon, 1996.

Principles of Plant Breeding by Robert W. Allard. John Wiley and Sons, New York, New York. 1999.

Return to Resistance: Breeding Crops to Reduce Pesticide Dependence by Raoul A. Robinson. AgAccess, Davis, California, 1996.

this otherwise impossible. It allows the rapid and accurate determination of the presence of a trait in a new cross. And it opens doors to new possibilities for controlling plant diseases and pests, as well as increasing tolerance to environmental stresses. "However, the ultimate worth of a cultivar," says Moore, "is determined by thousands of genes working in harmony, and it will be the role of plant breeders to mold the genetic diversity created by biotechnology into usable cultivars."

Rita Pelczar is associate editor of The American Gardener.

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PATHS DRAW YOU into a garden, move you through a garden, and form a constant pattern as important as walls and arbors. Their lines and materials, when chosen with consideration, anchor and complement the more mutable plants, and remain ornamental even when the garden is



Gardens divided into areas with distinctly different themes often include a variety of path styles. At the Bishop's Close garden in Portland, Oregon, a straight brick walkway traverses a formal garden, above left, while a curving stone path leads into a woodland garden, left. Above: A flagstone path blends well with stone walls and steps in this garden.

dormant. Behind the scenes, paths also play a critical role in allowing passage through the garden for maintenance. Yet these important landscape features are often afterthoughts in the process of creating a garden.

Look to your garden's style to determine the nature and composition of your paths. If the style reflects the setting of the surrounding landscape, and you design your paths to complement your garden style, the overall picture will be harmonious.

For instance, a garden set in a New England landscape with natural rock outcroppings lends itself to stone paths, while a woodland garden in the Pacific Northwest suggests trails covered with shredded bark or pine needles. In a meadow garden, a simple mowed grass path is best suited to the informal style; in the Southwest, a path of gravel or packed earth may be most appropriate. Seeking out indigenous materials to build your paths is one way to ensure they reflect your regional setting.

Larger gardens that encompass a medley of styles and themes or are divided into a sampler of garden rooms may call for a variety of path styles and materials. The Bishop's Close at Elk Rock, a public garden in Portland, Oregon, contains formal brick paths close to the main building, a gravel path edged with brick near the herb garden, and casual paths of crushed rock in the outlying areas.

FORMAL GARDENS NEED FORMAL PATHS

CLASSIC FRENCH AND ITALIAN gardens are the epitome of formal style; lines and shapes are as crisp and clearly delineated

as architecture. Hedges are strictly clipped, trees are often pleached—sheared to form a high wall of foliage—or espaliered, and beds are meticulously edged with dwarf boxwood. Yews and cypresses are carved into geometrical columns and obelisks, and deciduous trees are planted in long avenues that lead the eye in straight lines.

Paths in such gardens usually follow suit, often forming long axes like backbones, with symmetrical beds that mirror each other on either side. Paths enhance the formality by clearly defining areas of the garden.

If your garden's style leans toward these formal elements—symmetry, crisp lines, and carefully shaped plants—it would be wise to lay out the paths similarly, letting the lines be strong and straight when possible. Where curves are preferred, draw them boldly in large sweeps, without any fussy wiggles. The hallmarks of formality are simplicity and clean lines.

The best materials for paths in formal gardens are cut stone, poured concrete embedded with aggregate, brick, or trimmed grass. All of these can be used to form relatively smooth surfaces with strong, simple lines. Straight paths will naturally become the perimeters of square or rectangular beds and borders, while those that angle off on the diagonal will frame diamond-shaped or triangular spaces within their boundaries, so that the entire garden design benefits from a strict geometry.

Cut stone makes the most elegant path, because the edges are clean and the stones can be laid in a tight, almost seamless pattern. The advantage of concrete with mixed aggregate is that it can be easily poured into straight-sided frames. Mixed aggregate tones down the reflectivity of plain concrete and adds a subtle texture as well as traction.

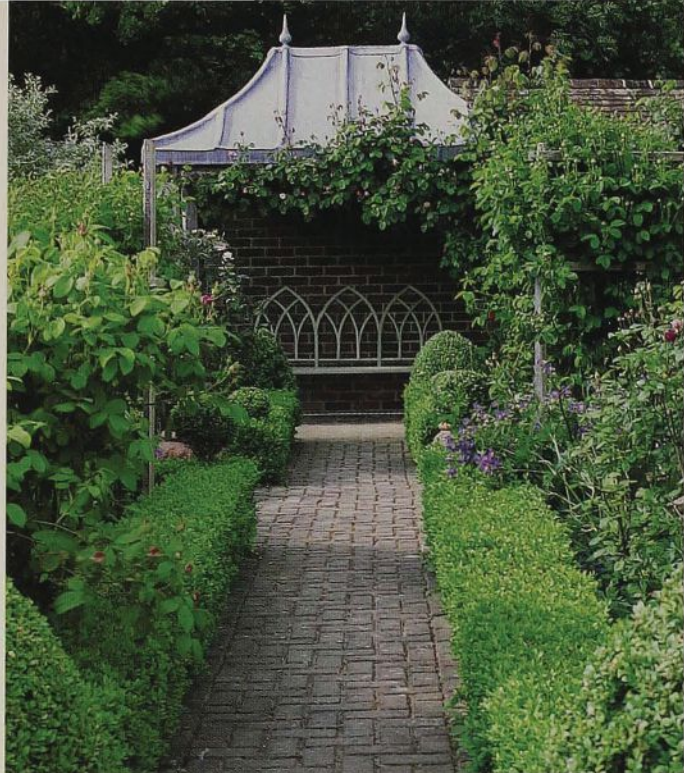
Brick also lends itself to a formal garden, especially if it matches your home's facade. If your house is brick but you prefer a concrete or exposed aggregate walkway, you can tie in the path by embellishing it with a brick edging. Avoid using brick in very shady places, however—especially in regions with wet climates—for it will remain damp and slippery.

Neatly trimmed grass paths can be very attractive between formal English-style perennial borders, making a refreshingly green counterpoint to the colorful flowers. A mowing edge of brick or poured concrete will make such paths easier to tend and also keep the grass from growing into the beds.

Neatly trimmed grass paths can be very attractive between formal English-style perennial borders, making a refreshingly green counterpoint to the colorful flowers. A mowing edge of brick or poured concrete will make such paths easier to tend and also keep the grass from growing into the beds.

THE PATH TO INFORMALITY

INFORMAL GARDENS—SUCH AS cottage, woodland, or meadow—are more relaxed in their lines and shapes, following nature's gentler lines. For example, rivers flow in curves, mountain trails meander along, and woodland paths wind their way between stout tree trunks. Similarly, the paths of a cottage gar-



Depending on how it is used, brick can be the perfect path material for both a carefully manicured formal garden, left, and the untamed exuberance of a cottage garden such as the one above.

den are more likely to amble gracefully through the garden in curvilinear fashion, embracing circular, oval, and loosely shaped beds within their lines.

Irregularly shaped fieldstones, brick, cobbles, crushed rock, bark mulch, or wood chips are suitable path materials for informal gardens. Easily shaped into curves that follow the natural contours of the site, these materials also provide more detailed textures. Informality is also an invitation for innovation and creativity; in a cottage-style garden at a beachside vacation house, a path of sand or crushed oyster shells can be a simple and elegant acknowledgment of a sense of place.

Softened rather than crisp edges are hallmarks of informal paths, so allow a gentle transition between paths and beds. To accomplish this, you can trace the edges of paths with rounded river rocks or weathered logs, or allow low-growing plants to blur the boundaries by encroaching upon the path.

Grass paths are also suited to informal gardens, especially as arteries that branch off an expanse of lawn. To keep grass paths

tidy and emphasize the bed shapes, edge them with brick—which will also serve as a firm mowing edge—or regularly maintain the edges using a string trimmer.

WOODLAND PATHS

IN A WOODLAND GARDEN, paths covered with shredded bark, wood chips, or pine needles are most in keeping with the informal setting. A woodland is the perfect place for a meandering path that wends its way among trees and shrubs and allows visitors to come suddenly upon specimen shrubs or treasured plantings of perennials growing close to the path. Consider placing plants with sweet-scented flowers such as sweet box (*Sarcococca* spp.) and witch hazels (*Hamamelis* spp.) near the path, where visitors will catch intriguing wafts of fragrance as they walk by.

Herbaceous perennials with mounding or pooling habits—barrenworts (*Epimedium* spp.) and woodland phlox (*Phlox divaricata*), for instance—are an inviting touch along the edge of a path; be sure to allow some room for these plants to spill over onto the path from place to place. Plants such as hostas and ferns with variegated or textured foliage help provide interest along the path in summer after spring-flowering perennials have died back.

Woodland gardens are also ideal places to provide a resting spot for visitors to pause and contemplate their surroundings, so consider carving out broader areas of the path where rustic log benches can be sited. Another way to add interest is to have a path diverge around a narrow island bed; this provides a setting for creative vignettes of plants that can be seen from various angles.

Crushed rock paths embedded with irregularly shaped rocks to add interest and serve as stepping stones are ideal for navigating rock gardens. These paths should flow through the plantings so that visitors can get close enough to get a good look at the many small treasures such gardens usually contain.



A meandering grass path entices visitors into this meadow.

MEADOWS AND BOGGY AREAS

GARDENS WITH NATURALISTIC features such as meadows or wetlands call for paths that are both functional and natural looking. Regular foot traffic through a meadow may keep a wide enough path open for single-file visitors, but if you have a large or less frequently visited meadow, it is probably best to mow your path regularly. A gently curving path winding through a meadow creates an inviting maze that will delight children who can barely see over the top of the meadow plants. If you live in an area where Lyme disease or other tick-borne ailments are prevalent, make sure the mowed path is wide enough that walkers can avoid contact with the underbrush.

If you have a wetland garden or a boggy area that you like to walk through, a ramp or boardwalk of preservative-treated or plastic lumber is the best way to provide firm footing. Stepping-stones may be an option if the ground is only slightly wet, but are likely to sink too deeply in really soggy soil.

MARKING TRANSITION POINTS

WHERE PATHS MEET UP WITH other paths or sidewalks, it can be helpful to provide visual and textural cues that there is a transition in materials or a change of garden settings. Where the lawn meets up with a path paved of stone or crushed rock, sinking several flat irregular rocks flush with the lawn at the transition point marks the entry to the path nicely. Stone stands out enough in texture and color to make a visual impression, and you can hear the difference when stepping from soft turf onto solid stone—a path informs your ears as well as your feet of imminent changes.

Where a brick path joins a flagstone patio, a transition zone of mixed stone and brick will prevent a jarring contrast between mediums. Sometimes small, purposeful touches can make all the difference.

Resources

Complete Home Landscaping by Catriona Tudor Erler. Creative Homeowner, Upper Saddle River, New Jersey. 2000.

Garden Paths: Inspiring Designs and Practical Projects by Gordon Hayward. Firefly Books, New York, New York. 1997.

Paths and Walkways: Simple Projects, Contemporary Designs by Hazel White. Chronicle Books, San Francisco, California. 1998.

Taylor's Master Guide to Landscaping by Rita Buchanan. Houghton Mifflin Company, Boston, Massachusetts. 2000.



In this Asian-inspired garden, a flagstone embedded in gravel serves as a visual cue that a transition is occurring in path materials.

PRIMARY AND SECONDARY PATHS

THINK OF THE PRIMARY PATHS AS the main walkways of the garden that take you to destinations near the house—the patio, the potting shed, and main beds and borders within view. Be generous with the width of these paths; they should be at least four to five feet wide, ample for two people to walk side by side. Wider is better than skimpy, especially if plants are going to spill over the edges.

Secondary paths lead to more outlying areas—say, the compost pile, the vegetable garden, or a secret garden behind a hedge. These need only be wide enough for a person walking single file or navigating a wheelbarrow—at least two feet. The narrowness of secondary paths encourages us to slow down and notice details that might otherwise be overlooked, such as the fragrance of dangling wisteria blossoms or the silky trunk of a ribbon-bark cherry.

Outlying paths can be made of rougher materials such as bark mulch, crushed rock, recycled brick, cobbles, stepping-stones, or even broken-up chunks of sidewalk. Steppingstones should be large enough for an adult's foot, and spaced two feet from center to center. I make my outlying paths from the free chips that tree services deliver. If your path will be used for wheelbarrow traffic, consider how easily a full load will travel over the path material.

Secondary paths are especially useful behind beds and borders, between beds and hedges, and within very large beds for maintenance access. To avoid compacting the soil, create narrow paths of steppingstones or bark mulch that enter large

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SIMPLE STEPS FOR LAYING A FLAGSTONE PATH

A flagstone path set in a bed of stone dust or sand is durable, attractive, and suits a variety of garden styles. What's more, it's a relatively easy project. The bed for the path should be about six inches deep—deeper if drainage is a problem in your garden—to allow for a thick layer of sand.

To find a local supplier of flagstone and stone dust, look in the Yellow Pages. The supplier can help you determine how much stone you'll need based on the square footage of your path. Select stones of various shapes and sizes that you can reasonably fit together in your path.



WHAT YOU'LL NEED:

- String or chalk for marking path
- Carpenter's level
- Stone dust or sand
- Flagstones
- Landscape fabric
- Utility knife for cutting fabric
- Shovel
- Broom
- Tamper
- Watering hose
- Work gloves



1. Use string or chalk to mark the outline of the pathway on your property. Use a shovel to dig out the path to a depth of 6 inches—or more, where drainage is poor.

To suppress the growth of weeds, lay permeable landscape fabric to fit in the bottom of the pathway, as shown. Shovel 3 to 4 inches of stone dust (or sand) on top of the fabric. Use a tamper to firm the layer.



2. Wearing gloves to protect your hands from abrasion, lay the flagstones on top of the stone dust, adjusting as needed for fit and level. Check the level of the stones periodically with a carpenter's level and adjust the height of individual stones as needed by adding or removing stone dust beneath the stones. The stones will settle slightly over time, so set them just a bit higher than ground level.



3. When all the stones have been arranged in the pathway, shovel stone dust over the stones a section at a time and use a stiff broom to sweep the dust into the spaces between the stones. Be sure to use enough stone dust to fill the spaces flush with the upper surface of the stones.



4. Use a blunt tool to pack the stone dust between the stones, eliminating air pockets. For this task, the handle of a shovel works well. Add more dust where needed.

When the path has been filled, hose it down lightly to settle the dust. Let the path dry for several hours, then pack down more dust where needed.

Comparing Path-Building Materials

Cost and ease of construction are important considerations in choosing path materials. Even if you intend to construct a path yourself, materials such as stone or brick are much more costly than gravel or mulch. And large pieces of flagstone can be very heavy. Another consideration with brick or stone is whether to set the paving material in tamped sand, rock dust, or a more permanent base of concrete. Building a formal path of cut stone or brick is much more time consuming and technically demanding than creating a grass, gravel, or wood chip path or simply inserting steppingstones into turf. —B.B.A.

Material	Cost	Pros	Cons
Bark mulch	inexpensive	easy to create, good for temporary use	needs to be replaced annually
Brick	moderate	durable	fairly difficult to install, slippery when wet
Ceramic or terra cotta tile	very expensive	variety of styles	slippery when wet, may not hold up well in harsh climates
Concrete pavers	moderate	low maintenance	not aesthetically appealing
Crushed rock (aggregate)	inexpensive	easy to create, packs down better than gravel	needs edging to keep it from spreading into beds
Flagstone	expensive	natural look, durable	fairly easy to install in sand, difficult to install in concrete
Grass	inexpensive	easy to create, restful to walk on	needs regular maintenance, not suitable for heavily trafficked areas
Gravel	inexpensive	easy to create	spreads easily into beds or grass, shifts underfoot
Interlocking pavers	moderate	moderately easy to install, durable, variety of styles	will not appeal to everyone
Preservative-treated lumber	moderate	moderately easy to create	can be slippery when wet
Wood chips	inexpensive or free	easy to create	can be messy, shifts underfoot

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beds on the diagonal, making it much easier to weed and groom the interior plants.

LAYING OUT YOUR PATHS

ONE WAY TO TRY OUT different path patterns is to lay out the garden on paper. You can make a rough sketch of the property by eyeballing the shape and the distances between boundaries, main structures, patios, beds, borders, and noteworthy trees and shrubs.

To draft a plan to scale, measure the garden with a tape or wheel, starting with the house and property lines. Pin down the exact location of significant structures and plants by measuring the distance from each object to two other fixed points. Then draft an aerial plan using a scale or a ruler, and graph or blueprint paper. Once your plan is completed, lay sheets of tracing paper over the top and experiment with an assortment of path shapes.

To draw curved paths easily, purchase an 18-inch-long piece of flexible rubber in a drafting supply store. Bend it into a variety of S-shapes and C-shapes, then trace the form you like best onto paper. You can also sketch curves freehand or use a piece of yarn.

I find it easier to envision paths right out in the garden. Straight paths can be laid out using stakes and string to mark the way. For curved paths, hoses left to warm in the sun make great flexible guides. I tweak the hose into just the right shape, moving it around so that I can check out the curves from different points of view, even going inside the house to see how paths look from the windows. You can also use spray chalk, or sprinkle flour or sand to draw the lines of a path.

Let the path pattern rest for a few days and consider it from all angles to make sure that it flows well and is in good proportion with nearby structures, beds, and borders. Walk the path a few times, and move a folding chair around to try out likely sitting spaces. Assess both the utility and beauty of the path before implementing your plan.

Whether your path is simple or elaborate, let it express your unique garden design. Make it safe underfoot and in keeping with your garden's style. Planned well, it will invite you and your visitors on a guided tour that is eventful through all the seasons.

A garden designer and writer, Barbara Blossom Ashmun lives in Portland, Oregon. Her most recent book is Garden Retreats, Creating an Outdoor Sanctuary, published this year by Chronicle Books.

BY KARAN DAVIS
CUTLER

The Greening of ZOOS


Gardeners can get some wild ideas about plants from zoo exhibits.

THE PLANTINGS AT THE entrance are like those outside many Southern California attractions: familiar tropical and subtropical ornamentals, such as date palms, bottlebrush, and bougainvillea, underplanted with bird of paradise, African lilies, and a mix of common bedding plants. Then your eye shifts to the two 20-foot-tall olive-skinned topiary elephants guarding the front gates. Welcome to the self-titled World Famous San Diego Zoo!

This whimsical blend of flora and fauna epitomizes a new truth: Zoos aren't just for animals any more. Most zoos—and San Diego has been a leader in this trend—are becoming botanical as well as zoological collections. In San Diego's case, 4,000 animals and 750,000 plants coexist on 100 acres. The zoo and the San Diego Wild Animal Park, its sister institution, are vis-

ited by more than five million people each year. Visitors do the most ohhhhhhing and ahhhhhhhing over giant pandas, boa constrictors, and cheetahs, but, whether they realize it or not, the plant displays are an important part of their overall experience.

