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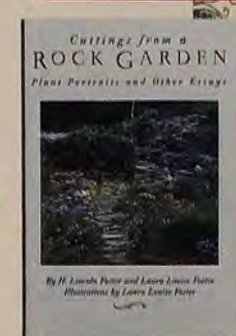
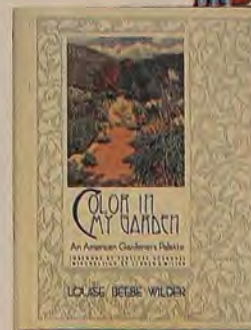
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American Horticulturist

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JUNE'S COVER

Photographed by James O. Yeager

The American beautyberry (*Callicarpa americana*) produces bright purple bunches of berries spaced along its branches. Birds love its fruit, and it will grow almost anywhere. Beginning on page 18, Arkansas writer Alice Yeager describes this and other native shrubs and small flowering trees that she has learned to substitute for plants not tough enough for Southern summers.

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COMMENTARY

As I travel around the country, I am struck by the change in awareness that has occurred during the past year. Such concerns as the drought in California (well into its fifth year), ground water contamination in the heavily populated East, community recycling initiatives, and controversies over manufacturers' claims of biodegradability have made the sort of front page news that in the 1980s was captured by surges in our economic growth. Greenpeace has replaced greenmail. But just as the "greed is good" ethic led to shenanigans on Wall Street, unbridled environmentalism is not always as good as the movement's leaders think.

Do they really *think* carefully about all the positions they take, or is their thinking done for them? What is the scientific basis for celebrities' claims that our children are at risk and the earth is being destroyed? They are now appealing to our emotions in the same way that corporate media stars urged us during the '80s to push ourselves to the limit in going for the good life. Many of us did not know our limits and learned about something called burnout. We did some great things, and our economy boomed. However, many of us have no more in 1991 than we had in 1981; some have even less.

So it is with much of the environmental movement. What price will we have to pay? While heightened awareness is always good, hypersensitivity—in this case to our natural world—can be a double-edged sword. There is no question that metal-lined, single-serving "drink" boxes should be reconsidered as the appropriate way to package liquids. But will our zeal to eliminate plastics, pesticides, and other ecological sinners cost our economy its much needed growth and competitiveness? Should it be allowed to threaten the livelihood of thousands of vegetable and fruit growers across the country who use pesticides judiciously? Does the public know how carefully pesticides are tested and regulated, and that it is not their use, but their abuse, that threatens us? And do they consider whether and how much the price of fresh produce might increase, and its availability decrease, if we stopped using chemicals to grow it?

The public needs a balanced view. This is why organizations such as ours exist. There is no substitute for sound, empirical data. Propaganda alone has never saved a species, nor will it alone save the earth. There will always be hyperbole because these are emotional issues. Long before and after we think about them, we will have feelings about them. So the need for scientifically based information is great.

We at the American Horticultural Society believe we can help fill the information gap with respect to horticulture and related environmental problems. We can go to the appropriate academic and professional organizations to learn the scientific basis for issues that are raised and claims that are made. That information and that balance will be reflected in the information that we pass along to you, to help you stay in perspective.

George C. Ball Jr.
AHS President





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AUGUST 1-12, 1991 SUMMER GARDENS OF CANADA

An exploration voyage along the Saint Lawrence River on board the small river steamer *M/V Victorian Empress* that begins in Montreal and concludes in Toronto. Using the ship's ability to navigate to numerous locations along the Saint Lawrence, we will be able to visit, with relative ease an amazing variety of gardens. Garden highlights include AHS members Francis and Anne Cabot's "Les Quatre Vents" in Murray Bay; Evergreen Garden, home of Anstice Esmond-White in Kemptonville; and the delightful cottage garden of Allen and Penelope Paterson in Hamilton. This exciting program is being led by Beverley White Dunn, long-time AHS Board Member, and Canadian naturalist Joan Williams.

SEPTEMBER 30-OCTOBER 20, 1991 GARDENS OF ASIA

Join AHS Executive Director Frank Robinson on a program that encompasses Thailand, China, and Japan. Highlighted are excursions to the ruined city of Ayutthaya; hillside villages near Chiang Mai; a jungle safari on elephantback to the village of Karen near Mae Hong Son; Beijing and the forbidden city; Xi'an and the tomb of Emperor Qin Shi Huangdi with its army of terra cotta figures; Shanghai's Yu Garden and Museum of Art and History; the beautiful gardens of Suzhou; Kyoto's holy Saihoji Moss Temple, Nijo Castle, and Ryoanji Rock Garden; and Nikko's botanical gardens. And by special invitation, we will visit the Imperial Palace Gardens as well as the Jindaiji Botanical Gardens in Tokyo.

OCTOBER 17-24, 1991 GARDENS OF CALIFORNIA

A most unique voyage in San Francisco Bay from which we will navigate up the Sacramento and Napa Rivers, a feat that has been thought impossible. With the help of AHS members and friends we visit a wonderful collage of private gardens in Woodside, Piedmont, Berkeley, Lafayette, Orinda, Walnut Creek, Sacramento, Davis, and Napa. Program highlights include four private gardens belonging to board members of the historic Filoli estate including James and Lurline Coonan, Mr. and Mrs. Eugene C. Trefethern Jr. of Napa, and Ruth Bancroft, whose garden in Walnut Creek, was featured in the October 1989 issue of *American Horticulturist*. This program is being led by Mrs. Harry Van de Kamp of Paso Robles, California, a former AHS Board Member whose collaboration with this program makes it a once-in-a-lifetime opportunity.

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Daitokuji Temple in Kyoto. Participants in an October tour of Asia will visit several Kyoto gardens.

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LETTERS

Those Hardy Alaskans

I am a newcomer to the Society but have thoroughly enjoyed the magazine so far. I was very interested, of course, to read the article on gardening in Alaska by Lenore Hedla (February) as I live in almost the same latitude and am always trying out plants to test their hardiness.

I came from England in 1951 so I am especially interested in growing English perennial flowers. Some species that Ms. Hedla mentions as impossible here *will* grow though some do not rebloom as freely as they do "outside." The bearded irises will grow here, given a south wall and a sheltered bed to encourage them.

Although Ms. Hedla says that the only perennial flowering vine that will do well here is *Clematis tangutica*, I have had luck with honeysuckle cultivars and another species clematis. I don't have the name, but it is pale pink, has delicate, drooping flowers, and it never dies back, even in bad winters.

I also have a number of fruit trees, and except for horrible damage by browsing moose, they do sometimes bear apples.

Nancy M. Sogge
Haines, Alaska

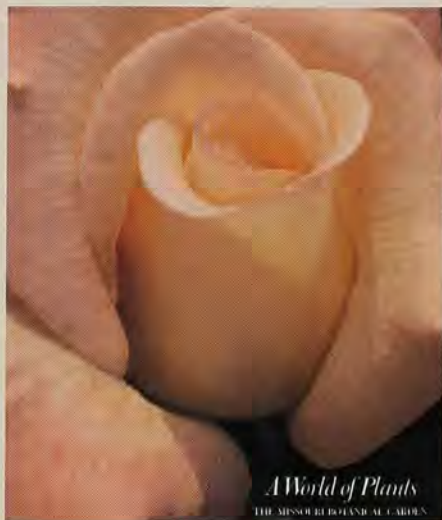
Begonia Fan

Many thanks to you and Lorra Almstedt for the excellent article on begonias in your February issue. Ms. Almstedt and your magazine have provided a great public service by helping people to learn more about this family of plants. I hope your readers will be encouraged by the article to try their hand at growing this very diverse and rewarding plant.

Russell H. Richardson
Chamblee, Georgia

American Horticulturist welcomes letters concerning the magazine or activities of the American Horticultural Society. Letters may be edited for accuracy, clarity, or length. In writing to us, please include a daytime phone number.

BOOK REVIEWS



A World of Plants— The Missouri Botanical Garden

Marshall R. Crosby, Peter Loewer, and Charlene Bry. Harry N. Abrams, Inc., New York, 1990. 191 pages. Color and black-and-white photographs and illustrations. Publisher's price, hardcover: \$39.95. AHS member price: \$33.95.

This colorful book is not a gardening book in the strict sense. It is a book about a garden: the Missouri Botanical Garden and the important role played by this institution in our daily lives. While "dirt" gardeners may not find this book on their ten-best list, the authors have succeeded in making it informative and easily read.

Of special interest to many amateur gardeners is a not-too-detailed but clear and concise explanation of how and why plants have scientific names. Another explanation as to what makes a genus or a species will not be stimulating to many, but this is one of the best attempts to simplify a complex concept. There is also a good discussion of the relationship between plants and other living organisms. The authors have been careful to relate the essays to our daily lives without being heavy handed.

Garden history buffs will enjoy the brief biography of Henry Shaw, the garden's

founder, and the early history of the garden's establishment. Designers and gardeners will find the descriptions of the various special gardens within the Missouri Botanical Garden enlightening. The attractive photographs help transmit a feeling for each garden and the list of plants is helpful.

My only criticism is that in one instance the authors slip up and tell us that "plants breathe." This is not true. They respire. Breathing is the mechanical process of inhaling and exhaling utilized by many animals to exchange gases, while respiration is a chemical process. But this is a small matter in this instance and easily forgiven.

A World of Plants is the type of publication that one can browse and skip through. The excellent photographs by Kiku Obata and well-reproduced botanical prints add a great deal to the reader's enjoyment and qualify this book to rest on any coffee table as a showpiece.

Finally, there is a message within a message. Not only are plants attractive and important to our continued well-being, but so are institutions like the Missouri Botanical Garden, which play a key role in the discovery and understanding of these important natural resources.

—Larry G. Pardue

Larry G. Pardue is executive director of the Marie Selby Botanical Gardens in Sarasota, Florida.

The Italian Renaissance Garden

Claudia Lazzaro. Photographs by Ralph Lieberman. Yale University Press, New York and London, 1990. 342 pages. Color photographs and illustrations. Publisher's price, hardcover: \$55.00. AHS member price: \$46.75.

In this splendid book, subtitled "From the Conventions of Planting, Design and Ornament to Gardens of Sixteenth Century Central Italy," the author describes the aristocratic, architectural Renaissance gardens near Rome and Florence between 1530 and 1590, particularly the four best-



preserved, at villas Medici, d'Este, and Lante and the Boboli Gardens.

All gardens suffer deviation from original plans at the hands of succeeding generations with different needs and tastes. Lazzaro's task, performed admirably, was to show us these magnificent places as they were, using contemporary prints and paintings, garden books, literary and travel journals, plant lists, and documents of gardens now gone or altered. Ralph Lieberman's beautiful photographs depict their present beauty.

Renaissance garden designers believed in the symbiotic relationship between art and nature in a "hierarchical universe," with "God at the summit, human beings in the center, and nature below." Garden art, by their definition, embraced not only landscape design, magnificent vistas, controlled geometric planting, and sculpted ornament, but science, architecture, earth moving, and above all, hydraulics and water-powered devices. Without the engineers who knew how to tap and use the multiple underground springs in Italy in the most extravagant and dramatic presentation of fountains, water chains, water stairs, alleys of fountains, lakes and lagoons, these gardens would not be.