The zoo's botanical residents play a multitude of roles. Blossoms create the most immediate impact, so the zoo's Web site alerts visitors to a few of the species that are blooming at any given time. A sampler might include coral trees (*Erythrina* spp.), flame vines (*Pyrostegia venusta*), and aloes in January; tower tree (*Schizolobium parahybum*), Chinese fringe trees (*Chionanthus retusus*), and blue glory bower (*Clerodendrum ugandense*) in April; and strawberry trees (*Arbutus unedo*), slipper orchids (*Paphiopedilum spicerianum*), and tea tree (*Leptospermum scoparium* 'Ruby Glow') in October. The sur-

A photograph of a gorilla in a lush green habitat. The gorilla is in the center, looking towards the camera, surrounded by dense foliage and tall grasses. The lighting is natural, highlighting the textures of the gorilla's fur and the surrounding plants.

Designing animal habitats appealing to humans yet tough enough to survive the day-to-day activities of animals such as this gorilla at the San Diego Zoo is one of the many challenges zoo horticulturists face.



Among the many naturalistic animal habitats at the San Diego Zoo is the Rain Forest Aviary, left. Among the zoo's more than 3,500 orchids is *Encyclia prismatocarpa*, below.



with environments more like those from which they came was simply good business.

The brainchild of local surgeon Harry Wegeforth, San Diego's zoo

was one of the 20-odd American zoos founded in the early 1900s. Although the zoo initially followed traditional practices, Wegeforth was soon inspired by new German zoos that promoted naturalistic exhibition areas and substituted moats for bars. It was the start of the greening of zoos everywhere.

ZOOSCAGING CHALLENGES

LOCATED IN an up-and-down mix of canyons and mesas, the San Diego Zoo's site was nothing but scrub-covered chaparral in 1916, according to horticultural manager Mike Bostwick, who has been at the zoo for the last 25 years. Today, a lush mix of exotic and native plants blankets the landscape. In addition to being a zoo, Bostwick explains, "we're an accredited museum with botanical garden status. We grow more than 6,500 species and have eight accredited plant collections: acacias, aloes, bamboos, cycads, erythrinias, ficus, orchids, and palms."

The orchid collection, largely housed in two greenhouses, includes 22 threatened or endangered orchid species. "We have about 3,500 orchids in 782 taxa. Some are so rare," Bostwick adds with a smile, "that we don't publicize the fact we have them."

However, most of the San Diego Zoo's flora—even its rare species—are incorporated in geographical simulations rather than gathered in taxonomic collections. One hundred ninety-two taxa of palms, 102 taxa of aloes, and 77 taxa of cycads are scattered throughout the zoo. The aim is to combine them and tens of thousands of other plants to create specific bioclimatic regions. It's called "environmental immersion" in the zoo world, and it produces a more natural home for the ani-

rounding flowers not only make visiting the Zoo more pleasant, they offer visitors from subtropical locales planting ideas for their own landscapes.

In addition to providing intrinsic beauty, the intensively planted grounds establish an exotic atmosphere, a wild setting that enriches the experience of seeing exotic animals and calls attention to the importance of habitat. And this zoo is a plant conservatory: Its enormous collection is used for propagating, teaching, and research and is available to students and scholars worldwide.

THE EVOLUTION OF ZOO GARDENS

PLANTS HAVEN'T ALWAYS been integral to zoos, which have evolved from motley collections of exotic animals kept on leashes or in cramped cages to the free-range "conservation centers" that delight

us today. The zoological garden in London's Regent's Park, which became the model for other zoos, dates from 1828. In the United States, the Central Park Zoo—now known as the Central Park Wildlife Center—opened in 1864. In 1868, it sent a pair of swans to Chicago's Lincoln Park, the genesis of the Midwest's first important zoo. Other cities followed: Philadelphia in 1874, Washington, D.C., in 1887, and the Bronx in 1899.

Because little was known about caring for exotic species, animal mortality was high in these early public zoos. Despite the work of organizations like the Wildlife Conservation Society—founded in 1895 as the New York Zoological Society—it was not a moral concern for animal well-being but the growing difficulty of obtaining new animals that led to more humane and enlightened zoo practices. Keeping animals healthy and happy by providing them

A Sumatran rhinoceros wades in a manmade pool in this lushly planted habitat exhibit at the Cincinnati Zoo.

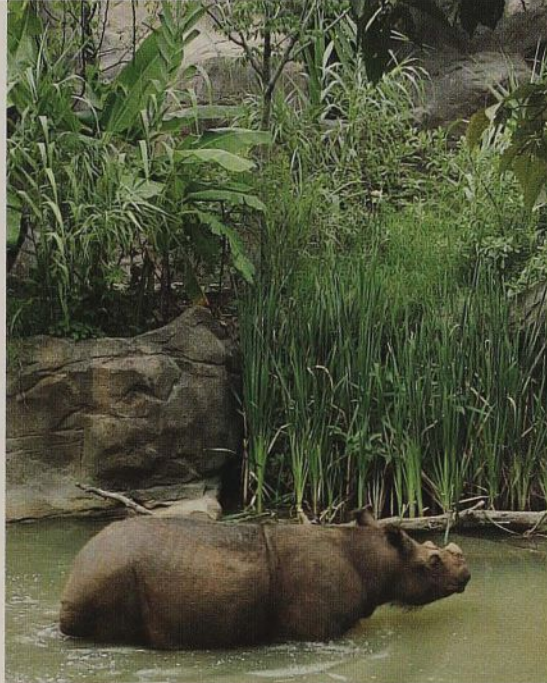
imals while giving visitors a sense of the habitat from which the animals come. "The zoo has 10 bioclimates," Bostwick says. "In each one we try to match plants and animals."

These are controlled wildernesses on a grand scale, larger and more exotic garden rooms than anything landscape designers Gertrude Jekyll or Vita Sackville-West had in mind, yet they follow guidelines familiar to home gardeners. Plants are used to establish perspective and boundaries, to create structure and atmosphere, to produce an organic whole. Additionally, Bostwick and his colleagues seek species that are culturally compatible and as pest- and disease-free as possible. Using toxic controls isn't an option in a landscape filled with irreplaceable animals and visited daily by thousands of people.

For example, in the zoo's Ituri Forest, a \$4 million-plus central Africa bioclimate that opened in 1999, spotted-necked otters swim in the stream, forest buffalos play in the mud, and monkeys cavort in the trees, all coexisting in a single enclosure.

The four-acre forest is landscaped with many species of bamboo, figs (*Ficus* spp.), bananas (*Musa* spp.), sausage trees (*Kigelia pinnata*), taro (*Colocasia esculenta*), wand lilies (*Ixia* spp.), papyrus (*Cyperus papyrus*), and scores of other African plants. Together, the plants and animals provide visitors with the sights, scents, and sounds of the jungle.

Similarly, Fern Canyon, a simulated rain forest begun in the 1930s, has the same multilayered structure as a true rain forest. Closest to the sun are large trees, such as the blue-flowered *Jacaranda mimosifolia* and tower tree (*Schizolobium parahybum*), which has yellow flower spikes. Beneath are the canopy plants, including Nikau palms (*Rhopalostylis* spp.), bo trees (*Ficus religiosa*), common figs (*F. carica*), Aus-



tralian tree ferns (*Cyathea cooperi*), and other mid-sized species that also support vines and epiphytes. The shady understory holds elephant's ears (*Alocasia* spp.), small palms (*Chamaedorea* spp.), ginger lilies (*Hedychium* spp.), and many species of ferns. The effect of this carefully manufactured bioclimate is altogether convincing.

FOOLING MOTHER NATURE

THE SAN DIEGO ZOO can create outdoor jungles and rain forests because a computer-controlled irrigation and misting system provides the necessary moisture—real rain forests receive more than

100 inches of rainfall per year—and because the zoo's location protects tropical plants against frost. For zoos in areas with less benign climates, ingenuity is required.

One solution to creating natural-looking habitats in colder areas has been to create indoor bioclimates. A good example is the Cincinnati Zoo's Manatee Springs, a 15,000-square-foot immersion exhibit that focuses on the diversity of Florida wildlife. Visitors follow boardwalks through simulated wetland and swamp ecosystems containing southern live oaks (*Quercus virginiana*), bald cypresses (*Taxodium distichum*), and water tupelos (*Nyssa sylvatica* var. *biflora*) festooned with Spanish moss. Below the trees grow native palms, pond apple (*Annona glabra*), switchcane (*Arundinaria gigantea* subsp. *tecta*), wax myrtle (*Myrica cerifera*), inkberry (*Ilex glabra*), and native grasses and wildflowers.

Cold-climate zoos that want to create tropical bioclimates outdoors must find hardy look-alikes for the tender plants they cannot grow. At Missouri's Kansas City Zoological Gardens, horticulturists have substituted sumacs (*Rhus* spp.), trees of heaven (*Ailanthus altissima*), and large-leaf magnolias (*Magnolia macrophylla*) for tropical species. Other temperate stand-ins for rain forest plants include bear's breeches (*Acanthus mollis*), Dutchman's pipe (*Aristolochia macrophylla*), catalpa (*Catalpa speciosa*), rose mallow (*Hibiscus*



Bamboo planted in the giant panda exhibit at the San Diego Zoo provides the inhabitants with a favorite foodstuff.

BROWSING THE ZOO

The term “browse” comes from the distinction between grazing and browsing animals. Grazers are herbivores like cows and sheep, which typically eat from ground-growing plants; browsers usually eat leaves, twigs, or bark from shrubs and trees.



San Diego Zoo staff prepare browse for resident giraffes.

The annual browse harvest numbers at the San Diego Zoo are staggering: more than 10 tons of bamboo for the two adult giant pandas, and 12 tons of ficus for the primates and tapirs (another 24 tons is sent to the Cincinnati Zoo to feed their Sumatran rhinos). Eucalyptus is harvested for the

koalas; acacia for the giraffes, gazelles, and antelopes; hibiscus (*Hibiscus rosa-sinensis*) flowers and mulberry (*Morus alba*) leaves for the douc and Francois’ langurs and the colobus monkeys; prickly pear cactus pads (*Opuntia ficus-indica*) for the Galápagos tortoises and Chacoan peccaries; palm fronds for the elephants; floss silk tree (*Chorisia speciosa*) for the sloths.

The browse list goes on and on, and harvesting is both a big and a daily chore. For starters, one browse worker is needed to oversee the growing, maintenance, and cutting of the bamboo for the pandas. Another staff member oversees the cutting of between 500 and 600 six-foot pieces of 36 different eucalyptus species for koalas each day. According to arborist Danny Simpson, “Every square inch on the zoo grounds that is available is planted for browse.”

At Walt Disney World’s Animal Kingdom™ in Lake Buena Vista, Florida, the principal browse is Carolina willow (*Salix caroliniana*), according to Horticulture Manager Wendy Andrew. “It’s pretty much accepted by all the herbivores,” says Andrew. The horticulture department has established fields of willow outside the park, using reclaimed water to meet the thirsty plant’s demanding water requirements. Because the willow is deciduous, winter browse is obtained from other plants, including Japanese blueberry (*Elaeocarpus decipiens*), a very attractive evergreen shrub or small tree that is used quite extensively in the park’s landscape. —K.D.C.

moscheutos), Virginia creeper (*Parthenocissus quinquefolia*), American basswood (*Tilia americana*), and oakleaf hydrangea (*Hydrangea quercifolia*).

Each new exhibit at the Bronx Zoo/Wildlife Conservation Park in New York City is designed to provide as authentic a habitat as possible. “It’s important that visitors get a sense of place, to understand the context in which the animals live rather than just see them as knick-knacks,” explains Robert Halpern, curator of horticulture. Halpern begins by consulting experts about the flora of the bioclimate to be re-created. “I listen to what our botanists say and then try to make what they’re telling me happen in New York.”

Despite efforts to provide an authentic environment, climate constraints often require compromises. “In the Congo exhibit, the genus *Aframomum* would be perfect,” says Halpern. “It’s native to West Africa, and it’s an important food plant for

both chimpanzees and gorillas.” But *Aframomum* turned out to be difficult to grow at the zoo. After considering several alternatives, Halpern finally settled on a calathea (*Calathea* sp.) he found at a nursery in Florida. Distinguished by intricately patterned, evergreen foliage, calatheas are native to tropical regions of Central and South America and are not hardy in New York, so Halpern grows them in containers that can be brought inside in winter. “It turned out to be a perfect substitute for *Aframomum*,” says Halpern.



Selecting plants for the Bronx Zoo’s African Plains exhibit was challenging.

COPING WITH WILD LIVES

AS IF CREATING exotic bioclimates weren’t challenge enough, zoo horticulturists also must find



Stumps, logs, branches, and other plant parts are often recycled as “furniture” or toys for animals such as these gorillas at the San Diego Zoo.

plants that can survive within the animal exhibit areas. However frustrating deer and rabbits may be in your garden, they don’t compare with dealing with giraffes and elephants. “It’s hard to keep plants alive in the exhibits,” says Danny Simpson, the San Diego Zoo arborist. “We use plants to establish boundaries, to screen, to support climbing and roosting, to provide shelter, shade, and entertainment.” Any plant within an animal’s reach is potential food, so before anything is planted the zoo must be certain of its safety.

Despite the difficulties, the zoo’s horticulturists have landscaped animal exhibits that previously were barren and replaced most plastic plants with the real thing. In some cases, plants must be wrapped, caged, or even hot-wired to prevent the animals from destroying them, but the staff is continually finding new and better ways to add plants to the animal compounds.

“To keep the giraffes from killing the winterthorn (*Acacia albida*),” Simpson

explains, “we set it just outside the compound—it’s within reach for grazing but protected enough so the trees can survive.”

Zoo horticulturists say habitat-based exhibits have improved the well-being of zoo animal populations. The neurotic behaviors characteristic of bored, caged animals are down, and birth rates are up. “Complex landscapes seem to give the animals so much more enrichment that we just don’t see the negative behaviors that were associated with old-style zoos,” says Wendy Andrew, horticulture manager at Animal Kingdom™ in Lake Buena Vista, Florida. “Visitors see a more complete picture, and the animals seem to be better adjusted. So it’s a win-win situation.”

A SELF-SUSTAINING ZOO

THE WEALTH OF plants is obvious to visitors who walk the San Diego Zoo’s tree-canopied paths, but what they don’t see is that this botanical collection is also a working farm. Each year, Simpson and his staff cut tons of plant material, or “browse,” for the animals to eat. “I’m sure we’re cutting the food bill by several million dollars each year,” Simpson estimates (see “Browsing the Zoo,” page 36).

Simpson and his staff also recycle plant material to create what he calls “furniture” for the animal compounds. “We use eucalyptus tree limbs, trunks, and stumps as toys for the elephants to push around or as climbing structures for the monkeys.”

“We try not to let anything go to waste. At the very least, we grind plant material into mulch.” The zoo, Simpson says, is moving toward self-sustainability.



A pair of giraffes dine on browse at Disney’s Animal Kingdom™ in Florida.

Resources

Bronx Zoo/Wildlife Conservation Park. (718) 220-5100; www.wcs.org/zoos.

Cincinnati Zoo & Botanical Garden. (513) 281-4700; www.cincyzoos.org.

Disney’s Animal Kingdom. (407) 939-2468; <http://disney.go.com>.

Kansas City Zoological Gardens. (816) 871-5700; www.kansascityzoo.org.

San Diego Zoo. (619) 231-1515; www.sandiegozoo.org.

Association of Zoological Horticulture.

Founded in 1980, the Association of Zoological Horticulture (AZH) promotes horticulture in zoos, aquariums, wildlife parks, and other living natural history museums. The AZH provides a vital forum for more than 400 horticulturists, landscape designers, and curators who specialize in animal habitats to share information and ideas about their profession.

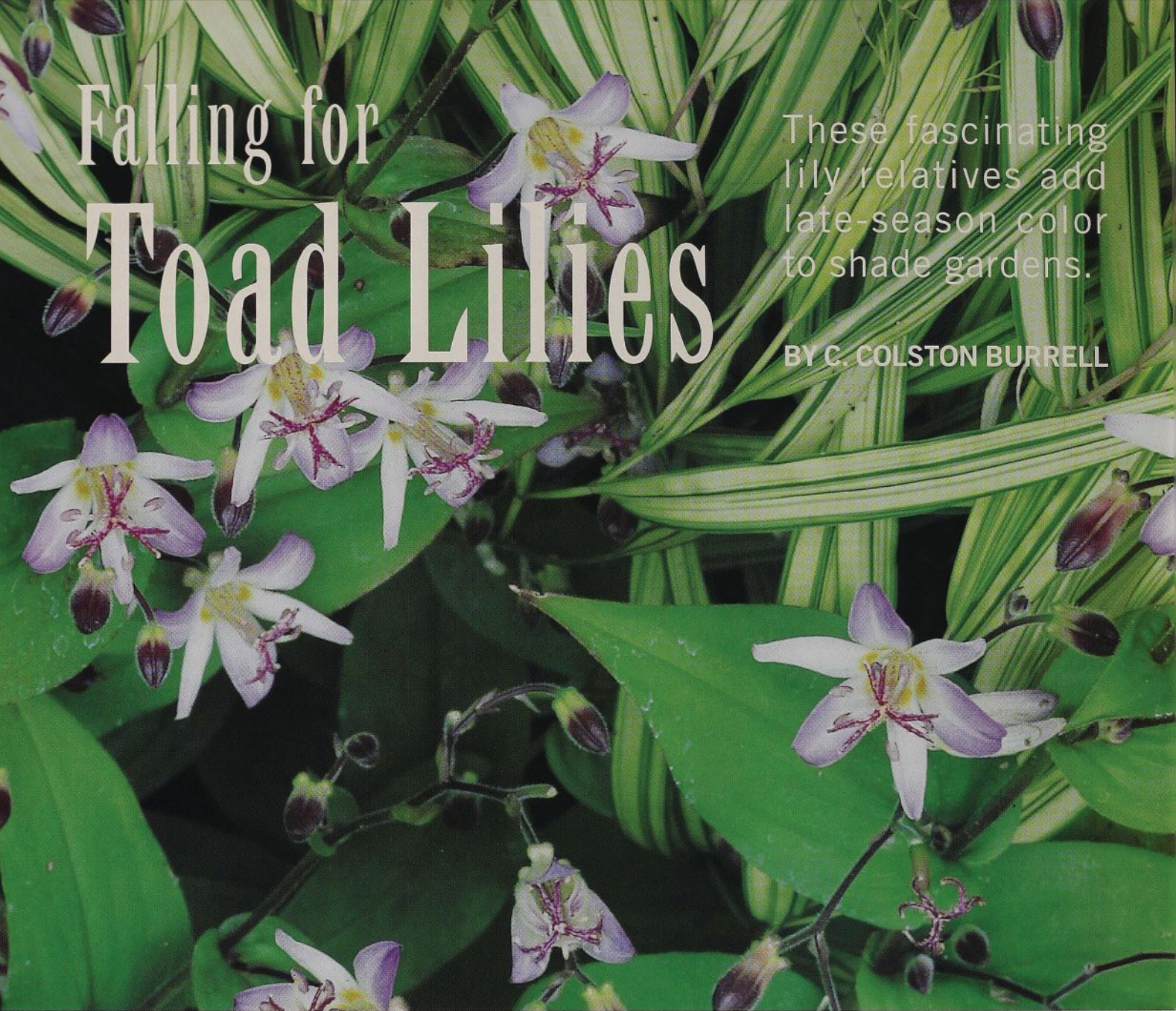
The organization’s 20th anniversary will be celebrated this year at its annual conference, to be held in New York City from September 30 through October 4. The keynote speaker is Peter H. Raven, director of the Missouri Botanical Garden.