Likewise, the term "garden" was a metaphor for a "closed orderly system," vast


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enough to contain infinite variety: buildings, planted terraces, topiary, grottoes, labyrinths, outdoor theater, allegorical and antique sculpture, grand staircases and walls, great trees, flowers, herbs, boxwood designs, *en broderie*—precisely laid out orchards and tubs of orange trees; *this* was a garden.

Directly adjacent and an integral part of the whole estate or villa was the great park, vineyard, and woodland; indeed, it was suggested that "ordered nature must be accompanied by its opposite," a more loosely planted landscape without geometry, allowing native greenery to remain.

This book is a delightful and scholarly contribution to our knowledge of the horticulture, artistry, science, and grand designs, conceived and laid on the ground in Italy 400 years ago.

—Faith Jackson

Faith Jackson, former book editor of the Miami Herald, is a Master Gardener who writes frequently about garden matters.

An Oak Spring Pomona: A Selection of the Rare Books on Fruit in the Oak Spring Garden Library

Sandra Raphael. Oak Spring Garden Library, Upperville, Virginia, 1990. 276 pages. Color and black-and-white illustrations. Publisher's price, hardcover: \$60.00. AHS member price: \$51.00.

Sandra Raphael is well on her way to creating a series unequaled in historic garden literature. The first book in the series, *An Oak Spring Sylva*, a tour through the historic books on trees in Mrs. Paul Mellon's private library in Upperville, Virginia, whet our appetites. *Pomona* goes a long way toward satisfying that hunger.

The tasteful mix of bibliography and history is easy to read and makes authors, illustrators, and their times, from the sixteenth to the nineteenth century, come alive. First-hand accounts describe long ago orchards—how the trees were arranged and the mode of cultivation. We learn that William Coxe "wrote the first home-grown American book on fruit-growing" in 1817, providing illustrations for many of his excellent descriptions. In "Cyder. A Poem," John Philips described in "Miltonic blank verse" the care and methods of apple propagation and lists apple varieties popular in 1708.

Much of the book is devoted to European and exotic cultivation, organized by century, with a short treatment of the American experience. Individual fruit types such as apples, pears, peaches,

grapes, and melons are given special attention. This arrangement allows one to see the connection between countries, nurseries, and collectors of new specimens from around the world.

I was disappointed that the section on grapes contained only one American imprint from the six or so titles that are rare, but the appearance of books on cranberry culture in America in the section on soft fruits was a pleasant surprise.

There are 170 images, more than sixty of which are in color. The illustrations are not just images of the fruit itself, but also show the tools used to grow them, methods of pruning and grafting, trellis and wall training, and plans for the orchards and grounds that are described.

The careful reader will acquire tips for cultivating fruit in small spaces, along walls, and in hot houses. Many of the cultivation techniques in these historic books have been forgotten and *Pomona* offers them eagerly.

An *Oak Spring Pomona* captures the emotions and tastes of the past and, in presenting them to us, helps preserve times of beauty, knowledge, and appreciation for more than just another 'Golden Delicious'.

—Keith Crotz

Keith Crotz owns and operates American Botanist, Booksellers, in Chillicothe, Illinois.

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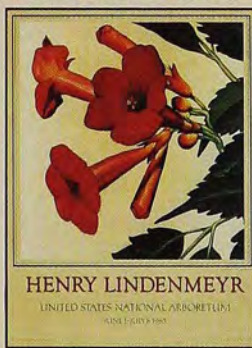
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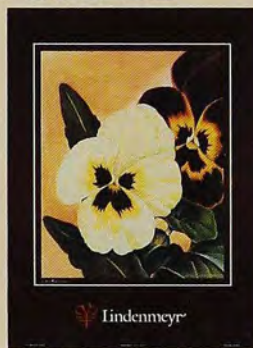
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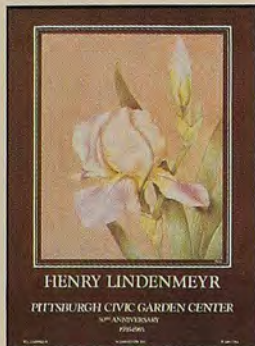
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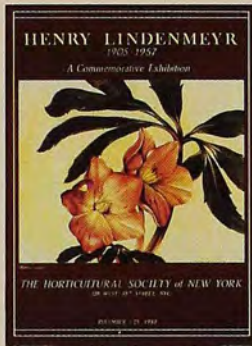
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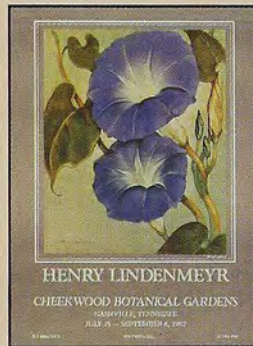
3. **Viola:** 22"×30"



4. **Iris:** 20"×27"



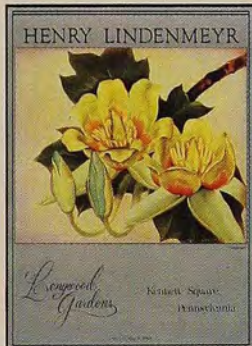
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An old barn in Elisabeth Sheldon's garden outside Ithaca is graced with a June-blooming clematis, poppies, and later-blooming phlox.



FAR ABOVE AND BEYOND

Cayuga's Waters

The climate of Ithaca, New York, is harsh in winter and humid in summer. But its gardeners have inspirations that outweigh nature's shortcomings.

B Y R U B Y W E I N B E R G

IF IT IS TRUE, AS THOMAS WOLFE WROTE, that you can't go home again, then why did Ithaca feel welcoming and familiar? Forty-one years ago this upstate New York town had been my temporary home during my college years.

But until recently, I had never thought of Ithaca as a "garden city." My memories are of trudging through heavy snow—averaging seventy-two inches a year—in bitter cold. Twenty below wasn't unheard of. Since the area has so many gray days, a short growing season, and hot, humid summers, I was surprised to hear a friend

MARTIN WEINBERG

remark not too long ago on the high proportion of college professors and others who rush home from work on the first warm day of spring with gardening on their minds. If Ithaca really did have more than its share of outstanding gardens, I wanted to see some of them and learn what motivated the people who, I knew, must work hard to maintain them.

The town in the valley now has 29,500 permanent residents, with Cornell sprawled all over East Hill and Ithaca College on South Hill. Unchanged and still glorious are the views from these elevated sites: rolling farm land, the southern tip of Lake Cayuga, and deciduous forest, dramatic both in fresh spring greenery and flaming autumn colors. Ithacans still hike, as I once did, beside boulder-strewn gorges colored with ferns and wildflowers, and marvel at the scenery from several bridges that span breathtaking heights. But many more walking trails have been carved through what was then inaccessible, and hikers can study wildlife at such places as the Cayuga Nature Center and Cornell's famous Lab of Ornithology bird garden.

My friend was right that a good many of Ithaca's residents aren't content with this scenic beauty, but have worked hard to create and maintain exceptional gardens. Horticulture, usually at its zenith in more congenial climates, is nevertheless clearly visible amid the difficult conditions far above and beyond Cayuga's waters. Ithaca has three garden clubs, is home base for the active Adirondack Chapter of the American Rock Garden Society and an herb society, the Auraca Herbalists. Even the high school is a focal point for gardening, with an annual Spring Garden Fair and Plant Sale where both hobbyists and nurseries sell plants to eager gardeners. Also at the school is the "Lavender Garden" of successively blooming perennials, planted and maintained voluntarily by Master Gardener Margaret Fabrizio.

While the urge to develop a slice of nature in one's own back yard knows no boundaries of geography or weather, a powerful urge this must be in a college town where everyone is barraged with bids for their leisure time—social, educational, athletic, and cultural. Gardening can hold its own, several Ithacans suggested, because it offers a little of all those elements.

But of course, Ithaca is a rather special college town.

Liberty Hyde Bailey, considered by most to be the father of American horticulture,



PHOTOS BY MARTIN WEINBERG

Above: Lupines, yarrow, thrift, and other perennials against the wall of an old barn foundation in the garden of Peter Trowbridge and Nina Bassuk.

Right: Trowbridge's home office looks out through an arbor on a bed of coralbells, irises, shasta daisies, and foxgloves.

Lower right: A clump of Siberian iris 'Eutin' in the Sheldon garden.



came to Cornell as a professor in 1888 at the age of 30. In 1903, he became dean and director of its College of Agriculture, which later became the College of Agriculture and Life Sciences. He expanded and reorganized the college, spearheaded the formation of the federal Agricultural Extension Service, established a "hortorium" to house his huge personal herbarium and library, and, among some sixty books credited to him, wrote *The Standard Cyclopedia of Horticulture* and the first two editions of *Hortus*, which for many serves as the bible for horticultural nomenclature.

Even after Bailey retired in 1913, the prodigious encyclopedist, writer, botanist, and lecturer continued to work in Ithaca at a pace that would have exhausted anyone

else. Bailey was an early proponent of a strange concept for his day: the idea that agriculture, botany, and horticulture were closely related. His writings and lectures went far beyond the economic. To him, the making of a garden was one of life's greatest satisfactions, and he encouraged others to garden as part of their everyday lives.

Active until his death at age 93, Bailey had long promoted the idea that Cornell's farms, woodlots, and ornamental plantings be coordinated into one administrative unit called Cornell Plantations. A colleague, Nelson Wells, drew plans for the project in 1938. Less than ten years later, it became a reality.

Today, Cornell Plantations manages some 3,000 acres, including thirty-four



formal gardens and some natural plots in Tompkins County where Ithaca is located.

Cornell Plantations is a living *Hortus* of hardy, beautiful, and useful trees, shrubs, native plants, perennials, and ground covers. The natural sciences of this New York state land grant college are well-served here within its many display gardens. All have been carefully landscaped and charted for both study and aesthetic purposes.

Its gardens include the Shrub Sampler, a series of connected outdoor rooms with paths that lead from the base of a steep slope to a flagstone terrace, and containing roses, viburnums, and other fine specimens; a display garden of the American Peony Society with 130 species and cultivars of tree and herbaceous peonies and

companion plants that bloom from mid-May until well into summer; the Mundy Wildflower Garden with native and naturalized American plants; and the Robison Herb Garden, featuring more than 800 plants long used for both cooking and medicine, with superb labeling and historical explanations.

The plantations' arboreta, botanical gardens, and native plant areas are adjacent to the Cornell campus. Says Peter Trowbridge, an Ithaca landscape architect: "The diverse offerings of the plantations, and the strong horticultural department at Cornell, are the prime reasons why Ithacans are inspired to create their own gardens."

Trowbridge and his wife, Nina Bassuk, both teach at Cornell. She is program director of the Urban Horticultural Institute and





is doing research on problems in propagation. Their six-acre property just outside of Ithaca was once a dilapidated dairy farm. The couple has transformed it into a contemporary home with well-designed gardens. The deck of the house overlooks the former barnyard, which is now a swimming pond. A sandy beach where a small boat is docked adds to the scene, but the eye travels beyond them to an arbor with benches, then curls around the southeast corner to the foundation of what was once a barn. Its silvery gray rocks are a local bluestone called llenroc (Cornell spelled backwards). In England, walls are often the hallmark of fine gardens. As a reflection of his British heritage, Trowbridge determined that the rock wall would be the garden's focal point. It also provides a



Left: *Thermopsis caroliniana* and *Centranthus ruber* bloom beside the herb garden at Cornell Plantations.