For more information on the AZH or its upcoming conference, visit its Web site at www.azh.org, or contact Robert Halpern, Bronx Zoo/Wildlife Conservation Park, 185th & Southern Boulevard, Bronx, NY 10460.

Links to the organizations above can be found on the AHS Web site (www.ahs.org).

“What we do,” he adds, “is just another part of the larger movement to conserve animals, plants, and their habitats. We hope that when people come visit the zoo, they will enjoy seeing the plants as much as the animals—and also that they will be inspired to make gardens of their own.”

Karan Davis Cutler gardens in northern Vermont. Her most recent book, Herb Gardening for Dummies, co-authored with Kathleen Fisher, was published earlier this year by IDG Books.



Falling for Toad Lilies

These fascinating lily relatives add late-season color to shade gardens.

BY C. COLSTON BURRELL

IN FALL, THE LAST GLEAM OF color in my shaded woodland garden comes from lilylike flowers bearing the intriguing name of toad lilies. A somewhat eccentric genus of summer- and fall-blooming herbaceous perennials that spread by creeping underground stems, toad lilies (*Tricyrtis* spp.) are best suited to moist, shady garden sites. Most are cold hardy in USDA Zones 5–8 and heat tolerant in AHS Zones 9–4. Their exotic, speckled flowers are sometimes compared with those of orchids, but a closer look belies this first impression; toad lily flowers have a unique character all their own.

Some people find the flowers more curious than beautiful. “As garden plants, the toad lilies must rate among those subjects which we cultivate mainly for interest’s sake, for they can scarcely be called showy,” writes British horticulturist Brian Mathew.

A more generous assessment comes from British garden writer Christopher Lloyd, who in his refreshingly opinionated new com-

pendium *Garden Flowers* suggests toad lilies “tie in well with hellebores...and appeal to the same sort of people.” I *am* one of those people. Toad lilies appeal to both the collector and the designer in me. I value their compellingly curious floral diversity and the late-season color they offer in the garden.

FAMILY CONNECTIONS

SO HOW DID THESE BEAUTIES end up with a common name like toad lilies? One theory is that it’s because the foliage is mottled like a toad. Another links the name to the speckled flowers. It has also been reported that the name arises from the practices of an indigenous Philippine tribe, which reputedly rubs juices derived from toad lilies on their hands to help them attract and catch frogs. But recent research suggests this colorful interpretation of tribal practices may be apocryphal. The



Opposite: The variegated foliage of hakone grass (*Hakonechloa macra* 'Aureola') sets off the jewel-like flowers of the toad lily hybrid 'Tojen'.
This page: The striking blooms of *T. hirta*.



Japanese name for *Tricyrtis* is *hototogisu*, which means “the cuckoo,” and some growers prefer to use the common name cuckoo flower.

Once part of the crowded lily family (Liliaceae), the genus *Tricyrtis* has recently been moved into the lily-of-the-valley family (Convallariaceae) as part of an ongoing nomenclatural reorganization. The name *Tricyrtis* is derived from the Greek *tries*, meaning “three,” and *kyrtos*, which means “convex,” referring to the inflated sacklike structures that project from the bases of the three outer petals—technically “tepals” because they are an indistinguishable combination of petals and petal-like sepals.

The genus’s half-inch- to two-inch-wide spotted or banded flowers can be upward facing or nodding. The six showy tepals are held around a central column. This column, which usually projects above the tepals, holds the reproductive structures. The style has three divergent lobes, each ending in a forked stigma. These lobes are usually spotted and are covered with stalked glands in many species. Six projecting stamens carry the pollen-producing anthers.

The flowers are carried either in the leaf axils—nodes—on the upper half to third of the stem or in branched terminal clusters called cymes. Flattened brown seeds develop in elongated, slender capsules. The tall, arching stems are clothed

The drooping, bell-shaped flowers of *T. macranthopsis*, top, are distinctively different from those of other toad lilies. In its native habitat, right, *T. macranthopsis* grows near waterfalls or on moist hillsides, so it will do best in moist, humid garden settings.

in alternate, lance-shaped to oval leaves highlighted by prominent veins. Leaves and stems may be smooth or densely hairy. In some species, the leaves envelop or clasp the stem, while in others they are simply stalkless. For the most part, toad lilies have thick, tuberous roots from which slender, horizontal roots known as

rhizomes branch off. These extend underground to gradually form tidy clumps. But in a few species these rhizomes spread more aggressively and can create broad patches.

Botanists have identified 15 to 20 species of *Tricyrtis*, distributed in the Far East from Nepal to China, Korea, Japan, and the Philippines. Plants are found in rich, moist woodlands and on moist to wet seepage slopes.

TRICYRTIS SPECIES

HORTICULTURAL nomenclature is in a hopeless tangle for many genera, and *Tricyrtis* is no exception. This article attempts to present the correct names of the species as they are currently understood. Much of the credit for sorting out the species should go to Darrell Probst, a plant explorer and the owner of Garden

Vision nursery in Hubbardston, Massachusetts, who is growing all the species from wild-collected seed in an attempt to set the record straight.

The most in-depth review of *Tricyrtis* was done by Brian Mathew (see Resources, page 43), who divided the genus into four groups of species based on visual relationships of flower, foliage, and habit. Mathew’s treatment seems so logical that I have retained his divisions for the purposes of discussing the species.

DRAMATIC AND DIFFICULT

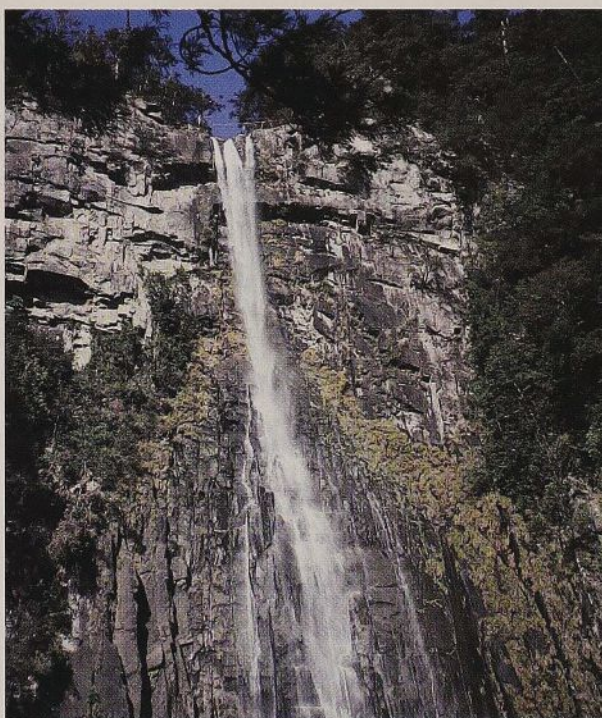
THE MOST DRAMATIC—and temperamental—toad lilies belong to the *T. macrantha* group. According to Probst, the members of this group are fairly easy to grow, but demanding moisture requirements “make it tough to get them to look good.”

The defining member of this group, *T. macrantha*, is a lovely but seldom encountered species that features floppy—botanists would term them decumbent—stems and broadly lance-shaped to oval, pleated leaves. Flowers are borne in the leaf axils along the upper third of the stem.

The best known and most coveted species in this group is *T. macranthopsis*, sometimes listed as a subspecies of *T. macrantha*. The glossy, pleated leaves are narrower and more pointed than those of the latter, however, and they clasp the long arching to decumbent stems. The one-and-a-half-inch yellow flowers are carried along the upper third to half of unbranched stems. Plants are native to seepage slopes and waterfalls where the roots are bathed with water, so success in the garden depends on consistent soil moisture and humidity.

WOODLAND ARISTOCRATS

THOUGH CURRENTLY little known, the aristocratic Japanese woodland natives that reside in the *T. flava* group are sure to become widely available in the near future. A few nurseries now carry *T. ohsumiensis*, which has stunning, soft butter yellow, cup-shaped flowers lightly dotted with brown. The flowers are carried in pairs or triads



“Their exotic, speckled flowers are sometimes compared with those of orchids, but a closer look belies this first impression; toad lily flowers have a unique character all their own.”

in the axils of the succulent, pointed oval leaves that curl around stout, 12- to 18-inch stems. Flowering time varies from late summer through October.

The diminutive *T. nana* grows to barely six inches tall. The compact stems bear several spotted, oval leaves that are widest near the tip. The inch-wide, flat to slightly bowl-shaped, pale greenish yellow flowers are lightly but evenly spotted red-brown. Plants bloom in late summer and early autumn. This species is hard to find, but a purple-leaved selection from Japan, often sold under the invalid name ‘Chabo’, will quicken the pulses of toad lily fans.

Though rare in its native Japan and very new in cultivation, *T. perfoliata* is a worthy garden plant highlighted by cascading stems that pierce the blades of the pleated, lance-shaped leaves. Showy upright, cup-shaped yellow flowers are borne in the leaf axils along the full length of the stems.

SUMMER FLOWERS

SUMMER FLOWERS are the signature of *T. latifolia*. The sole member of its group, it is sometimes listed under the pseudonym *T. bakeri*, due in part to variability over its wide native range in Japan and in China.

This species differs from other toad lilies not only in its July and August bloom period, but in the upright carriage of its funnel-shaped, purple-spotted yellow flowers in branched terminal clusters.

Early flowering and excellent cold hardiness—USDA Zone 3, with protection—have won this adaptable plant a permanent place in the hearts of northern gardeners who may lose blooms to frost with other species. Mottled rosettes of leaves emerge early in the spring, but the spotting is soon lost as the erect stems—clothed in oval, clasping leaves—elongate to their full height of two to three feet. The cultivar ‘Forbidden City’ is a striking selection with dark stems and a brown band marking each of the outer, triangular tepals.

FAMILIARITY BREEDS CONFUSION

THE GROUP *T. hirta* contains the best known and most horticulturally muddled species in the genus. These toad lilies share upward-facing, white to pale violet flowers heavily spotted with darker purple or deep red. Some species bear axillary flowers, however, while others produce terminal clusters. Individual flowers may be funnel shaped, or have tepals held flat or drooping.

The group’s namesake, *T. hirta*, has arching stems studded with jewel-like, purple-spotted flowers in the leaf nodes. The softly hairy, two-ranked, lance-shaped



Both *T. latifolia*, above, and *T. ohsumiensis*, right, have yellow flowers speckled with purple and brown spots, respectively. Summer-blooming *T. latifolia* is a good choice for northern gardeners because its floral display is not endangered by early frosts.

leaves clasp the two- to four-foot stems. Plants are late flowering, usually waiting until mid-September to bear their first blossoms. The selection ‘Miyazaki’ has large, heavily spotted flowers; ‘White Towers’ and ‘Albescens’ are unspotted, pure whites; ‘Alba’ is white with creamy spots; ‘Variegata’ is a strong grower with gold-edged leaves and purple-spotted flowers, similar to ‘Miyazaki Gold’. Despite hardiness to USDA Zone 4, plants are of dubious garden merit in the

north because early frost often damages flowers just as they open.

Native throughout most of Japan, *T. affinis* (synonym *T. parviflora*) is a perky little toad lily with erect, wiry, one- to four-foot stems loosely clothed in broadly lance- or oval-shaped, spotted leaves. The sparsely hairy foliage retains its spotting throughout the growing season, creating an attractive effect in combination with the characteristic flowers, which are flat and rather starry.

Though sometimes confused with *T. affinis*, *T. macropoda* (synonym *T. dilatata*) is taller than the former species—to three feet—and its flowers are carried in terminal cymes and in the upper leaf axils. The purple-blotched, white flowers of this handsome plant have fully reflexed petals, swept backwards like an upside-down cy-



clamen. The nearly oval, clasping leaves have undulating margins and are held perpendicular to the stem, giving the plant a statuesque look. This is one of the earlier blooming species with the first flowers often opening in July or early August.

The cultivar ‘Tricolor’, sometimes incorrectly listed under *T. affinis*, has spotted, gray-green leaves striped with pink and white and striking flowers that open ivory and fade to creamy yellow. A selection from



Often sold as *T. formosana*, this attractive toad lily is a hybrid of that species and *T. hirta*.

China known as “Yungi Temple Form” grows to five feet tall with flowers lining the stems as well as crowning the summit.

Native to Taiwan and China, *T. formosana* is perhaps the most often misidentified toad lily. The true species is an erect plant to two feet tall with delicate, broadly lance-shaped leaves and white to lilac, crimson-spotted flowers carried in open cymes. Mathew maintains that the leaf bases of pure *T. formosana* taper to a narrow tubular sheath that wraps around the stem, rather than clasping as in other species. Plants spread quickly by stoloniferous roots, creating broad patches in the garden. Plants sold in the trade as *T. ‘Hototogisu’* are true *T. formosana*. The selection ‘Samurai’ has leaves attractively edged in gold.

Most plants sold under the name *T. formosana* are in fact an unnamed hybrid between it and *T. hirta*. Hardy to USDA Zone 4, this hybrid features erect stems to three feet tall crowned with terminal cymes of white flowers that are heavily spotted with maroon.

Plants sold as *T. formosana* ‘Amethystina’ are actually a selection of *T. lasiocarpa*. *T. lasiocarpa* is more floriferous than the former species, with larger flowers carried in branched terminal clusters. The tepals are rich maroon, with faint spots. This superb plant, however, will thrive only in USDA Zones 7 to 9.

Though difficult to obtain, *T. maculata* is a worthy species with stems to four feet tall and large terminal cymes of starry, purple-spotted, white to lavender flowers. This species has the westernmost range of any *Tricyrtis*, from the Himalayas as well as China.

SUCCESS WITH TOAD LILIES

One of the criticisms of *Tricyrtis* is that the foliage is often brown by the time the flowers open. Proper siting and adequate moisture are the keys to avoiding plants that appear to have been marinated and grilled. Plant toad lilies in evenly moist, humus-rich soil in a site that receives dappled sunlight to part shade, depending on climate. Apply an annual top dressing of compost or well-rotted manure to enrich the soil. Full sun will burn the foliage and compromise the display in the garden.

Northern gardeners often avoid late-blooming species for fear plants may be damaged by frost just as they begin blooming. But when I gardened in Minnesota, in years when early frost threatened newly opened flowers I cut the stems just above the soil line and brought them indoors in a vase. The foliage stayed handsome, and the stems continued to bloom for three to four weeks.

Slugs love to devour the succulent foliage of toad lilies. A light dusting of diatomaceous earth around the plant's perimeter and on the foliage will deter these manic munchers. By and large, however, *Tricyrtis* are pest free.

To propagate, divide clumps in spring or remove shoots from the edge of the clump. Cuttings taken after growth hardens—but not later than mid-July—will root readily. Seeds do not require conditioning and will germinate quickly if sown on the surface of a moist potting medium.

—C.C.B.

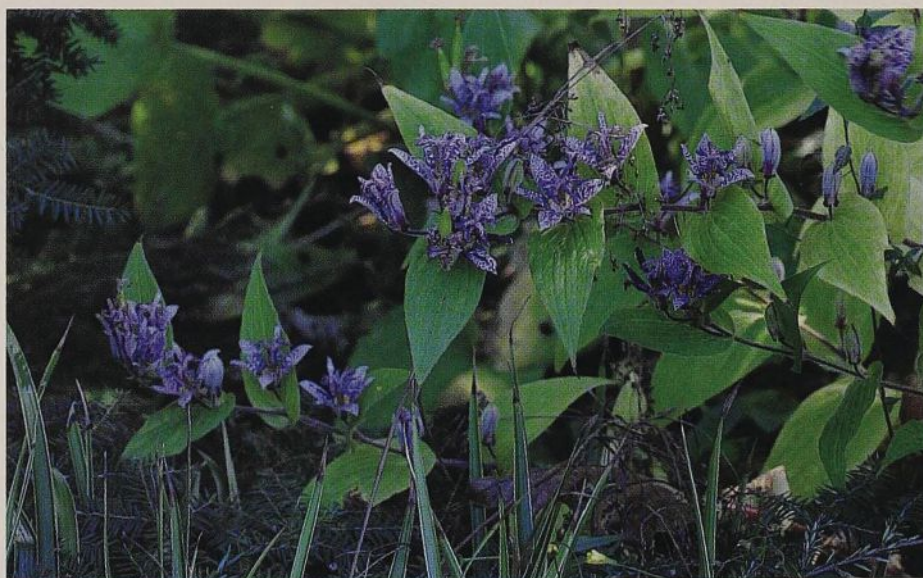
T. setouchiensis—said to resemble *T. affinis*, but with flowers in cymes—has only recently been offered in this country from seed collected in Japan.

THE HYBRIDS

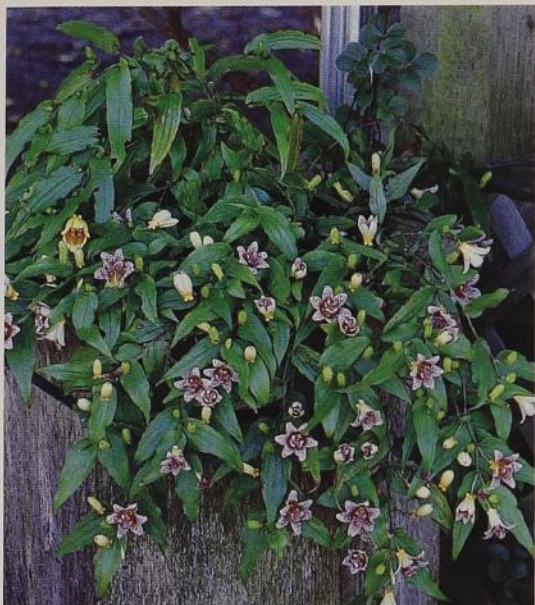
IF THE CHARM OF toad lilies lies in the exotic nature of the flowers, then a handful of hauntingly beautiful hybrids are sure to captivate you. *T. × ‘Kohaku’*—derived from a cross between *T. hirta* and *T. macranthopsis*—is a beauty with the

best attributes of both. Open, vase-shaped white flowers, heavily spotted with rich purple, face upward from the leaf axils on the upper half of the stems. The overall effect of a mature plant in bloom is a rich green cascade studded with glowing lights. The stems are weakly upright to gracefully declining.

For popularity and ease of care, *T. × ‘Tojen’*—sometimes mistakenly rendered as ‘Togen’—wins the prize. Upright cymes of unspotted lavender and white flowers decorate two-foot stems clothed in broad,



The white to lilac flowers of *T. hirta* are heavily speckled with rich purple spots.