Above: Hardy geraniums 'A. T. Johnson' and 'Johnson's Blue' grow along a path above the wall that encircles the herb garden.

Lower left: *Inula helenium* is a favorite of long-time Ithaca gardener Audrey O'Connor.

warm microclimate for the perennials at its base and the little bulbs above. This backdrop lends a special intensity to flower colors.

From here, paths flow through a number of gardens, all of which seem to have spaces for herbs. Culinary and ornamental herbs are mixed in pleasing combinations. "The English love variegation," notes Trowbridge, who has enlivened the garden with such plants as *Cornus alba* 'Elegantissima', which has green and white leaves; gold-tipped forms of *Chamaecyparis*; and *Lonicera* 'Gold Net', a ground-cover honeysuckle with yellow stenciled leaves. Some of his many plants were gifts. "Gardeners here do a lot of sharing," Trowbridge observed.

One of the gardeners who not only shares,

but sells, arranges, collects, and seed-grows interesting perennials is the nationally known writer Elisabeth Sheldon. Sheldon feels that most Americans are too narrow in their use of native plants. She points out *Actaea pachypoda*, *Vancouveria hexandra*, *Disporum lanuginosum*, and *Smilacina racemosa*, American natives that have been neglected by most gardeners here.

Sheldon has gardened in Lansing, just outside Ithaca, for eighteen years, on part of a 100-acre farm with a Victorian house and several outbuildings. Her drive ends in a rock wall—which Sheldon built herself—topped with dwarf alpiners. The weathered wood of an old barn frames a heavily blooming *Clematis* 'Sho-un' surrounded by oriental poppies, irises, and later-blooming phlox. A grove of sassafras trees

and a few conifers shade a tiny pool and early wildflowers such as Bowman's root (*Gillenia trifoliata*), bellwort (*Uvularia grandiflora*), and golden star (*Chrysogonum virginianum*).

But in midspring and summer, her sunny borders steal the show. In one area is a beautiful pink and purple mass of veronicas, irises, and geraniums. Another group features *Potentilla fruticosa* 'Abbotswood' and the purple flowers of *Geranium sanguineum* set against a Japanese maple with burgundy foliage.

All this is truly a labor of love. High winds blowing off nearby Lake Cayuga necessitate heavy winter protection with cut evergreen boughs. Heavy snow, the best cover, has been conspicuously absent the past few years. Lately, browsing deer herds have increased, but the Sheldons planted multiflora roses at the property's perimeter, hoping that thorns would deter them.

Immediately north of the Cornell campus is a residential area known as Cayuga Heights. Perhaps it's the attraction of the stately 90-year-old trees, but throughout the years, in spite of deer, the climate, and soil that is heavy, rocky clay or shale, a multitude of fine gardeners have established their homes here and when they leave, been replaced by others equally determined and innovative.

More than fifty years ago, Audrey O'Connor and her husband bought a large parcel of wooded, swampy land. They then drained, ditched, dug a pond, and raised areas for this garden on the edge of the Sapsucker Woods Preserve. Half a century later, O'Connor continues to grow herbs and a variety of unusual perennials—usually from seed. No longer able to restrain the wayward, she enjoys the charm of ever spreading patches of European ginger, Japanese primroses, a variety of thymes, coltsfoot (*Tussilago farfara*), golden moneywort (*Lysimachia nummularia* 'Aurea'), and countless other plants.

For twenty-two years the editor of Cornell Plantation's quarterly magazine, O'Connor has written articles on herbal history for a number of journals and is a founding member of the Auraca Herbalists, which helped develop Cornell's Robison Herb Garden. Many of the plants destined for the public garden began their lives in her cold frames or small conservatory.

Unaffected by the many kudos she has received over the years, O'Connor con-

CORNELL'S HORTICULTURAL HAVEN

At Cornell University, horticulture is divided into three departments: floriculture and ornamental horticulture, pomology, and vegetable crops. Its undergraduate and graduate degree programs have churned out a long list of leaders in American horticulture, including florist crop specialist Kenneth Post, lily breeder L. H. McDaniels, and Director of the U.S. National Arboretum Henry Marc Cathey.

The Liberty Hyde Bailey Hortorium, a part of the division of biological sciences, houses a vast collection of pressed and dried plants from all parts of the world and a conservatory of living tropical plants. It also has one of the nation's largest nursery and seed catalog collections with 129,000 catalogs dating from the early 1800s to the present.

The hortorium offers two extension services to the public—locating plant and seed sources and rare plant identification. Requests for source information should include the scientific and common names of each plant and \$2 for each plant requested up to a maximum of five. There is also a \$2 identification fee for each plant identification request. For more information write to the L. H. Bailey Hortorium, College of Agriculture and Life Sciences, Cornell University, Ithaca, NY 14853.



JESSIE M. HARRIS

Above: *Gillenia trifoliata* is one of the American native perennials grown by Elisabeth Sheldon.

Right: Jack and Nina Lambert have planted *Hakonechloa macra* 'Aureola' next to a Japanese lantern.



MARTIN WEINBERG

tinues her work growing and writing about rare and unusual herbs and exotic plants. This keen plantswoman is currently documenting the diverse indigenous woody plants she has observed and enjoyed on her property since 1940. *Inula*, a yellow member of the composite family, is one of her special favorites. O'Connor introduced me to a naturalized species, *I. helenium*, a tall-flowering native of central Asia that would be useful to the rear of a damp border.

A few blocks away, art professor Jack Lambert and his wife Nina, a psychologist, live on a lot 100 feet wide by 184 feet deep, which, by emphasizing diminutive plants, they have filled with variety. Although peak bloom is in April and May, with some repeat in fall, Jack and expert rock gardener Nina have developed a garden with all-season interest. For twenty-nine years, this talented couple has consolidated their efforts to create rock areas with hummocks, berms, and valleys. In one area are alpine mats and buns; in another, slightly taller rock garden plants and dwarf rhododendrons and azaleas.

Although this is a collector's garden, there is no lack of cohesion in the plantings. Each area flows gradually into the next through concentration on color and form. There is plentiful foliage interest, with such dwarf conifers as gray-green *Juniperus communis* 'Pencil Point', dwarf Hinoki cypress, low-weeping hemlocks (*Tsuga canadensis* 'Sargentii'), as well as heaths and heathers. There is summer interest from ornamental grasses, including the white variegated oats, *Arrhenatherum elatius* 'Variegatum', and *Hakonechloa macra* 'Aureola', a shade lover with blades of golden yellow, set here next to a Japanese lantern. Troughs filled with miniatures from such genera as *Androsace*, *Saxifraga*, *Gentiana*, and *Draba* are on the patio adjoining the house; a surrounding dry rock wall is hugged by a group of the tiny boxwood, *Buxus microphylla* 'Compacta'. Meticulous culture plus a warmer microclimate are obvious here, because plants such as *Cyclamen coum*, tender 100 miles south in Larchmont, New York, seem to flourish in the Lambert's garden. But as with so many other semi-rural neighborhoods, deer damage has been increasing, although Nina has found that setting out bars of Cashmere Bouquet soap seems to repel them.

Each home in Cayuga Heights is of a distinctive style. Joan and Walter Relihan live in a tudor on a steep one-acre lot



PAMELA HARPER

Above: Cornus alba 'Elegantissima' is one of the many variegated plants in the Trowbridge-Bassuk garden. Left: A birch and a potted geranium soften, but do not compete with, the architecture of the Relihan house.

overlooking a ravine. Since they bought it in 1979, they have renovated its formerly lovely garden with the help of a landscape designer. Their small front patio is hidden by mature shade trees on a broad lawn. Views from the windows, as well as from a circular midlevel turf pad, look down into the ravine which rushes with the runoff waters of Pleasant Grove Stream. Damp soil plants are being newly established here. Perennials and shrubs on this difficult site include hardy rhododendrons, 'Delaware Valley White' azalea, daylilies, astilbes, and tiger lilies. Joan Relihan has her own explanation for the motivation to garden here against all odds. "Winter is so long," she says, "that Ithacans garden in their starvation to see lovely greenery."

I left Ithaca happy that it is not too far from my home for future visits. It was uplifting to see that creative gardening can occur where growing conditions are less than perfect. Perhaps there is hope for my own garden, which while 125 miles southeast, is not much warmer. Liberty Hyde Bailey often said that there is no climate that does not suit some interesting plants. It is this philosophy that Ithaca gardeners have taken as their own.

Ruby Weinberg is a frequent contributor to American Horticulturist.



Natives Out of the Woods

Native trees and shrubs can be as beautiful as any hybrid, and will thrive in landscapes where imports languish.

B Y A L I C E B . Y E A G E R

While traveling through New England a number of years ago, I noticed some strikingly beautiful trees bearing clusters of bright red berries. It didn't take long to find out they were American mountain ash (*Sorbus americana*). The next spring I ignored my better judgment and ordered a nursery-grown mountain ash for our place in the piney woods of southwest Arkansas (USDA Zone 8). Apparently finding our hot, humid summers too much to bear, it flourished for only one season and died of some mysterious disease the following year. The same story applies to a golden chain tree (*Laburnum anagyroide*), several rhododendrons, and a number of other desirable plants.

After many years of such efforts, I have concluded that I was on the wrong track. Our landscape and finances would both have fared better if we had gone native and worked with the plants nature has seen fit to bestow upon us. I've learned that it's best just to admire and take photos of the plants we see doing so well "up North," and not be duped into thinking we Southerners can grow them successfully in areas where heat and extreme humidity reign



The small, pinkish white flowers of the American beautyberry (above) appear at the leaf axils and are transformed into clusters of red-violet berries (left) come autumn.



ROB SIMPSON

for many days at a time each year. (By the same token, I imagine many a traveler from the North has gone home with a desire for camellias, cape jasmines, and Texas bluebonnets.)

Not only do the Southern natives outgrow the imports from abroad or elsewhere in our country, but they have an amazing longevity. They are already acclimated and they grow without any pampering. They seem almost eager to please, as though they were glad to receive some long overdue attention.

Many of our native plants have a wide climatic range. In fact, many plants that are at home in the South are native to much of the Eastern United States and even into Canada, so can be recommended for landscapes almost anywhere in the country. Not only are they spectacular at certain times of the year, but some are

regarded highly as honey plants and food sources for humans as well as many types of wildlife. Generally, the natives are very resistant to diseases and insects. Anyone who has ever battled various fungal and viral diseases along with the myriad of hungry borers, beetles, caterpillars, etc., that beset our domesticated exotics, will appreciate the ease of caring for native plants.

Wildflowers, both annuals and perennials, have been getting a lot of well-deserved attention as additions to home landscapes. But our native shrubs and small trees have been somewhat overlooked.