T. x 'Kohaku' and *T. macranthopsis* grow compatibly in a wooden planter at Collector's Nursery.

waxy leaves that shimmer in the dim woodland light. 'Sinonome' is justifiably popular, with white flowers spotted with rich violet. A new hybrid called *T. x 'Empress'* is described by Diana Reeck of Collector's Nursery as having "extra large flowers and almost spidery petals, white spotted purple, opening wider than any I have seen."

If you like plants with gold foliage, try *T. x 'Lemon and Lime'*. This introduction from the wholesale Terra Nova Nurseries has golden leaves edged with green. Other gilded toad lilies include 'Lightning Strike'—which has gold leaves edged in dark green and lavender-spotted flowers—and 'Shining Light', which has irregularly striped gold-and-green leaves with lavender flowers.

TRICYRTIS IN THE GARDEN

TOAD LILIES ARE subtle and are best planted where they can be appreciated at close range. Because of this, it's important not to arbitrarily stick them in the garden; choose the spot for each species to accentuate its unique charms.

To show off the dramatic foliage and flowers of floppy-stemmed species such as *T. macrantha*, *T. macranthopsis*, and 'Kohaku' in the garden, place them where the cascading stems can tumble artfully over a rock wall or decorative log.

Toad lilies are perfect for tall contain-

ers such as chimney pots that lift the plants high enough for the stems to dangle down without resting on the ground. Place arching species like *T. hirta* and *T. formosana* at the base of shrubs such as viburnums or daphnes, so the stems can weave through the branches for support. The purple-spotted flowers make a stunning color echo with the lilac fruits of beautyberries (*Callicarpa* spp.). Use upright, perky species like *T. latifolia* and *T. macropoda* to add height to low plantings of woodland wildflowers.

Good garden companions for toad lilies include those with distinctly contrasting foliage. Lacy plants such as astilbes, barrenworts (*Epimedium* spp.), foam-flowers (*Tiarella* spp.), bleeding hearts (*Dicentra* spp.), and ferns fall into this category, as do plants with bold foliage, such as hostas, ligularias, mayapples (*Podophyllum* spp.), hellebores, and wild gingers (*Asarum* spp.).

For added color at flowering time, choose fall-fruiting baneberries (*Actaea* spp.), white wood aster (*Aster divaricatus*), woodland sage (*Salvia koyamae*), zig-zag goldenrod (*Solidago flexicaulis*), Japanese anemone (*Anemone x hybrida*), and variegated sedges such as *Carex siderosticha* 'Variegata'.

A FINAL WORD

TOAD LILIES MAY BE an acquired taste but, once tried, they can be addictive. "The toad lilies have a particular personality that is difficult to explain," writes University of Georgia horticulturist Allan Armitage in *Herbaceous Perennial Plants*. "Gardeners often grow them because they are unusual rather than showy; however, the flowers never fail to elicit conversation and their curious beauty should be admired close up."

Try them in your shade garden, and I guarantee you'll be hooked like I am. ♡

Author and landscape designer C. Colston Burrell lives in the Blue Ridge Mountains of Virginia. His latest book, Perennials for Today's Gardens, features new perennials in 150 popular genera, including Tricyrtis.

Resources

"A Review of the Genus *Tricyrtis*," a monograph by Brian Mathew, March 1985 issue of *The Plantsman*.

Herbaceous Perennial Plants (second edition) by Allan K. Armitage. Stipes Publishing, Champaign, Illinois. 1997.

Sources

Collector's Nursery, Battle Ground, WA. (360) 574-3832. www.collectorsnursery.com. Catalog \$2.

■ *T. x affinis*; *T. x 'Empress'*; *T. formosana* 'Samurai'; *T. hirta* 'Alba', 'Albescens', 'Miyazaki', 'Variegata'; *T. x 'Kohaku'*; *T. latifolia* 'Forbidden City'; *T. x 'Lightning Strike'*; *T. macranthopsis*; *T. macropoda* "Yungi Temple Form"; *T. ohsumiensis*.

Heronswood Nursery Ltd., Kingston, WA. (360) 297-4172. www.heronswood.com. Catalog \$8.

■ *T. hirta* 'White Towers'; *T. macranthopsis*; *T. macropoda* "Yungi Temple Form"; *T. maculata*; *T. nana* 'Chabo'; *T. ohsumiensis*; *T. setouchiensis*; *T. x 'Tojen'*.

Plant Delights Nursery, Inc., Raleigh, NC. (919) 772-4794. www.plantdelights.com. Catalog 10 stamps or a box of chocolates.

■ *T. x 'Kohaku'*, *T. lasiocarpa* 'Amethystina', *T. macranthopsis*.

Roslyn Nursery, Dix Hills, NY. (631) 643-9347. www.roslyn-nursery.com. Catalog \$3.

■ *T. hirta*; *T. hirta* 'Alba', 'Miyazaki', 'White Towers'; *T. formosana* 'Samurai'; *T. x 'Kohaku'*; *T. macropoda*; *T. x 'Sinonome'*.

Wayside Gardens, Hodges, SC. (800) 845-1124. www.waysidegardens.com. Catalog free.

■ *T. lasiocarpa* 'Amethystina'; *T. hirta* 'Alba', 'Miyazaki', 'Miyazaki Gold'.



Legacy in a Nutshell

Growing native nut trees from seed is an investment in the future.

BY GUY STERNBERG

FRIENDS FREQUENTLY ASK ME to recommend a shade tree for their yard. They want something strong wooded, fast growing, deep rooted, winter hardy, heat tolerant, drought resistant, trouble free, and good for wildlife. It should have attractive structure, great fall color, and nice bark. And, once established in their not-so-good soil, it should be able to thrive on its own with absolutely no care!

"How about a nut tree?" is my short answer. There are many types of nut trees—including some that produce edible nuts—that can meet every requirement just listed. Hard-wooded, long-lived nut trees make some of the best shade trees for many parts of North America. Especially in areas where factors such as Dutch elm disease, birch borers, maple wilt, heat, cold, drought, or clay soil restrict your choice of other favorite shade trees, durable nut trees may be your best bet.

But a good selection of nut trees is hard to find at many nurseries. Why? These hardy trees usually develop massive root systems early in life, making them difficult to transplant unless special techniques are employed. Many nurseries don't know about or aren't willing to spend time with such techniques. Nut trees also have a reputation for slow growth, but this can be overcome with proper cultural practices. So the average homeowner who buys plants from the local nursery resorts to selecting something else, thereby missing a great opportunity.

But *you*, dear gardener, are above all that! Proud of your landscape, you would like your garden to increase in splendor every year, living on as a legacy to your family and community. You want something more than a quickie tree that will last just long enough for you to sell the old homestead in a few years. You want quality—something that will become majestic and magnificent—but you can't find it at your local nursery. So here's the big secret: It's easy to grow your own nut tree!

If the idea of growing something that may outlive your grandchildren and that might add thousands of dollars to the value of your property appeals to you, then here's how to go about doing it.

Facing page: A majestic walnut tree is a dominating presence in this farm field. **Above:** Walnut seeds are encased in a tough, fibrous husk containing a compound that can stain hands and clothing.

NOTEWORTHY NUT-BEARING TREES

ENGLISH WALNUT (*Juglans regia*), pecan (*Carya illinoensis*), and chestnuts (*Castanea* spp.) may be the first trees that come to mind when thinking of edible nuts, but there are many more that warrant consideration as shade trees. The *Juglans* genus includes several walnut species, heartnut, and butternut; and within the *Carya* genus are several species of hickory. Though most make better food for wildlife than humans, the category of nut trees covers several species of beech (*Fagus* spp.), buckeye (*Aesculus* spp.), hornbeam (*Carpinus* spp.), ironwood (*Ostrya* spp.), filbert (*Corylus* spp.), wingnut (*Pterocarya* spp.), tanoak (*Lithocarpus* spp.), chinquapin (*Castanopsis* spp.), and about 500 different oaks (*Quercus* spp.).

Each of these genera offers some great species for landscaping, and most include representatives native to North America. They share certain desirable characteristics such as strong wood, toughness, longevity, tolerance of some environmental extremes, and value to native wildlife. Specific ornamental attributes vary from one species to the next, as does their adaptability to climate and soil conditions. Selecting the tree with the desired characteristics and suitability to the site is simply a matter of becoming familiar with the choices.

Tanoaks and chinquapins only grow in warm climates, where they make grand specimens, but the other genera all include cold-hardy species. While most develop into large trees, hornbeams, fil-



WHAT IS A NUT?

The term "nut" is often used rather loosely. According to *Barron's Complete Gardener's Dictionary*, a nut is "a hard, woody, or brittle one-seeded fruit that does not open at maturity." The fruits of beech and oak trees fit this definition, but not those of walnuts and butternuts. The nuts of the latter trees are encased within a fleshy husk, which means that from a botanical standpoint they are more closely allied with drupes, or stone fruits, such as peaches and almonds.

berts, and ironwoods are usually fairly small trees or large shrubs.

SELECTING A NUT TREE

BEFORE YOU decide which tree is best for your garden, be sure to examine both their attributes and their shortcomings. There are a few problems associated with nut trees: Some can litter the ground with nuts each autumn, but squirrels and other animals enjoy them and will help clean them up for you. For those who are planning to plant their trees in a lawn rather than a savanna, pasture, or mulched bed, the hornbeams, ironwoods, wingnuts, and even some oaks have such small nuts that litter is not a great concern in less-than-pristine turf.

Though the majority of these trees are tolerant of pests and diseases, butternuts and some chestnuts—including the once mighty American chestnut (*Castanea dentata*)—are highly susceptible to some fungal diseases.

Walnut trees and close relatives, including butternut and heartnut, are known to be allelopathic—they produce a toxin called juglone that inhibits the growth of certain plants located nearby—so don't plant them near vegetable gardens, pine trees, or ericaceous plants such as rhododendrons and other members of the heath family. They also can stain patios and concrete driveways if the nuts fall directly on them.

However, walnuts are compatible with cool-season turf grasses, which are apparently not affected by the allelopathic substance.

Beeches, on the other hand, develop spreading surface root systems that do not combine very well with lawns, but they give the landscape a touch of class in all seasons if grown in a mulched bed.

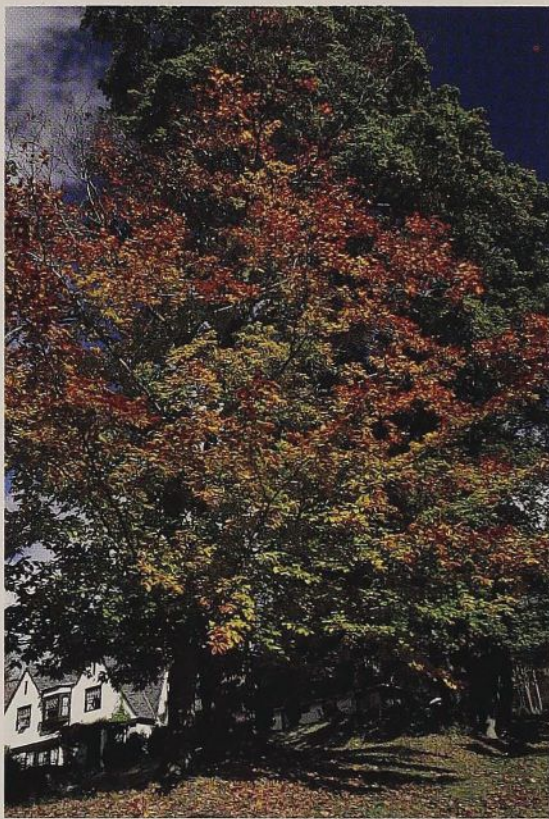
Though buckeyes tend to lose their leaves early in the autumn, they are among the first to green up in spring, and they sport gorgeous flowers that vary in color from species to species.

Hickories can be frustratingly difficult to transplant, but may be the best genus of all for spectacular color in early fall. And be-

cause the oaks are so diverse, there are species suited to nearly every garden.

SEED HARVEST AND PREPARATION

BE AWARE THAT most nut tree genera are wind-pollinated and notorious for out-crossing. Seeds collected—with permission—from an arboretum, where many species may be planted in close proximity, are likely to be hybrids. Given the choice, I prefer to obtain seeds from native habitat sources, getting permission when needed. Obtaining rare varieties is easier if you join one of the organizations



An American beech tree shows off its fall colors.

that sponsor seed exchange programs; a few mail-order nurseries carry tree seeds (see box on page 48).

In temperate North America, nuts ripen in late summer or autumn and should be gathered as soon as they fall for use as seeds. Better still, pick them from the tree just before they drop, so they don't lie on the ground and bake in the sun or become infected with fungi. Select nuts without any noticeable insect or disease damage, and cut a couple open to make sure they are not hollow from insect feeding or lack of pollination. Avoid those that fall much earlier or

Conditioning

Exposing nut tree seeds to natural cycles of cool and warm temperatures outdoors is the easiest way to fulfill their dormancy requirements, but for more uniform and reliable germination, follow these guidelines for artificially breaking dormancy. Place seeds in a refrigerator at 34 to 41 degrees Fahrenheit for cold conditioning, or in a room kept at 68 to 80 degrees for warm conditioning. Conditioning periods should be 90 to 120 days. To save space in your refrigerator, place nuts in moist perlite or sphagnum peat moss in a sealable, polyethylene bag.

Genus	Treatments
<i>Aesculus</i>	variable: cold or none
<i>Carpinus</i>	warm then cold
<i>Castanea</i>	cold
<i>Castanopsis</i>	none needed
<i>Corylus</i>	variable: alternate cold and warm
<i>Fagus</i>	cold
<i>Juglans</i>	cold
<i>Lithocarpus</i>	none needed
<i>Ostrya</i>	warm then cold
<i>Pterocarya</i>	cold
<i>Quercus</i>	none needed*

*With the exception of the red oak subgenus (*Erythrobalanus*), which responds to cold conditioning.

later than the majority from the same tree. Discard any that feel especially light, or that float in water after their husks or caps have been removed.

Nut seeds are often covered in protective coatings such as husks (as in walnuts and butternuts), burs (chestnuts), or cupules (oaks). Removing these is unnecessary if you plan to germinate the seeds outdoors, but if you intend to subject them to pregermination treatments such as cold or warm conditioning, removing the coatings will save space and reduce the risk of rot.

Store nuts in labeled plastic bags and keep them refrigerated—but not frozen—until planting or pregermination treat-

ment. Don't allow them to dry out, other than brief surface drying to retard fungus growth. If a fungus appears during storage, wash the nuts in a solution of one part bleach to 10 parts water, air-dry them briefly on absorbent paper, and return them to storage in a new, clean plastic bag.

PLANTING

MANY SEEDS HAVE built-in dormancy requirements that must be met before they can germinate and grow. In most cases, stratifying or conditioning the nuts—that is, subjecting them to a period of cool temperatures or to alternating cycles of cool and warm temperatures—satisfies the dormancy requirement. Planting nuts outdoors in fall allows nature's thermostat to accomplish this task, but it can also be done by placing seeds in the refrigerator.

In some species, individual nuts may require a cycle of cool-warm-cool stratification before they will germinate, so if you don't see many sprouts the first spring, don't be too discouraged; leave them alone for a couple of years until everything has emerged (see the chart on page 46 for a description of germination requirements by genera).

Nuts should be planted on their sides in holes a little deeper than the thickness of the nut. Many oak nuts send down a radicle—the embryonic root that develops from a seed—in the fall, but wait until spring to send shoots up from the soil.

To discourage rot, use a planting medium that drains well, but never allow seedlings to dry out completely.

Because the seedling can survive for several months on the food stored in the seed, fertilization is not particularly critical in the first growing season. But applied in moderate doses following complete germination, fertilizer will help a seedling make more vigorous growth. I recommend slow-release formulations such as Polyon, Woodace, or Agriform.

CHIPMUNKS, SQUIRRELS, AND MICE, OH MY!

ALTHOUGH MOST nut seedlings are too robust to be very susceptible to damping-off fungi, it always pays to use a sterile medium for container planting. But rodents—and even some birds—are a different matter. A combination of wire

SEED HANDLING OPTIONS

Most nut tree seedlings form long taproots early in their development. This is great for a seedling germinating in its permanent home, but not so good for one that is growing in a pot or that is destined for transplanting a year or two down the pike. You have several options for dealing with this; select the one that suits your planting situation and personal convenience.

1. Plant the seeds directly into their permanent location, using a commercial, plastic tree shelter for protection from rodents, mowers, herbicide sprays, and desiccation. This allows the tree to develop the best, most natural root system.

2. Pregerminate the seeds by cold conditioning until the radicles—the embryonic roots—emerge. If they do not emerge during the cold period, the stratified seeds can be placed in a loose, moist medium and brought to room temperature until the radicles pop out.

Then clip the tips of the emerging radicles prior to planting, causing them to branch into a fibrous root system. Plant them in an outdoor seedbed where they can be kept for two years, or in a suitable container system where they usually are best kept for a single year.

3. Whether or not you clip the radicles, use copper-treated root-control containers, bottomless containers placed on elevated mesh benches, or other techniques to keep the taproots from extending too far or circling in a container.

Bottomless containers allow the roots to grow straight down out of the pot so they do not begin to circle. As they grow out the bottom and into the open air, their tips dry out and die. This technique—known as “air pruning”—forces the root to branch out inside the pot. A new seed-starting product called Rootainers (see “Supply Sources,” page 48) also fosters this process.

4. You can plant nuts in deep pots if you transplant and root-prune them during the first year, before the roots reach the bottom. I prefer shallower, bottomless pots—used with the techniques mentioned above—to encourage a fibrous root system that will establish better when transplanted.



Clipping the radicle on an oak.



The author shows a root-pruned tree.



A copper-treated root-control pot.

protectors, elevated planting benches, mouse baits, repellents, traps, and vigilance are often necessary to protect seeds and seedlings from these pests.

When using half-inch wire mesh for protection of hypogeous seeds (those that have cotyledons—seed leaves—that remain below soil level after sprouting) such as acorns, hickory nuts, chestnuts, walnuts, filberts, or buckeyes, the mesh can be laid directly on the soil or container. The new growth will sprout between the wire strands. The following autumn, when the seedlings become dormant, the mesh can be lifted carefully away; this is much easier to do with deciduous species than evergreens. Don't remove the protection any sooner, however, because rodents will completely uproot seedlings, even late into the growing season, to eat the attached nut residue.

SMARTGARDEN™ Tip

KEEPING RECORDS

When you plant a nut tree, you are planting something that probably will last longer than your memory. In 30 years, you or someone else may want to know exactly what you have and when it was planted. So starting with the first label on the seed bag and continuing through the final planting and subsequent growth of the tree, keep accurate records of all your seed collections.

Most serious growers keep the following data about their trees:

- Genus, species, variety.
- Year planted.
- Provenance—locality collected (exact location of parent tree if possible) and whether the parent was a wild or a cultivated tree.
- Special characteristics of the parent—large nuts, great fall color, good form, unusual size, historic interest, or whatever inspiration led you to pick seeds from that particular tree.
- Exact planting location (if several trees might become confused later).
- Special propagation notes (pregermination treatments, stratification time and temperature, days from sowing to emergence, etc.).

—G.S.