One of the loveliest, early blooming trees in our area is *Amelanchier arborea*, whose common names include Indian pear, shadbush, serviceberry, sarvis, and Juneberry. (*A. arborea* is closely related to and often confused with *A. canadensis*, a more wide-

ly available species.) This tree is one of my favorites because when it blooms I know that spring is not far away. The common names reflect its heralding of spring as well as its wide native range. *Amelanchier* species were called shadbush because they flowered at the same time that the shad ran up tidal rivers to spawn; Colonial Americans named them serviceberry because by the time the shrub had bloomed, the ground had thawed enough to bury those who had died in the winter. Before there is any sign of life among our other deciduous trees, the Indian pears cover themselves in pearly white clusters of flowers very much like domestic pear blossoms. Our honeybees flock to these trees at the slightest hint of opening blooms and thus begins the first honey flow of the season.



Because these trees grow to a height of thirty feet or more, are somewhat pyramid shaped and give very good shade, they make excellent lawn specimens. Occasionally, suckers will form at the base, but these are easily controlled with a sharp pair of clippers. Small, edible, round fruits hanging in clusters ripen by midsummer, providing food for many kinds of birds and other wildlife.

Late in the fall, after most deciduous trees have lost their color, the Indian pear puts on a brilliant show of yellow and orange. Thus it is not only the first to come on stage in the spring but it is the last to take a bow in the fall.

The Indian pear is a tough native, and, once established, will almost take care of itself. It does not grow in overflow areas, but otherwise is not choosy as to soil or

location. It is somewhat drought tolerant and will grow in both sunny and semi-shaded places. I have transplanted a number of the young trees in early spring or late fall and have yet to have a failure. The trees will usually bloom within three years and be well on their way to becoming nice shade trees.

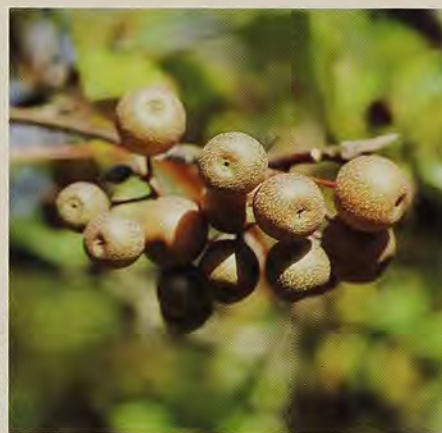
In my experience this native is less subject to wind damage than the look-alike 'Bradford' pear, so often used as a quick-fix for landscaping along parkways and on public lawns, as well as to enhance private yards. Fortunately, *Amelanchier* species have a wide range of territory from the deep South to Canada and up to the plains area. Thus they may be enjoyed by a large portion of our population.

Just as the Indian pear's blossoms fade, the redbud (*Cercis canadensis*) comes into bloom and our honeybees switch to their pea-shaped, purple pink flowers. (It is also called the Judas tree, but this name is a foreign import transferred from the related *C. siliquastrum* of southern Europe, which was said to blush red in shame because Judas Iscariot hanged himself on it.) The redbud is another important native tree that is not only beautiful but provides the honeybees with nectar and pollen for early spring brood rearing.

There is no scarcity of redbud trees throughout our forest and I look forward to their blooming just for the sheer joy of their color. Their flowers are followed by heart-shaped leaves that give excellent shade from summer sun. I have had no difficulty resetting young redbuds during the dormant season. However, I don't like to transplant one over thirty inches tall, as anything taller has less chance of survival. (Not to mention the work involved!)

The redbud is adaptable to a wide range of territory, as it is native from south of the Great Lakes to the Gulf Coast and even into northern Mexico. Redbuds aren't particular as to soil as long as it is well drained. Like any tree, however, it does appreciate a helping hand if drought conditions become severe.

You will not usually find redbud trees growing in dense hardwood forests where they would be overshadowed by such species as sweet gums or oaks. They prefer more light and tend to live along the edges of forests in hilly areas. Redbuds rarely grow over twenty-five to thirty feet and tend to have short trunks with spreading branches and rounded tops—just right to shade lawn chairs on a summer day.



The decorative fruits of native trees and shrubs help sustain birds and other wildlife. Bluish purple berries hang from the fringe tree (top) in early autumn; the small, apple-shaped fruits of the Indian pear (above) ripen by midsummer.

Left: Forests from Maine to Florida are painted pink with the dramatic flowers of the wild azalea.



Top: The wahoo opens its mature fruit capsules in early fall, exposing bright reddish orange seeds.

Above: Flowering redbud is a common spring sight throughout the Eastern United States.

Right: The long white panicles of *Chionanthus virginicus* have inspired many common names, including fringe tree, old-man's-beard, and grancy graybeard.

A fringe benefit of the redbuds is the shedding of their fall mantle of yellow leaves within a short period of time, so that raking is easier than when dealing with deciduous trees that prolong dropping their leaves. When the leaves are gone, the many clusters of pealike, flattened pods will hang fluttering in the wind most of the winter. Due to the many seeds, young seedlings are not scarce.

In midspring when I see a grancy graybeard or fringe tree (*Chionanthus virginicus*) in bloom, I always think it should be called "glow-in-the-dark." The long panicles of small greenish white flowers appear before the leaves are prominent, giving the small trees a gleam of their own. These flowers are the fringes of the "fringe tree" and the beard of the "grancy graybeard," apparently a corruption of grandfather graybeard, another common name (which derives from a more familiar one, old-man's-beard). This tree is native to a wide range of territory from New Jersey to the middle of Florida and across to east Texas.

Despite being a native that likes to grow in the company of hardwoods, a grancy graybeard makes a fine lawn specimen. A young tree may be transplanted without difficulty while dormant. It prefers a well-drained, sandy loam soil in a sunny to partially shaded spot; it will not do well in dense shade.