Oak seedlings growing in containers in the author's greenhouse are covered with wire mesh to protect them from rodents.

Wire mesh protection should be elevated above the surface for beech, hornbeam, and other trees with epigeous seeds (those that extend their seed leaves above the ground when sprouting). Otherwise, the seedlings may be damaged, or the seed leaves will emerge through the wire and be eaten by rodents. I usually plant such species in pots with lidded wire chimneys tall enough to allow for the first year's growth.

Remember, too, that you may have to deal with deer, rabbits, or other animals in outdoor holding beds, or as your trees are transplanted and grow into saplings.

CARE AFTER PLANTING

BESIDES THE inevitable war with deer, your trees must overcome drought and competition from weeds and turf. Help them by removing all vegetative growth in as large a circle as acceptable around each tree, and applying organic mulch to conserve moisture, retard weed growth, and moderate soil temperature. Water new trees weekly if needed, using an amount equal to one inch of rain. This will be easier to do if you build a small levee around the perimeter of the hole at planting time.

Inspect the trees periodically for insect damage and other problems. Prune them very lightly during the growing season to maintain a central leader, if necessary. Any heavy pruning should be deferred until the dormant season. Once established, many nut trees will grow three feet per year if they are afforded such care.

Guy Sternberg operates Starhill Forest Arboretum in Petersburg, Illinois. He is co-author with Jim Wilson of Landscaping with Native Trees, published in 1995 by Chapters.

Seed Exchanges

Membership in most of the following organizations is required in order to participate in seed exchanges.

American Horticultural Society. www.ahs.org. For information about participating in the AHS Seed Exchange, see the seed exchange form on the tear-out card attached between pages 8 and 9 of this issue.

International Plant Propagators' Society. www.ipps.org.

International Oak Society. www.saintmarys.edu/~rjensen/ios.html.

Northern Nut Growers' Association www.icserv.com/nnga/index.html.

Seed Sources

Callahan Seeds, Central Point, OR. (541) 855-1164. Catalog \$1.

F. W. Schumacher Co., Inc., Sandwich, MA. (508) 888-0659. Catalog free.

Smith Nursery Company, Charles City, IA. (515) 228-3239. Catalog free.

Starhill Forest Arboretum Seed Distribution Program. www.gardenweb.com/directory/sfa.

Supply Sources

Lee Valley Tools, Ltd. (800) 871-8158. www.leevalley.com. Roottrainers® seed-starting containers.

Oikos Tree Crops. (616) 624-6233. Tubex™ tree shelters.

Resources

Manual of Woody Landscape Plants by Michael Dirr. Stipes Publishing, Champaign, Illinois. 1998.

Seeds of Woody Plants in North America by James A. Young and Cheryl G. Young. Dioscorides Press, Portland, Oregon. 1992.

Tom Clothier's Garden Talk: Tree Seed Propagation Page. www.anet-chi.com/~manytimes/page64.htm#0.



This urban garden in Brooklyn is being restored to its former glory.

BY CATHERINE M. BROWN

PHOTOGRAPHS BY ANITA SABARESE

NEW YORK CITY is known for its glass skyscrapers and concrete avenues. But if you follow a street called Prospect Park West in the borough of Brooklyn past a cobblestone orb named Bartel-Pritchard Circle, you will come to an unexpected oasis: Prospect Park. This green gem has become a haven for people without gardens, an urban paradise for those who live in cement towers and brick tenements.

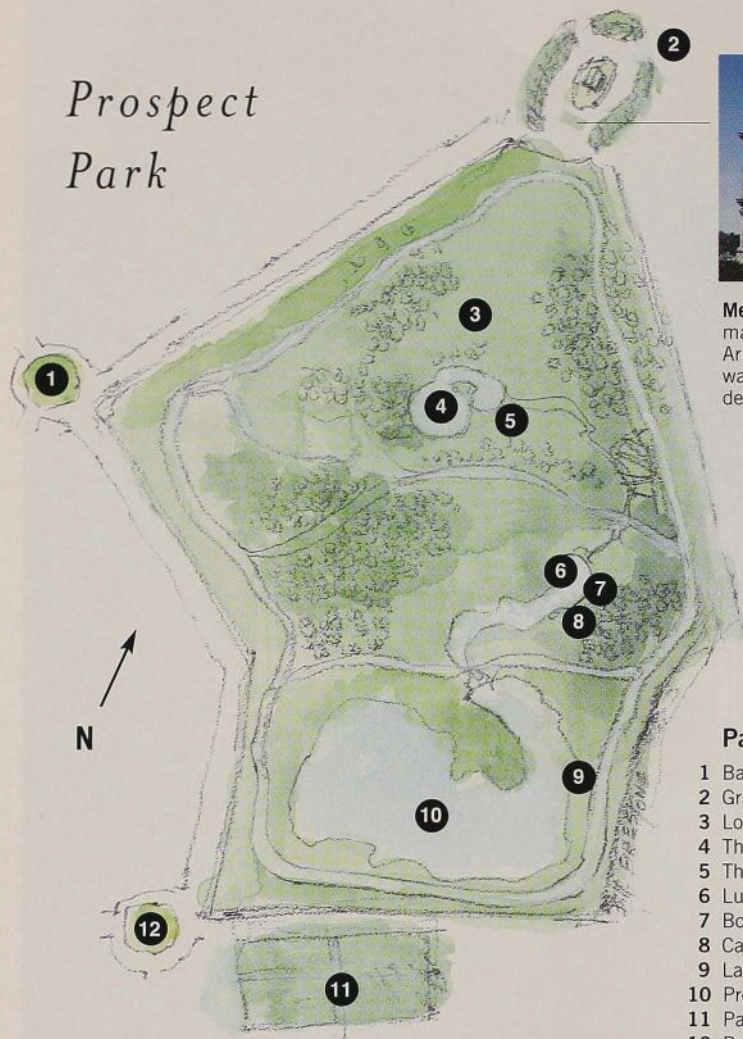
Brooklyn folk are a funny breed. Give them a tiny patch of dry, brown earth and they will grow something: a spindly tomato plant tied to a stick with a strip of pantyhose, a triumphant spray of marigolds. They place window boxes bursting with red geraniums precariously on crumbling sills. They drill holes into huge terra cotta pots and chain them to wrought iron railings on their front stoops so the local riff-raff won't steal their impatiens.

Give them a big square of park, and they will turn it into their backyard.

That's exactly what Prospect Park has been for well over 130 years—Brooklyn's backyard. Here, residents do what they would do behind the privacy of their own white picket fences—if they had them.

Top and bottom left: Prospect Park's Long Meadow, seen here in fall and spring finery. Bottom right: Ambergill Falls.

Prospect Park



Memorial Arch to the park's main entrance at Grand Army Plaza. This structure was modeled after the Arc de Triomphe in Paris.

Park Highlights

- 1 Bartel-Pritchard Circle
- 2 Grand Army Plaza
- 3 Long Meadow
- 4 The Pools
- 5 The Ravine
- 6 Lullwater
- 7 Boat House
- 8 Camperdown Elm
- 9 Landing Shelter
- 10 Prospect Lake
- 11 Parade Grounds
- 12 Park Circle

Resources

Prospect Park Alliance. Offers "A Guide to Nature in Prospect Park" for self-guided walking tours (\$3), and maps of the park (\$2). For more information, call (718) 965-8954. The alliance also sponsors treks in the park. Contact the Urban Park Rangers at (718) 438-0100 or visit www.prospectpark.org.

"Wildman's" Wild Food and Ecology Program. For tour schedules and to make reservations for Steve Brill's foraging tours in Prospect Park and other parks in the New York City area, contact Brill at (718) 291-6825, or e-mail him at wildmansteve@bigfoot.com. The suggested donation for tours is \$10 for adults and \$5 for children.

Wild New York by Michael Crewdson and Margaret Mittelbach. Three Rivers Press, New York, New York. 1998.

They enjoy savory barbecues with fares reflecting a rich ethnic tapestry—Jamaican, Italian, Latino, even plain old American. They give birthday parties for their children here. In the summer, there are concerts under the city stars. People play softball and soccer, ride horses, and cool off under the municipal sprinklers.

In short, they live here.

A DISTINGUISHED PAST

BEFORE PROSPECT PARK was created, Brooklynites who wanted a respite from city life would visit nearby Green-Wood Cemetery to picnic on the hills and dells among the monuments and mausoleums, beneath dramatic weeping willows and azaleas as big as trees. Green-Wood was the prestigious final resting place for people from across the country—among them Civil War generals, the inventor of the hot dog, artist Louis Comfort Tiffany, and Teddy Roosevelt's first wife, Alice. In the mid-1800s, it was decided that Brooklyn needed a park of its own.

The creation of Prospect Park—on the site of the 1776 Battle of Long Island, the first major conflict between the Continental and British Armies in North America following the signing of the Declaration of Independence—was authorized by the City of Brooklyn in 1860. However, the park's development was delayed by the Civil War, and it wasn't until 1865 that famed landscape architects Frederick Law Olmsted and Calvert Vaux—who had designed Central Park in Manhattan the previous decade—finally completed their plan. Construction on



Prospect Park's architects: Frederick Law Olmsted, left, and Calvert Vaux, right.

Prospect Park was finished in 1867, when it was opened to the public.

Olmsted and Vaux considered Prospect Park to be the most definitive example of their work, more perfect than Central Park. For one thing, the park's site was naturally more conducive to plant growth than Central Park. "They weren't dealing with the rocky underlayer Central Park has," explains Mary Fox, vice president of capital and planning for the Prospect Park Alliance, an organization founded in 1987 to help preserve and restore the park. "Plants simply grew better here."

And, unlike Central Park, this commission did not result from a competition with a fixed site and program. Olmsted and Vaux had the opportunity to reject—and did—the original scheme of Prospect Park in which Flatbush Avenue completely bisected the proposed site. Instead, they recommended that the allotted land be expanded to the south and west.

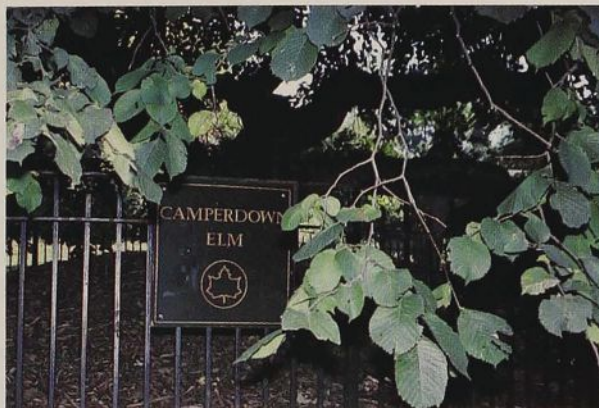
In order to create the impression that one was in the country instead of the middle of a city with a population of

nearly 300,000, Olmsted and Vaux designed Prospect Park so that none of the buildings surrounding the park were visible from any given point inside. While this pastoral effect was easier to achieve in a time when buildings were rarely taller than a few stories, even now, in certain locations, this grand illusion is still possible.

Olmsted and Vaux's original design included many rustic Adirondack-style shelters, which were extremely popular in the "back to nature" craze of their day. Unfortunately, many of these wooden structures have rotted over the years. The Landing Shelter on the shore of Prospect Lake—a 1971 reconstruction of the 1870 original—is an example of many such structures that once bordered the lake in the 19th century.

THE PARK TODAY

PROSPECT PARK is a skillful melding of nature and human vision. When Olmsted and Vaux arrived on the scene, the park's glacier-carved terrain was already distinguished by valleys, woodland, and stretches of meadow; they modified parts of the landscape by removing selected trees and planting others, filling in certain hollows, and—most notably—creating the 60-acre Prospect Lake and its tributaries. In the park's 526 acres, Olmsted and Vaux successfully tied together meadow, woodland, and water with graceful arches, winding



paths, ponds, waterfalls, thick forests, sprawling lawns, and a rose garden. "Olmsted was concerned about how you *felt* in the park," says Tupper Thomas, administrator of Prospect Park and president of the Prospect Park Alliance, "how you reacted emotionally when you took in certain vistas. For example, the Long Meadow wasn't one uninterrupted open space, but full of twists and turns, with trees planted here and there. In one sense, they obstructed your view, yet in another, they drew you through the space so you could discover new wonders around each corner."

In Louis Harman Peet's illustrated book *Trees and Shrubs of Prospect Park*, published in 1902, the author painstakingly documents the size and location of

hundreds of oak (*Quercus* spp.), hornbeam (*Carpinus* spp.), maple (*Acer* spp.), white ash (*Fraxinus americana*), and European linden (*Tilia x europaea*). Although some of these trees no longer remain, Prospect Park is still a lively rainbow of colors, especially in the spring, when the cherry, magnolia, and forsythia are in full bloom.

Among the original trees still guarding the Boat House at Lullwater is the Camperdown Elm



(*Ulmus glabra* 'Camperdownii'), immortalized in Marianne Moore's poem of the same name. This Scotch elm grafted onto an American elm was planted by Olmsted himself in 1872 and is one of the few elms to survive a blight of Dutch elm disease that decimated elms in the park in the early 20th century.

More plentiful at Prospect Park is the wild plant life. "Wildman" Steve Brill—perhaps best known for his highly publicized arrest in 1986 for eating plants he'd picked in Central Park—leads foraging tours in New York City area parks, including Prospect Park (see "Resources," page 50), where he finds culinary possibilities in the likes of field garlic, dandelion, and mustard. According to Brill, a self-taught naturalist, "There are many large parks throughout greater New York, and they present a wide range of ecosystems and species. Yet few of us are familiar with common wild plants, their identification, natural history, food and medicinal uses, or the folklore associated with them."

Brill's hands-on—and mouths-on—program is designed to get urbanites back in touch with nature. He suggests participants bring plastic bags and containers for collecting berries, mushrooms, and other edibles, and a pen and paper for jotting



In this bucolic scene photographed in 1903, a flock of sheep graze in the Long Meadow.

Rebuilding an Urban Forest

The restoration of a city forest the size of Prospect Park is no easy task. In 1987, when the Prospect Park Alliance was formed as a public/private partnership with the City of New York, the New York City Parks Department was faced with a dilemma: Should it stay faithful to Olmsted's original de-



The ravine has been replanted and its slopes protected with coir mesh to prevent erosion.

sign or heed the vast horticultural knowledge gained in the 100-plus years since the first tree was planted in this Brooklyn garden? "We wanted to keep it as historically correct as possible," explains Mary Fox, vice president of capital and planning for the Prospect Park Alliance, "but Olmsted had a fondness for non-native plants—such as Norway maple—that later proved to be invasive." The alliance finally decided to keep as close to Olmsted's vision as possible while also taking into account modern-day ecological practices that would create a healthier, flourishing forest.

Part of the restoration, which began in 1996, entails reintroducing the right plants into the landscape—non-invasive species that have flourished in the park and were also part of Olmsted's design. On top of the list for restoration was the ravine, which studies had shown to be seriously ravaged. "In effect, we had to re-create a forest," says Fox of the now completed endeavor.

Louis Harman Peet's 1902 book *Trees and Shrubs of Prospect Park* proved indispensable in this process. "Peet's careful descriptions of tree locations and calipers [trunk dimensions] has helped us identify species that predated Olmsted's original design from those introduced later," ex-

plains Tupper Thomas, administrator of Prospect Park and president of the Prospect Park Alliance. "This helped us decide what species should be reintroduced."

Charles Beverage, an Olmsted scholar, was also consulted for the project. And finally, director of landscape management Ann Wong began the task of gathering seeds by hand from the park and the surrounding region.

"We felt it was important to use plants with the same ge-

netic material as those that have been here 1,000 years," says Wong. "If you buy a red maple in a nursery, chances are it was grown in Washington State. It may or may not do well in the north-eastern United States." The collected seeds were then grown at a local nursery and later transplanted in the park.

Maintaining the integrity of the restoration will be a community effort. "Educating home gardeners about indigenous species and invasive species is so important," says Thomas. "All it takes is one bird to transport seeds of an invasive plant from someone's backyard to the park to undermine all we've done."

Now that the ravine is completed, the alliance is looking ahead. "We hope to restore Concert Grove—one of the most beautiful vistas here overlooking the lake," says Fox. "One hundred years ago, musicians were ferried out to the small island in its center to play music as the people strolled through the formal gardens. Imagine *that*."

—C.M.B.

down the many recipes and cooking instructions he dispenses en route.

A RESTORATION SUCCESS STORY

IF YOU SEEK more traditional nature walks, "Behind the Fences" tours of Prospect Park's newly restored ravine are hosted by the Prospect Park Alliance and the Urban Park Rangers every Saturday and Sunday from mid-April through mid-November.

Until a few years ago, this corner of Brooklyn's last remaining forest—complete with waterfalls, a miniature gorge, and reflecting pools—was in serious trouble. Heavily used by mountain bikers, joggers, and other joyseekers who routinely strayed off the designated pathways, "this section of the park was so well loved," one park ranger explains, "that residents almost loved it to death."

To help save the ravine, it was fenced off in 1996, when restoration began in the park. The fence is scheduled to remain another three to six years.

The ravine's understory, which had been virtually destroyed, has already made a remarkable comeback. Coir mesh and timber have been placed on hillsides to impede erosion. Tumbled waterfalls have been reconstructed, using old photographs and picture postcards as guides. More than 1,000 native plants now border the pond, which, although it has not been restocked, is already teeming with fish and frogs. And great blue herons have even been spotted here, a true sign of the ravine's rebirth.

Michael Crewdson, co-author of *Wild New York*, views Prospect Park itself as a unique study in urban gardening. "Prospect Park is a huge experiment in transforming simple gardening into the recreation of an entire forest ecosystem in the middle of a city," he says. "The alliance is trying to restore the park from the ground up by revitalizing the soil and planting wildflowers, shrubs, and trees—the sorts of things we do in our own gardens, except this is on a grand scale. And hundreds of thousands of people will be able to enjoy the end results."

You see, much more than a tree grows in Brooklyn.

A resident of Brooklyn, Catherine M. Brown is a free-lance writer and urban gardener.

Book Reviews

The Plantfinder's Guide to Early Bulbs.

Rod Leeds. Timber Press, Portland, Oregon, 2000. 192 pages. 7½" x 10¼". Publisher's price, hardcover: \$34.95. AHS price: \$24.46.

THIS HANDSOME volume addresses 48 genera of early-blooming bulbs, including many that bloom at a time of the year when we are grateful for any bit of color or sign of life we can find in the garden.

In Part One, the author describes the botanical differences among bulbs and offers information on cultivation, propagation, and pests and diseases. The chapter "Where to Plant Early Bulbs" includes ideas for using bulbs in herbaceous borders, lawns, raised beds, rock gardens, and containers.

The core of the book is an extensive "A-Z of Early Bulbs." Descriptions of numerous varieties of bulbs both common—such as crocus and snowdrops—as well as the lesser-known—including several introductions from South Africa such as *Massonia* and *Babiana*—are provided. The result is a broad range of plants that will interest beginners and experts alike.

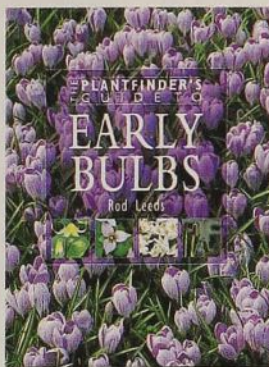
Leeds describes each plant as if he has personally selected and grown it. The photographs are excellent, but with so many intriguing plants described, more illustrations would be welcome. For example, when he describes *Romulea atranda* as having "large flowers of pale magenta or violet with a purple zone above a yellow throat and black or purple anthers with yellow pollen—a very stunning combination of colors," we want to see!

Because the author is English, many of the plants he describes are not well known to American gardeners, and it should be noted the book has not been edited for our hardiness zones.

The charm of Leeds' book is his familiarity with the plants he so obviously loves. As we read through the book, we never lose sight of the regions where the bulbs grow wild, and we never forget that we are doing something unnatural when we tame them for our gardens. Leeds writes, "We may think we know what conditions plants need, but the unexpected keeps us in our place, showing us that we still have much to learn." And we always will; that's why horticulture keeps us young.

—Chela R. Kleiber

Chela R. Kleiber is director of education at Tyler Arboretum in Media, Pennsylvania, and co-author of *The Burpee Complete Gardener*. She gardens in Philadelphia.



Taylor's Master Guide to Landscaping.

Rita Buchanan. Houghton Mifflin, Boston, Massachusetts, 2000. 400 pages. 8½" x 11". Publisher's price, hardcover: \$40. AHS price: \$28.

Sunset Northeastern Landscaping.

Ken Druse, editor. Sunset Books, Inc., Menlo Park, California, 2000. 416 pages. 8½" x 10¾". Publisher's price, softcover: \$29.95. AHS price: \$23.96.

Southern Living Landscape Book.

Steve Bender, editor. Oxmoor House, Birmingham, Alabama, 2000. 416 pages. 8½" x 10¾". Publisher's price, softcover: \$29.95. AHS price: \$23.96.

Complete Home Landscaping.

Catriona Tudor Erler. Creative Homeowner, Upper Saddle River, New Jersey, 2000. 9" x 10". Publisher's price, softcover: \$24.95. AHS price: \$19.96.

ONE OF A GARDENER'S great frustrations is trying to find the information

you want without having to flip through 10 or 12 books. New ideas, along with answers to gardening problems, abound in *Taylor's Master Guide to Landscaping* by Rita Buchanan.

If I had only one book to turn to for solutions on garden design and construction, plant care and maintenance, this would be the volume I'd buy. Buchanan covers all the basics on topics such as paving, retaining walls, steps, paths, and fences, but she tells you when you need to hire an expert rather than try the project yourself. "Only skilled stone masons can make dry-laid stone steps that look—and are—safe and stable to walk on," she advises.

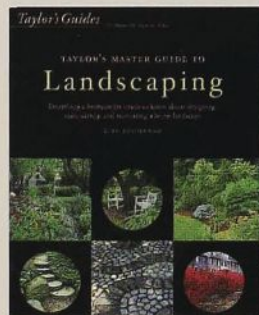
Buchanan also steers homeowners away from materials such as pea gravel that look terrific in garden photographs but are truly impractical. "Anyone who has lived with it will tell you that uniform, round aggregate, such as pea gravel, is totally unsuitable for pavement because the particles continually roll, slip, and shift underfoot," she says. "This is annoying and tiring to walk on, even dangerous. Pea gravel is also hard to

confine; it leaps across any edging."

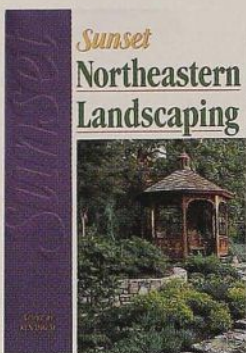
Plant lists in this book are among the most useful and unusual I've ever encountered—plants with

colored leaves, trees for small patios, shrubs for narrow hedges, plants that flower in hot weather, and much, much more. Tips on plant combinations plus basic design elements such as repetition, texture, contrast and color provide a comprehensive guide to garden design that will make anyone's landscape stand out.

The photographs in the book beautifully illustrate points made in the accompanying text, and the excellent drawings are very easy to understand.



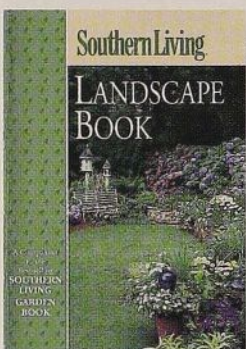
TWO NEW VOLUMES from the publishers of *Southern Living* magazine and Sunset books will be helpful to gardeners living in the northeastern, mid-Atlantic, and southern regions of the country.



Sunset's *Northeastern Landscaping*, edited by Ken Druse, and Southern Living's *Landscape Book* are similar in many ways: They contain many identical drawings and photo-

graphs, and the text in many sections of the two books varies only slightly, if at all.

Both of these volumes contain brief descriptions with many illustrative photographs and drawings of construction techniques and planting designs. The books are excellent for quick reference on plant topics such as wildflowers, ornamental grasses, bulbs, perennials, trees, shrubs, ground covers, and deer-resistant plants. There are some important differences between the two, however, and gardeners in regions that span the two areas may want to carefully consider the information they'll find most useful.

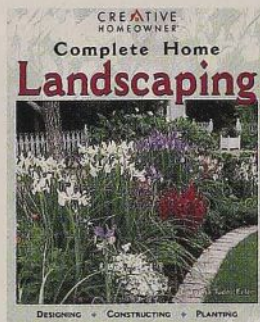


Northeastern Landscaping contains sections on wetlands, woodland

gardens, winterizing water gardens, animal pests, and low-allergen plants that can reduce suffering for the millions who are susceptible to pollen. Southern Living's *Landscape Book* concentrates on many gardening features unsuitable up north: garden fireplaces, tropical plants, container gardens, and a more expansive treatment of water features. In addition, the Southern Living volume is filled with photographs of stunning gardens, each, in itself, an individual lesson in garden design.

COMMITTED do-it-yourselfers and organic gardeners may prefer Catriona Tudor Erler's *Complete Home Landscap-*

ing. This book includes useful details on managing plant pests and diseases without the use of pesticides; renovating existing trees, shrubs, and lawns; garden design; composting, weeding, and mulching. However, chapters on garden construction might better be titled "Complete Home Headaches." I wouldn't advise *anyone* to tackle masonry brick steps as a home landscaping project, let alone in the four simple steps



illustrated on one page in this book. The author defines the task as "challenging," and she's certainly not kidding! Still, this could be a

useful book for a homeowner who wants to understand the building process before hiring a professional landscape contractor.

—Jane Berger

Jane Berger is a writer and a partner in the Garden Design Group LLC of Alexandria, Virginia.

Growing Home: Stories of Ethnic Gardening.

Susan Davis Price. University of Minnesota Press, Minneapolis, Minnesota, 2000. 208 pages. 9 3/4 x 9 3/4". Publisher's price, hardcover: \$34.95. AHS price: \$34.95.

THIS BOOK is a delight from beginning to end. It's a book of tales, all of them true, of recent immigrants and the gardens they have created. Transplanted from countries all over the world, these people now live and garden in Minnesota—a tremendous change of climate for most. These ordinary yet extraordinary people grow both ornamentals and edibles as links to the homes of their childhoods and the cultures they left behind. So do I; so do many gardeners who grew up in America. As British author L. P. Hartley

wrote in his 1954 novel *The Go-Between*: "The past is a foreign country: they do things differently there."

Growing Home is beautifully illustrated with John Gregor's color photos of gardens and gardeners. Charming, a photograph of the gardener as a child in his or her native land is also included where possible.

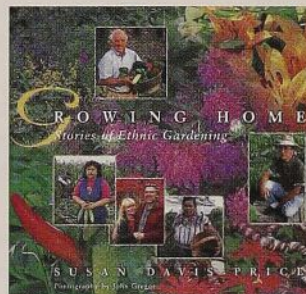
This is an excellent bedtime book; each chapter is complete in itself. Yet unifying the book are greater themes: the joy and peace found in the garden; the value of compost and gardening without dangerous chemicals; the garden as a way to pass one's heritage on to children. Another thought occurred to me as well. Patriotism in America these days is so often associated with guns and bombs. *Growing Home* reminds me of what gives us our greatest strength as a nation: the hybrid vigor we gain from the blend of cultures that is America.

"Culture is rooted in the land," explains Gita Kar, who came from India and now gardens with her husband, Pradip, in Minnesota. "When you are not in the land of your culture, where do you grow your roots? I think we began to grow our roots into our American reality with the permanence of our garden and the trees we planted and the changing of the seasons."

In addition to all this high-minded idealism, there are practical tips as well. Of Ludmila Bryskin, who moved here from Russia with her husband, Leonid, Davis writes, "She has learned that seeds will germinate very quickly if they are kept moist, wrapped in plastic, and carried close to her heart. 'The temperature is uniformly warm,' she [Ludmila] explained, 'and you soon forget they are there. Old ladies know that tip.'"

You will enjoy *Growing Home*. It will make an excellent gift; I've got it earmarked for three gardening friends already. It comes with my highest recommendation.

—Nancy McDonald



Nancy McDonald writes about and tends her extensive gardens in Michigan's Upper Peninsula.

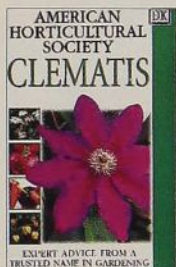
Gardeners' Books

The books listed here have not been critically evaluated; they have been chosen for description based on unusual subject matter or substantive content. Through a partnership with Amazon.com, AHS members can order these and other books at a discount by linking to Amazon.com through the Society's Web site at www.ahs.org.

Plants

AHS Practical Guides: Clematis.

Charles Chesshire. DK Publishing, Inc., New York, 1999. 72 pages. Publisher's price, softcover: \$8.95. AHS price: \$7.16.

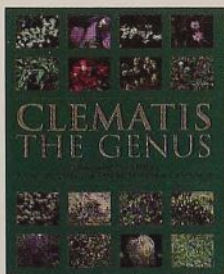


THIS concise illustrated guide provides practical information on selecting, planting, training, and pruning clematis. Photographs show you how to propagate your own clematis from seed, cuttings, or layering. Step-by-step instructions for building a trellis for the vine and details of training clematis to form a globe are covered. An illustrated gallery of selections is arranged according to flowering time.

Clematis the Genus:

A Comprehensive Guide for Gardeners, Horticulturists, and Botanists.

Christopher Grey-Wilson. Timber Press, Portland, Oregon, 2000. Publisher's price, hardcover: \$39.95. AHS price: \$27.96.

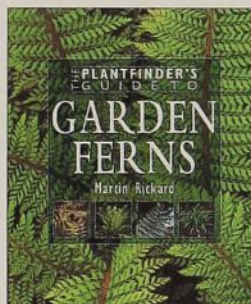


THIS book describes both familiar and rare species, some of which are only found in the wild. The book is comprised of three sections: Cultivation, botany, and classification,

including a survey of all known species. Over 100 color photographs illustrate the range of ornamental characteristics offered by this genus. Keys are included to assist with identification; maps indicate the distribution of species in the wild.

The Plantfinder's Guide to Garden Ferns.

Martin Rickard. Timber Press, Portland, Oregon, 2000. 192 pages. Publisher's price, hardcover: \$34.95. AHS price: \$24.46.



WRITTEN for gardeners, this book demonstrates how easily ferns can be used to enhance nearly every landscape. Rickard discusses how to select, grow, and propagate this diverse group of plants. Enhanced with more than 120 color photographs and 20 line drawings, the book focuses on both hardy species and those for cool conservatories. The alphabetical listing of ferns includes a description, site preference, and hardiness for each species covered.

Water Gardening

Complete Guide to Water Gardens.

Kathleen Fisher. Creative Homeowner, Upper Saddle River, New Jersey, 2000. 201 pages. Publisher's price, softcover: \$19.95. AHS price: \$15.96.

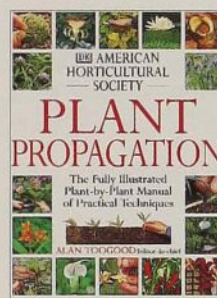
A COMPREHENSIVE guide to water garden design and installation, this book addresses both aesthetic and practical concerns. More than 400 color photographs and diagrams help illustrate design, construction, and maintenance. Details on building a pond's foundation, constructing streams and waterfalls, in-

stalling fountains and lighting, and incorporating bridges and stepping stones are included, as well as a useful encyclopedia of select aquatic plants.

Propagation

AHS Plant Propagation.

Alan Toogood, editor-in-chief. Photography by Peter Anderson. DK Publishing, Inc., New York, 1999. 320 pages. Publisher's price, hardcover: \$34.95. AHS price: \$24.46.



ALL you ever wanted to know about plant propagation can be found in this detailed guide to techniques and equipment used for propagating a wide variety of

plants. Step-by-step instructions, illustrated with color photographs, are provided throughout.

Perennials

Perennials for Every Purpose:

Choose the Right Plant for Your Conditions, Your Garden, and Your Taste.

Larry Hodgson. Rodale Organic Gardening Books, Emmaus, Pennsylvania, 2000. 502 pages. Publisher's price, hardcover: \$29.95. AHS price: \$20.96.

IDEAL FOR novice gardeners, this book covers basic information on site selection, plant selection, buying plants, garden design, and care of perennials. It includes an encyclopedia of over 1,000 perennials arranged by purpose, such as everblooming, moisture-loving, and fantastic foliage. Readers can go directly to the area that most interests them to find out more about each plant.

Regional Happenings

NORTHEAST

SEPT. 9. **Intervale Festival.** Harvest festival and educational events. Sponsored by Gardener's Supply and the Intervale Foundation. Burlington, Vermont. (802) 660-3505.

SEPT. 16. **Harvest Fair.** Brooklyn Botanic Garden, Brooklyn, New York. (718) 623-7220.

SEPT. 20. **Gardeners Fair and Picnic.** Wave Hill, Bronx, New York. (718) 549-2899.

SEPT. 27. **Plants from the Dark Side: New Shade-Loving Perennials.** Lecture by Tony Avent. Cornell University, Ithaca, New York. (607) 255-2407.

SEPT. 30-OCT. 1. **An Early 19th Century Agricultural Fair.** Old Sturbridge Village, Sturbridge, Massachusetts. (800) 733-1830.

OCT. 6 & 7. **A Gathering of Gardeners 2000.** Seminar and plant sales. George Eastman House, Rochester, New York. (716) 271-3361.

OCT. 7. **Antique Apple Tasting.** Old Sturbridge Village, Sturbridge, Massachusetts. (800) 733-1830.

MID-ATLANTIC

SEPT. 9. **Yuletide Farm Community Plant Swap.** Yuletide Farm, Milford, Delaware. (302) 422-2234.

SEPT. 9-OCT. 1. **GardenFest.** Longwood Gardens, Kennett Square, Pennsylvania. (610) 388-1000.

SEPT. 10. **House and Embassy Garden Tour.** Nine properties. Woodrow Wilson House, Washington, D.C. (202) 387-4062.

SEPT. 15 & 16. **Fall Garden Fair and Plant Sale.** Lewis Ginter Botanical Garden, Richmond, Virginia. (804) 262-9887.

SEPT. 15-17. **Harvest Show & Plant Sale.** Frelinghuysen Arboretum, Morristown, New Jersey. (973) 326-7600.

SEPT. 16 & 17. **The Harvest Festival.** Horticultural Center, Philadelphia, Pennsylvania. (215) 988-8800.

SEPT. 17. **Lecture by Lynden B. Miller on ur-**

AHS Events

Events sponsored or co-sponsored by AHS are indicated by an **AHS** symbol. Expanded and updated Regional Happenings listings can be viewed on the Society's Web site at www.ahs.org.

ban design and gardening. Cylburn Arboretum, Baltimore, Maryland. (410) 367-2217.

SEPT. 21-24. **American Dahlia Society National Show.** Doubletree Hotel, Pentagon City, Virginia. (301) 698-2505.

AHS SEPT. 23. **This Magic Moment.** Gala and silent auction. Friends of River Farm. George Washington's River Farm, Alexandria, Virginia. (703) 768-5700.

OCT. 13-15. **Fall Maryland Home & Garden Show.** Timonium Fairgrounds, Timonium, Maryland. (410) 863-1180.

OCT. 21-NOV. 9. **Chrysanthemum Festival.** Longwood Gardens, Kennett Square, Pennsylvania. (610) 388-1000.

SOUTHEAST

SEPT. 7-11. **American Community Gardening Association's 21st Annual Conference.** Loudermilk Center, Atlanta, Georgia. (404) 762-4077.

SEPT. 8 & 9. **Gourd Festival.** Cary Community Center, Cary, North Carolina. (919) 362-4357.

SEPT. 21-OCT. 28. **Fall Candlelight Tours of Homes & Gardens.** Sponsored by the Preservation Society of Charleston. Charleston, South Carolina. (843) 722-4630.

SEPT. 22 & 23. **Conifer Weekend.** Piccadilly Farm, Bishop, Georgia. (706) 769-6516.

SEPT. 23. **GardenFest.** Atlanta History Center, Atlanta, Georgia. (404) 814-4000.

SEPT. 28 & 29. **Fall Gardening Symposium.** Featuring woody ornamentals. Atlanta Botanical Garden, Atlanta, Georgia. (404) 876-5859.

SEPT. 28-OCT. 3. **Roses On My Mind.** The American Rose Society and Deep South Dis-

trict Convention and Rose Show. Crowne Plaza Ravinia Hotel, Atlanta, Georgia. (770) 565-7576.

OCT. 5-8. **Charleston Garden Festival.** Symposium, tours, marketplace. Gaillard Auditorium, Charleston, South Carolina. (843) 722-0661.

OCT. 7 & 8. **Plantfest!** Louisiana State University's Hilltop Arboretum, Baton Rouge, Louisiana. (225) 767-6916.

OCT. 7 & 8. **Secret Gardens of the French Quarter.** Tour. New Orleans, Louisiana. (504) 568-9385.

OCT. 11-14. **Fall Plant Sale.** Wing Haven Gardens and Bird Sanctuary, Charlotte, North Carolina. (704) 331-0664.

OCT. 13 & 14. **American Bamboo Society Annual Meeting.** Lectures, demonstrations, plant sales. Zoo Atlanta, Atlanta, Georgia. (912) 987-1795.

OCT. 13-15. **Chrysanthemum Festival.** Tryon Palace, New Bern, North Carolina. (252) 514-4900.

OCT. 29-31. **3rd International Oak Conference.** North Carolina Arboretum, Asheville, North Carolina. (828) 665-2492.

NORTH CENTRAL

THROUGH OCT. 29. **Jr. Railroad.** Model train exhibit. Chicago Botanic Garden, Glencoe, Illinois. (847) 835-5440.

SEPT. 3, 4, 10, 17, & 24. **Tribute to Trees.** Morton Arboretum, Lisle, Illinois. (630) 719-2465.

SEPT. 23. **Fall Festival.** Minnesota Landscape Arboretum, Chanhassen, Minnesota. (612) 443-2460.

SEPT. 23 & 24. **10th Annual Barberton Mum Fest.** Lake Anna Park, Barberton, Ohio.

SEPT. 28-30. **Community Forestry At Its Best National Conference.** Arbor Day Farm's Lied Conference Center, Nebraska City, Nebraska. (402) 474-5655.

SEPT. 30-NOV. 5. **Chrysanthemum Flower Show.** Garfield Park Conservatory, Chicago, Illinois. (312) 746-5100.

Water Wisdom in Albuquerque

HARNESSING THE beauty of drought-tolerant desert flora with the water-saving principles of xeriscaping will be addressed in "Painting the Desert with Plants," the theme of the 7th Xeriscape Conference, to be held October 20th and 21st at the Albuquerque Convention Center in Albuquerque, New Mexico.

Conference organizers have lined up a host of landscape architects, garden designers, and irrigation specialists to share their expertise on water conservation through xeriscaping. Sandra Postel, the director of the Global Water Policy Project and an internationally recognized author and lecturer, will serve as the keynote speaker. Other well-known presenters include landscape architect and author Jim Knopf; David Salman, owner of Santa Fe Greenhouses and the mail-order nursery High Country Gardens; and garden designer and author Judith Phillips.

The conference fee of \$95 includes attendance at the two-day conference, along with all materials, lunch on both days, and a "Meet the Speakers" reception on Friday evening. Attendance is limited—last year's conference was a sell-out with more than 300 attendees from across the United States—so be sure to register well in advance of the October 4 deadline. The conference is sponsored jointly by the Xeriscape Council of New Mexico—which initiated the conference in



This colorful bed of assorted drought-tolerant plants is part of the xeriscape outside the cacti/succulent house at the Albuquerque Botanic Gardens.

1988—the American Society of Landscape Architects, the New Mexico Conservation Alliance, and the Xeric Garden Club of Albuquerque. For more information, call (505) 343-4121, visit the Council's Web site at www.xeriscapenm.com, or write to the Xeriscape Council of New Mexico, P.O. Box 14311, Albuquerque, NM 87191.

—Margaret T. Baird, Communications Assistant

OCT. 7. **Fall Fest.** The Iowa Arboretum, Madrid, Iowa. (515) 795-3216.

OCT. 7. **Seed Saving Workshop.** Garfield Park Conservatory, Chicago, Illinois. (312) 746-5100.

OCT. 7 & 8. **A Blast to the Past Fall Festival.** Matthaei Botanical Gardens, Ann Arbor, Michigan. (734) 998-7061.

OCT. 7 & 8. **Ohio Gourd Show.** Morrow County Fairgrounds, Mt. Gilead, Ohio. (419) 362-6446.

OCT. 13-15. **Wild Bird and Backyard Habitat Expo.** Waukesha County Expo Center, Waukesha, Wisconsin. (800) 324-3337.

OCT. 14 & 15. **Autumn at the Arboretum.** Klehm Arboretum and Botanic Garden, Rockford, Illinois. (815) 965-8146.

OCT. 14 & 15. **Mum Festival.** Botanica: The Wichita Gardens, Wichita, Kansas. (316) 264-0448.

OCT. 25-28. **International Maple Symposium.** Morton Arboretum, Lisle, Illinois. (630) 719-2468.

SOUTH CENTRAL

SEPT. 16 & 17. **Herb Fest.** Powell Gardens, Kingsville, Missouri. (816) 697-2600.

SEPT. 22-OCT. 15. **Butterflies in the Blachly Conservatory.** Dallas Horticulture Center, Dallas, Texas. (214) 327-8263.

SEPT. 24. **Omaha Council of Garden Clubs Field Day.** Omaha Botanical Gardens, Omaha, Nebraska. (402) 453-5403.

SEPT. 28-30. **58th Annual Bulb & Plant Mart.** Sponsored by the Garden Club of Houston. Westminster United Methodist Church, Houston, Texas. (713) 626-7908.

SEPT. 29-OCT. 1. **Fall Fort Worth Home & Garden Show.** Fort Worth Convention Center, Fort Worth, Texas. (713) 529-1616.

OCT. 6 & 7. **Herb Harvest Fall Festival.** Ozark Folk Center, Mountain View, Arkansas. (870) 269-3851.

OCT. 16-20. **Managing the Mosaic: Connecting People and Natural Diversity in the 21st Century.** The Natural Areas Association 27th annual conference. Regal Riverfront Hotel, St. Louis, Missouri. (573) 751-4115.

OCT. 19-22. **Native Plant Society of Texas Symposium.** Texas Women's University, Denton, Texas. (512) 868-8799.

OCT. 19-22. **Texas Rose Festival.** Tyler Municipal Rose Garden & Rose Museum, Tyler, Texas. (903) 597-3130.

OCT. 20-22. **Fall Texas Home & Garden Show.** Astrohall, Houston, Texas. (713) 529-1616.

OCT. 20-22. **Texas Butterfly Festival.** Mission, Texas. (800) 580-2700.

OCT. 21. **Aunt Flora's Gigantic Fall Plant Sale.** Corpus Christi Botanical Gardens, Corpus Christi, Texas. (361) 852-2100.

NOV. 4. **Fall Family Garden Fair.** San Antonio Botanical Gardens, San Antonio, Texas. (210) 225-5848.

NORTHWEST

SEPT. 9-10. **Hardy Plant Society Plant Sale.** Washington County Fairplex, Hillsboro, Oregon. (503) 224-5718.

SEPT. 12-15. **9th Annual Watchable Wildlife Conference.** Casper Parkway Convention

Center, Casper, Wyoming. (307) 766-5637.

SEPT. 24. **Fall Plant Sale.** Sponsored by Berry Botanic Garden. Cedar Hills Recreation Center, Beaverton, Oregon. (503) 636-4112.

OCT. 1. **Fall Bulb Sale.** Washington Park Arboretum, Seattle, Washington. (206) 325-4510.

OCT. 5-8. **Portland Fall Home & Garden Show.** Portland Expo Center, Portland Oregon. (503) 246-8291.

OCT. 14. **Women in Horticulture Conference.** Association for Women in Horticulture. Shoreline Conference Center, Seattle, Washington. (206) 781-7741.

OCT. 29. **Mushroom Show & Plant Sale.** Mount Pisgah Arboretum, Eugene, Oregon. (541) 747-3817.

SOUTHWEST

SEPT. 25-28. **3rd Rare and Endangered Plant Conference.** Dubois Conference Center, Northern Arizona University, Flagstaff, Arizona. (602) 774-1441

OCT. 13-29. **Annual Fall Landscaping Festival & Plant Sale.** Boyce Thompson Arboretum State Park, Superior, Arizona. (520) 689-2723.

OCT. 14. **Pumpkin Festival.** Chatfield Arboretum, Littleton, Colorado. (303) 973-3705.

OCT. 14-16. **Western Regional Master Gardener Conference 2000 and 10th Southwestern Low Desert Gardening and Landscaping Conference.** Mesa Conference and Convention Center, Mesa, Arizona. (602) 470-1556.

OCT. 20-22. **Arizona Fall Home Show.** Phoenix Civic Plaza, Phoenix, Arizona. (800) 439-7550.

OCT. 28 & 29. **Fiesta de los Chiles.** Chile pepper festival. Tucson Botanical Gardens, Tucson, Arizona. (520) 326-9686.

WEST

SEPT. 2 & 3. **Fern and Exotic Plant Show and Sale.** Los Angeles International Fern Society. Arboretum of Los Angeles County, Arcadia, California. (562) 864-0883.

SEPT. 8-10. **South Bay Home & Garden Show.** Santa Clara Convention Center, Santa Clara, California. (800) 765-3976.

SEPT. 9. **Heirloom Tomato Festival.** Kendall-Jackson Wine Center, Santa Rosa, California. (800) 769-3649.

The Monarchs at Pacific Grove

IF YOU'RE ENTHRALLED at the sight of butterflies fluttering through your garden, consider a visit to the Monarch Grove Sanctuary in Pacific Grove, California, which calls itself "Butterfly Town, USA." From October through February, this small community on the state's central coast plays host to thousands of monarch butterflies that spend their winter in a naturalized grove of blue gum eucalyptus trees (*Eucalyptus globulus*). These stately trees, some 100 years old, provide the butterflies with the right balance of temperature and humidity vital for the semi-hibernation state they enter each winter. "Monarchs are attracted to the long leaves of this type of eucalyptus, where they form clusters," explains Ro Vacarro, president of Friends of the Monarchs, a non-profit organization that leads tours of the grove and safeguards its fragile visitors. "The trees form a flat canopy of foliage, which shelters the monarchs and keeps temperatures steady," she says. Monarchs also need the moisture provided by the coastal fog rolling off the Pacific, and a stand of Monterey pines (*Pinus radiata*) in the grove fosters the delicate microclimate by providing protection from the wind and freezing temperatures.

Friends of the Monarchs estimate that some 35,000 monarchs overwinter annually in Pacific Grove—one of several destinations in the butterflies' complex migratory loop, which annually takes them thousands of miles up and down the west coast of North America and spans four generations in a single year. A hushed awe pervades the area on autumn mornings, when the sun emerges and the seemingly lifeless monarchs, huddled together with folded wings, begin to stir with the warmth of the sun's rays. The peaceful atmosphere in the two-and-a-half acre grove is preserved despite the thousands of visitors that flock to the area each fall to observe this wonder of nature. Last year, some 100,000 people from around the world viewed the enormous clusters of butterflies. "We notice how visitors to the grove respond when they first view this spectacular sight," Vacarro says. "It softens their faces and brings their voices down to whispers."

The Monarch Grove Sanctuary is located between Ridge Road and Grove Acre Avenue in Pacific Grove. For more information, call the Pacific Grove Chamber of Commerce at (800) 656-6650, or visit the Friends of the Monarchs Web site at www.pgmonarchs.org/fomh.html.

—Karen L. Dardick, special from Los Angeles, California

SEPT. 22 & 23. **Gardening Under Mediterranean Skies II: Horticulture in a Drier Landscape.** Garden design symposium. Strybing Arboretum & Botanical Gardens, San Francisco, California. (415) 661-1316.

SEPT. 29-OCT. 1. **Peninsula Fall Home & Garden Show.** San Mateo Expo Center, San Mateo, California. (800) 765-3976.

OCT. 11-14. **Fall Plant Festival.** Huntington Botanical Gardens, San Marino, California. (626) 405-2141.

OCT. 12-15. **Fall Plant Festival.** Huntington Botanical Gardens, San Marino, California. (626) 405-2141.

OCT. 14 & 15. **Arborfest & Fall Plant Sale.** Fullerton Arboretum, Fullerton, California. (714) 278-4790.

OCT. 27-29. **Orchid Harvest: 14th Annual East West Orchid Show.** The New Otani Hotel and Garden, Los Angeles, California. (619) 296-4287.

OCT. 28-NOV. 19. **Rhinos Who Surf.** Chrysanthemum Festival. San Diego Wild Animal Park, San Diego, California. (760) 747-8702.

NOV. 3-6. **Bonsai—Bearing Fruit.** Annual convention of the Golden State Bonsai Federation. Oakland Marriott, Oakland, California. (650) 429-2749.

NOV. 4 & 5. **Japanese Garden Festival.** Descanso Gardens, La Canada, California. (818) 952-4401.

CANADA

SEPT. 7-9. **3rd International Symposium on Japanese Gardens.** Montreal Botanical Garden, Montreal, Quebec. (514) 872-0607.

SEPT. 17. **Fruit Growers Festival.** Devonian Botanic Garden, University of Alberta, Edmonton, Alberta. (780) 987-3054.

NOV. 2-12. **The Winter Garden Show at the Royal.** The Coliseum at the National Trade Center, Exhibition Place, Toronto, Ontario. (416) 263-3400.

New Products



SelecTimber™

SelecTech, a company that manufactures a range of quality products from low-end scrap materials, has just released SelecTimber, a timber look-alike made from 100 percent recycled molded plastic. Lightweight and impervious to rot and weather extremes, SelecTimber is an attractive, smart choice for retaining walls, raised beds, and other home garden landscaping projects. The 5½-inch-by-5½-inch timbers are available in eight-foot-long sections, priced at \$18 to \$22 per timber.

SelecTech, Inc., 15 Fourth Street, Taunton, MA 02780. (877) 647-5400.

Reppers®

Keep your landscape dog and cat free with Reppers pellets, biodegradable puffed rice grains treated with methyl nonyl ketone and oil of citronella that dispense an odor that animals find offensive. A kit includes four mushroom-shaped evaporator pods designed to prolong the effectiveness of the Reppers grains by protecting them from the elements. Each pod will treat a 12-square-foot area, and the grains are effective for up to six weeks, after which the pods should be refilled. A set of four evaporator pods and a 3½-ounce jar of Reppers grains retails for \$19.99. Refill jars are \$9.95.



Beaphar, 6200 Falls of the Neuse Road, Suite 102, Raleigh, NC 27609. (919) 855-9990. www.beaphar.com.

Sluggo®

Now you can get rid of slugs in your garden without fear of poisoning pets or wildlife. Sluggo, a snail and slug bait originally developed in Europe, has been earning rave reviews for its effectiveness and safety. While most slug baits contain metaldehyde, which is toxic to a variety of animals, Sluggo's active ingredient is iron phosphate, a slow-acting organic compound that kills snails and slugs before biodegrading into the garden. A one-pound shaker, which will treat up to 1,000 square feet, sells for \$10 to \$11; the 2½-pound container treats up to 2,500 square feet and retails for \$15 to \$17.

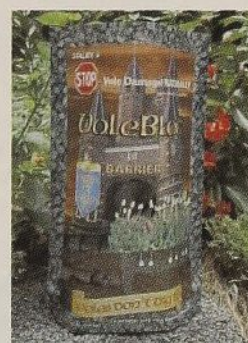


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Monterey Lawn and Garden Products, Inc., 3654 S. Willow Avenue, P.O. Box 35000, Fresno, CA 93745-5000. (559) 499-2100. www.montereylawngarden.com.

VoleBloc™

Deter tunneling voles from damaging your bulbs and other tender landscape plants with Volebloc, a lightweight, non-toxic, coarse aggregate derived from kiln-fired slate rock. Mixed into the soil, Volebloc repels voles, which will avoid tunneling through such abrasive material. As an added benefit, Volebloc improves the porosity and drainage of the soil, thereby encouraging root growth.



Carolina Stalite Company, P.O. Box 1037, Salisbury, NC 28145-1037. (877) 737-6284. www.volebloc.com.

Classifieds

CLASSIFIED AD RATES: All classified advertising must be prepaid. \$2.50 per word; minimum \$60 per insertion. Copy and prepayment must be received on the 20th of the month three months prior to publication date. Send orders to: AHS Advertising Office, 1775 Jamieson Street, Suite 210, Alexandria, VA 22314-5715. Phone (703) 518-4700; fax (703) 518-8495.

BOOKS

Hortica: Color Cyclopaedia of Garden Flora with Hardiness Zones and Indoor Plants, 8,100 color photos by Dr. A. B. Graf, \$238.

Tropica 4: 7,000 color photos of plants and trees for warm environments, \$165.

Exotic House Plants: 1,200 photos, 150 in color, with keys to care, \$8.95.

Shipping additional. Circulars gladly sent.

ROEHRS CO., Box 125, East Rutherford, NJ 07073. (201) 939-0090. FAX (201) 939-0091.

GREENHOUSE PLASTICS

BOB'S SUPER-STRONG GREENHOUSE PLASTIC—Pond Liners. Resists hailstones, yellowing, leafburning. Samples: 2 stamps appreciated. Box 42AG, Neche, ND 58265; (204) 327-5540 daily.

INTERNET

GARDENWEB. Come visit with other gardeners from around the world at GardenWeb, the Internet's garden community: www.gardenweb.com.

PEONIES

BEAUTIFUL JAPANESE/CHINESE TREE PEONIES. Wide variety of exotic, INEXPENSIVE peonies available. Catalog \$3. All plants 3 years old and older. SMIRNOW'S SON'S PEONIES, Dept. AG, 168 Maple Hill Road, Huntington, NY 11743. Phone: (631) 421-0836.

ROSES

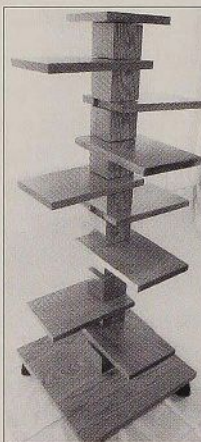
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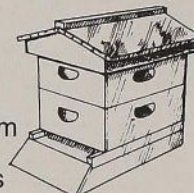
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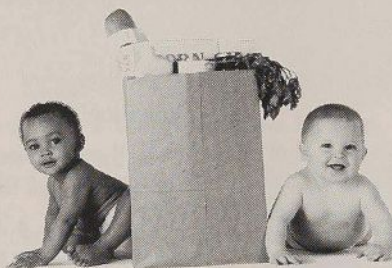
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Pronunciations and Planting Zones

Most of the cultivated plants in this issue are listed here with their pronunciations and USDA Plant Hardiness and AHS Plant Heat Zones. If 0 is listed in place of USDA hardiness zones, it means that plant is a true annual—it completes its life cycle and dies in a year or less. Tropical plants that are hardy only in USDA Zone 11 are listed by minimum average temperature. To purchase an AHS Plant Heat Zone Map, call (800) 777-7931 ext. 0.

A-E

Acacia albida uh-KAY-shuh
AL-bih-duh (10-11, 12-9)
Acanthus mollis uh-KAN-thus
MOL-lis (7-11, 12-4)
Andropogon gerardii an-dro-PO-gon
jeh-RAR-dee-eye (2-7, 7-1)
Anemone × **hybrida** uh-NEM-o-nee
× HY-brih-duh (4-8, 8-1)
Annona glabra uh-NO-nuh GLAB-
ruh (9-11, 12-10)
Anthurium hookeri an-THUR-ee-um
HOOK-er-eye (10-11, 12-10)
Arbutus unedo AR-byew-tus YEW-
nee-doh (8-9, 9-6)
Arundinaria gigantea subsp. **tracta**
ah-run-dih-NAIR-ee-uh jy-GAN-
tee-uh subsp. TEK-tuh (5-9, 9-4)
Aristolochia macrophylla uh-ris-
toe-LO-kee-uh mak-ro-FIL-luh
(5-8, 8-4)
Artemisia filifolia ar-teh-MEEZ-yuh
fih-lih-FO-lee-uh (4-8, 8-1)
Aster divaricatus ASS-ter dih-vair-
ih-KAY-tus (3-9, 9-1)
Bouteloua gracilis boo-teh-LOO-uh
GRUH-sih-liss (5-9, 12-4)
Carex siderosticha 'Variegata'
KAIR-eks sih-dur-ROS-tih-kuh
(6-9, 9-3)
Carya illinoensis KEH-ree-uh ill-
ih-no-ih-NEN-sis (5-9, 9-5)
Castanea dentata kas-TAY-nee-uh
den-TAY-tuh (4-8, 8-1)
Catalpa speciosa kuh-TAL-puh
spee-see-O-suh (4-8, 8-1)
Chionanthus retusus ky-o-NAN-thus
reh-TOO-suss (5-9, 9-3)
Chorisia speciosa chor-ISS-ee-uh
spee-see-O-suh (10-11, 12-9)
Clerodendrum ugandense klee-
o-DEN-drum yew-gan-DEN-see
(9-11, 12-3)
Coffea arabica CAW-fee-uh uh-
RAB-ih-kuh (10-11, 12-1)
Colocasia esculenta kol-o-KAY-see-
uh es-kyew-LEN-tuh (10-11, 12-4)
Cyathea cooperi sy-ATH-ee-uh
KOO-pur-eye (10-11, 12-10)

Cyperus papyrus sih-PER-us puh-
PY-russ (9-11, 12-8)
Elaeocarpus decipiens el-ee-
o-KAR-pus dee-SIP-ee-enz
(8-11, 12-8)

F-N

Ficus carica FY-kus KAH-ree-kuh
(7-10, 12-1)
F. religiosa F. ree-lij-ee-O-suh
(10-11, 12-1)
Fragaria chiloensis frah-GAY-ree-
uh chil-o-EN-sis (4-8, 9-7)
Fraxinus americana frak-SIH-
nus uh-mair-ih-KAN-uh
(6-9, 9-3)
Hibiscus moscheutos hy-BISS-kus
mos-KOO-tos (5-11, 12-1)
H. rosa-sinensis H. RO-zuh-sy-
NEN-siss (9-11, 12-1)
Hydrangea quercifolia hy-DRAN-
juh kwer-sih-FO-lee-uh (5-8, 8-1)
Ilex glabra EYE-leks GLAB-ruh
(5-9, 9-3)
Imperata cylindrica 'Rubra' im-
peh-RAH-tuh sih-LIN-drih-kuh
(4-9, 9-3)
Jacaranda mimosifolia jak-uh-RAN-
duh mih-mo-sih-FO-lee-uh
(11, 12-10)
Juglans regia JEW-glanz REE-jee-
uh (5-9, 9-7)
Leptospermum scoparium lep-toh-
SPUR-mum sko-PAR-ee-um
(9-10, 12-3)
Liatris punctata ly-AY-triss punk-
TAY-tuh (4-9, 9-1)

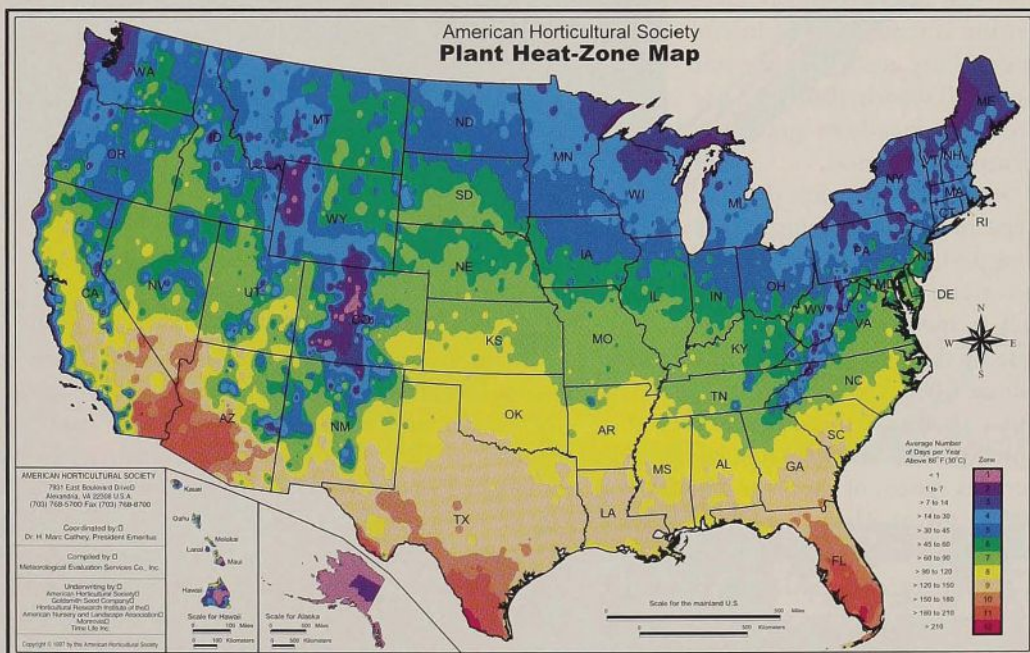
Machaeranthera canescens mak-
ee-RAN-thur-uh kuh-NES-senz
(7-9, 9-7)
Magnolia macrophylla mag-NOLE-
yuh mak-ro-FIL-luh (6-9, 9-6)
Mentzelia decapetala ment-ZEE-
lee-uh dee-ca-PET-uh-luh (4-8,
12-7)
Myrica cerifera my-RIH-kuh seh-
RIF-er-uh (6-9, 9-5)
Nyssa sylvatica var. **biflora** NIS-suh
sil-VAT-ih-kuh var. by-FLOR-uh
(5-9, 9-5)

O-S

Opuntia ficus-indica o-PUN-shuh
FIE-kus-IN-dih-kuh (9-11, 12-9)
O. imbricata O. im-brih-KAY-tuh
(9-11, 12-9)
Panicum virgatum PAN-ih-kum
vur-GAY-tum (5-9, 9-5)
Parthenocissus quinquefolia par-
then-o-SISS-us kwin-kweh-FO-
lee-uh (4-9, 9-5)
Phlox divaricata FLOKS dih-vair-ih-
KAY-tuh (3-9, 8-1)
Pyrostegia venusta py-ro-STEE-juh
veh-NEW-stuh (10-11, 12-9)
Quercus virginiana KWER-kus vir-
jin-ee-AN-uh (8-11, 12-8)
Salix caroliniana SAY-iks kar-o-lin-
ee-AY-nuh (6-9, 9-3)
Salvia koyamae SAL-vee-uh ko-
YAH-mee (5-9, 9-4)
Schizolobium parahybum skits-o-
LO-bee-um pair-uh-HY-bum
(10-11, 7-1)
Senecio spartioides seh-NEE-see-o
spar-tee-OY-deez (4-7, 8-3)
Solidago flexicaulis sol-ih-DAY-go
flek-sih-KAW-liss (6-8, 8-6)

T-Z

Taxodium distichum taks-O-dee-um
DIS-tih-kum (5-11, 12-5)
Tricyrtis affinis try-SUR-tiss uh-
FEE-niss (5-9, 9-4)
T. flava T. FLAY-vuh (5-9, 9-4)
T. formosana T. for-MO-san-uh
(6-9, 9-4)
T. hirta T. HUR-tuh (4-9, 9-1)
T. lasiocarpa 'Amethystina'
T. las-ee-o-KAR-puh (7-9, 9-5)
T. latifolia T. lat-ih-FO-lee-uh
(3-8, 8-1)
T. macrantha T. muh-KRAN-thuh
(5-8, 9-4)
T. macranthopsis T. muh-kran-
THOP-sis (5-8, 9-4)
T. macropoda T. mak-ro-PO-duh
(4-9, 9-1)
T. maculata T. mak-yew-LAY-tuh
(5-9, 9-4)
T. nana T. NAH-nuh (5-8, 9-4)
T. ohsumiensis o-soo-mee-EN-sis
(5-8, 9-4)
T. perfoliata T. per-fo-lee-AY-tuh
(5-8, 9-4)
T. setouchiensis T. seh-too-chee-
EN-sis (5-8, 9-4)
Typha latifolia TY-fuh lat-ih-FO-lee-
uh (2-11, 12-1)
Ulmus glabra 'Camperdownii' UHL-
mus GLAB-ruh (3-9, 8-2)





Notes from River Farm

Meadow, Grove, and Stream

by Janet Walker

WE HAVE GROVES IN ABUNDANCE here at River Farm, and a tidal “stream”—the mighty Potomac—that rivals in its beauty any river in the East. Now we are fashioning ourselves meadows, too, to bask in Wordsworth’s “celestial light,” of which we enjoy a surfeit. And of course our meadows serve more pragmatic purposes as well, such as reducing the amount of time we spend mowing grass—and thus our contributions to air, water, and noise pollution. This is an important consideration given the number of visitors who flock to River Farm in the summer.

It appears the dominion of the lawn may be finally waning, here in the United States as elsewhere. We all know—and appreciate—a good lawn when we see one. But we also know by now the awful environmental price we pay for the vast monoculture of our outdoor carpets. Entire ecosystems are currently in jeopardy owing to this pleasant indulgence, but we only have to lock up the mowers for a season or two to swing the balance.

Of course, nothing is ever quite that simple: Human intervention is required even in settings where aesthetics are not critical. If woody plants are not removed, meadows gradually become woodlands.

Since the mid-1990s, the U.S. Department of Agriculture has been paying farmers by the acre to convert unproductive fields back to meadowland. The purpose of this program is to re-establish habitat for the wide range of distressed fauna that call meadows home, and which play an integral role in nature’s complex system of checks and balances.

Our job at River Farm will be even more complex. We are a companionship of gardeners, and gardening implies a degree of control. Our aim is not to simply let the chips fall where they may—

an easy but frequently untidy solution—but to achieve, instead, a sort of “designer” meadow. Many of our native plant species evolved and thrive best in meadows, and these will be receiving our particular attention and encouragement.



A nascent meadow takes shape on the sloping field that runs along the banks of the Potomac at River Farm.

Just as introduced species of birds will have to be prevented from commandeering the bluebird nesting boxes we’ll be featuring in our meadow, invasive non-native plants will have to be held at bay and dealt with at ground level. We know that, ideally, 70 percent of our meadow should consist of warm-season grasses, and that these should be of the clumping variety to facilitate the movement of

wildlife among them. We know which birds and butterflies favor particular plants, and which plants make ideal companions. We know how to provide for the needs of the pollinators, and how they in turn can be made to serve us.

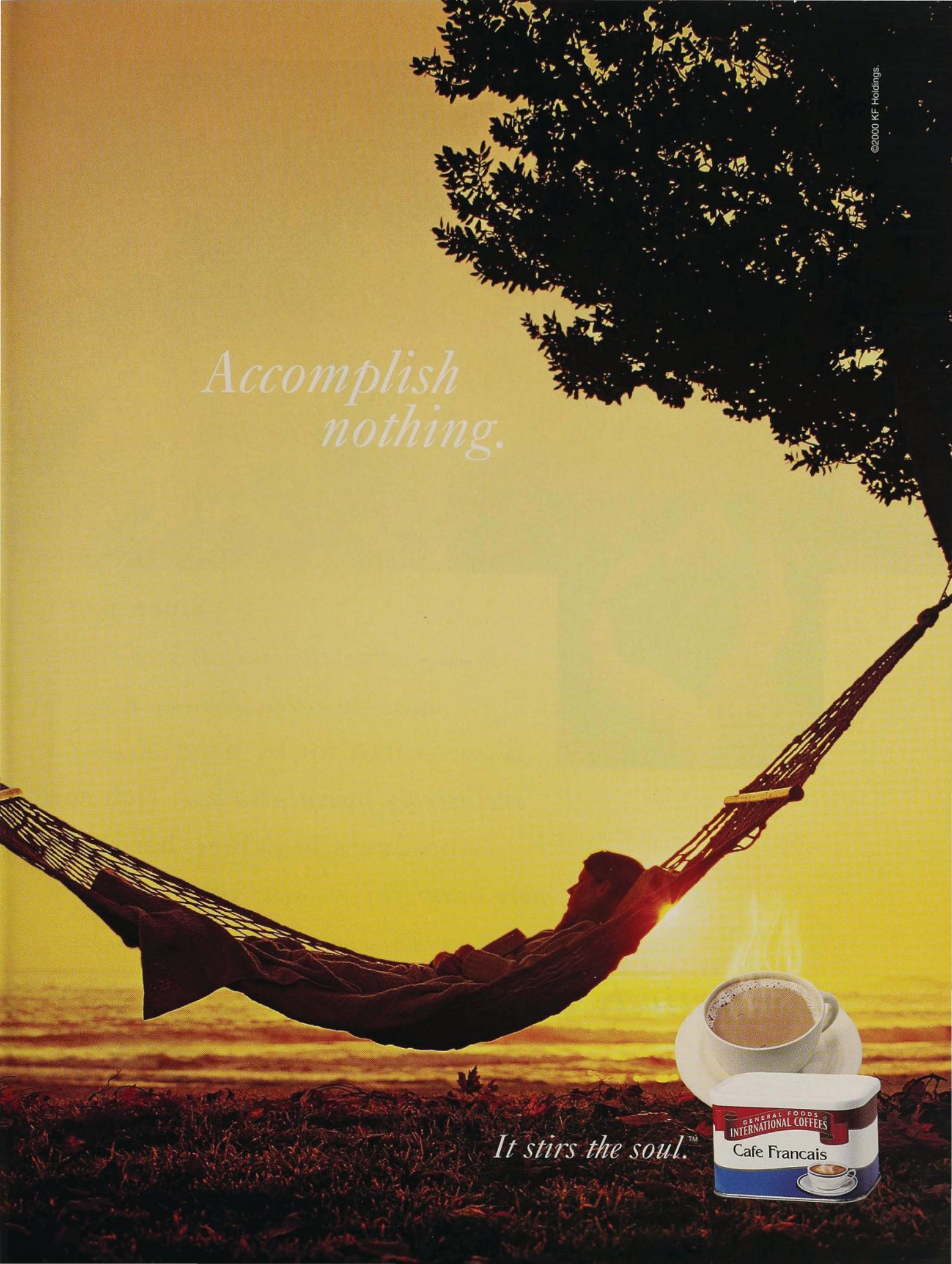
In addition to encouraging bluebirds to nest at River Farm, we intend to put up a purple martin house overlooking the meadow. A single martin will eat up to 2,000 mosquitoes a day, so an entire colony, if we can attract them, will improve our quality of life in more ways than meet the eye. Other kinds of wildlife no doubt will come unsolicited to make their own contributions to our quality of life and the diversity of our meadow.

Since this is a new venture for us, there will undoubtedly be a learning curve involved here. We will keep you updated

on what we learn. And if any of you have already gone this route, we’d love to hear from you. This is “smart gardening” in its elemental form, so let’s compare notes. You can reach me by e-mail at jwalker@ahs.org.

Janet Walker is director of horticulture at the American Horticultural Society’s River Farm headquarters.

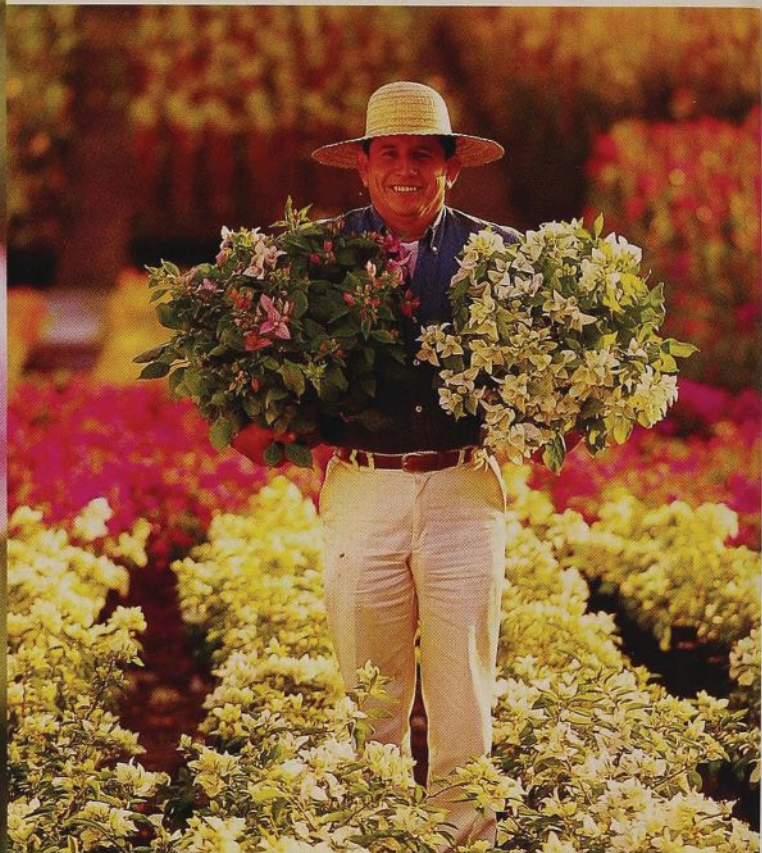
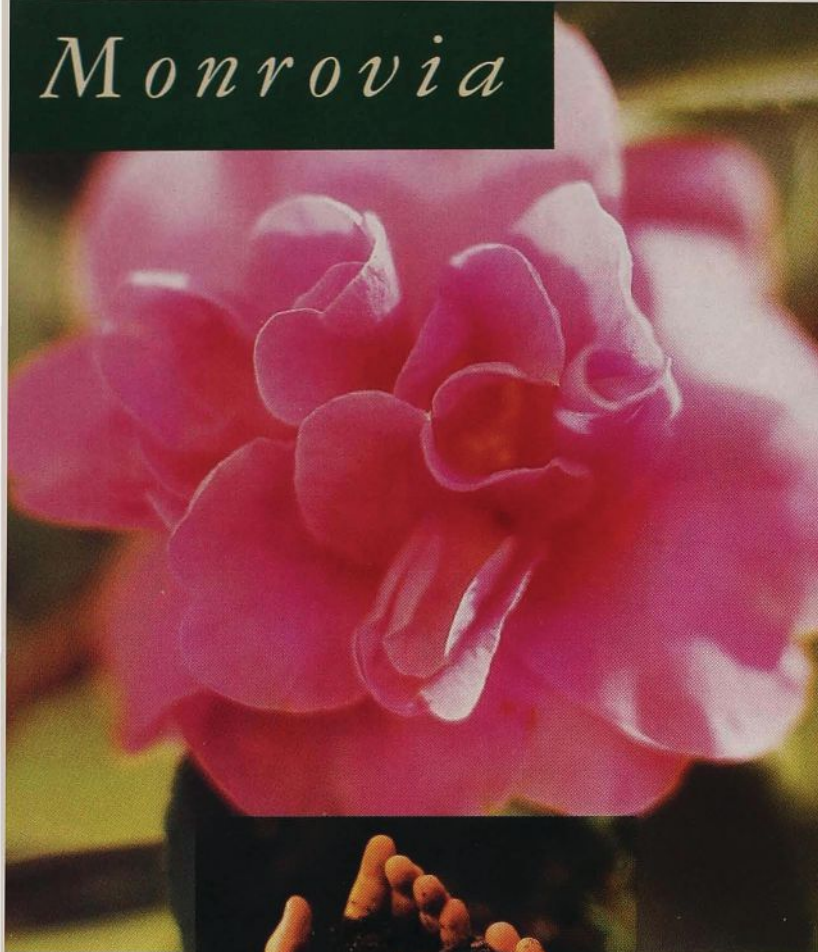
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