Depending on growing conditions, a grancy graybeard may reach a height of twenty to twenty-five feet. The trees are usually multistemmed but can be pruned to a single trunk. As the trees age, they have a tendency to spread out, enhancing their spring show and providing a nice shady spot for relaxing. The large, narrowly elliptical leaves are a shiny dark green during summer, and, in fall, add a bright yellow tint to the landscape.

A female grancy graybeard will produce small, purplish blue fruits that ripen in autumn and attract birds. If fruits are desired, however, a male tree should be planted nearby.

Grancy graybeards are not as numerous as they once were in forests in our area. The decline of these hardy native trees can be traced in large part to the destructive practices of pulpwood cutters who often wreak havoc with small trees when removing large timber.

Particularly noted for the bright purple of its berrylike fruits in autumn, the American beautyberry (*Callicarpa ameri-*

cana) is an outstanding native shrub. Also known as French mulberry, it is hardy from Virginia southward into east Texas. It usually survives winter temperatures into the lower teens, and if killed back to the ground, will put forth new growth in the spring. Beautyberry can reach a height of six to seven feet.

This is a shrub that will grow almost anywhere, but it prefers rich soil, abundant leafmold, and the semishade of taller plants. Although it will stand a good deal of dry weather, it needs moisture to develop fully its plentiful crop of berries. Any berries left to dehydrate on the bushes will be picked off by birds wintering over in the area. I remember a particularly hard winter when a beautyberry shrub in our yard with a large supply of dried berries still clinging to its branches became the mainstay for a mockingbird.

The fruiting habit of the beautyberry is different from that of many other flowering plants. The small, pinkish flowers appear at the leaf axils in little clusters surrounding the branches. Leaves are fairly large—about four to five inches long, opposite, toothed, and rough textured, and have an aromatic scent when bruised. The shrubs will continue flowering from early until late summer, depending on the amount of moisture available, so it is not unusual to see flowers and maturing berries at the same time. When autumn renders the shrubs leafless, the colorful bunches of berries spaced along bare branches are often used in fall bouquets.

This does not seem to be a long-lived shrub, but plants are hardy, fast growing, and will produce flowers and fruit the next year after planting.

Wild azalea (*Rhododendron periclymenoides*) is known by several common names, among which are pinxter flower (Dutch housewives gathered the pink flowers to decorate their houses on Pinxter Day or Whitsunday), pink azalea, and, in some parts of the country, honeysuckle. This lovely shrub frequents upland forests as well as the edges of swamps and bogs from Maine to Florida and west to Louisiana and Missouri.

My start of wild azalea came from a Louisiana friend's wooded acreage where the plants grew in dappled sun beneath tall pines and some hardwood trees. I found that the small plants were not hard to transplant in early spring while the soil was still moist and the shrubs were just beginning to put on growth. I kept watch over them for a few



JESSIE M. HARRIS

years, providing water during dry spells until I felt they were established. Now they are on their own and greet me each spring with a beautiful show of pinkish white blossoms that appear in terminal clusters before the leaves are fully developed.

Wild azaleas are very hardy and are suited to semishade and acid soil. They will tolerate quite a bit of dryness, but should not be allowed to suffer for lack of water. These somewhat slow-growing plants will eventually reach a height of six to seven feet.

One of the showiest shrubs, because of its colorful capsulelike fruits, is *Euonymus americanus* (locally called the wahoo, although *E. atropurpurea* usually claims the Indian name meaning "burning bush"). Well distributed from southern Ontario to Georgia and west to Texas, it varies in height from six to eight feet. These plants

prefer moist soil and grow in thickets, along the edges of forests, or on stream banks.

The wahoo is an attractive deciduous shrub with interesting green branches and elliptical, opposite leaves two to four inches long. Flowers are greenish white, small, and appear on tiny stems at the leaf axils. But the flowers are not the focal point for these plants. The grand show comes in autumn when the mature purplish red fruit capsules open to expose the orange-colored seeds inside them. These capsules dangling from the green stalks provide a real splash of color in the autumn woods, and the fruit hangs on until damaged by freezes.

The plants do well in acid soil but do not require it. They seem to prefer semishade to full sun. Wahoo shrubs work in nicely with other shrubbery, particularly where a spot of

SOURCES

Carroll Gardens, 444 East Main Street, P.O. Box 310, Westminster, MD 21157, (301) 848-5422. *Amelanchier canadensis*, *Cercis canadensis*, *Chionanthus virginicus*. Catalog \$2.

Eastern Plant Specialties, Box 226, Georgetown, ME 04548, (207) 371-2888. *Callicarpa americana*, *Cercis canadensis*, *Chionanthus virginicus*. Catalog \$1 deductible.

Roslyn Nursery, 211 Burrs Lane, Dix Hills, NY 11746, (516) 643-9347. *Cercis canadensis*, *Chionanthus virginicus*, *Rhododendron periclymenoides*. Catalog \$2.

Woodlanders, Inc., 1128 Colleton Avenue, Aiken, SC 29801, (803) 648-7522. *Callicarpa americana*, *Cercis canadensis*, *Chionanthus virginicus*, *Euonymus americanus*. Catalog \$1.

fall color is needed to liven up the landscape.

Like other plants, wahoos need some water to help retain their fruit during extreme droughts. Otherwise, this is another native that will give years of enjoyment with little care.

These plants are barely the tip of the iceberg where useful native trees and shrubs are concerned. There are some things to keep in mind, however, when dealing with natives:

Try to simulate native growing conditions as much as possible. Don't expect a sun-loving plant to do well in a shaded spot and vice versa. Pay attention to its natural soil and moisture requirements. Don't put a moisture-loving plant in a dry spot. A native that's tough in one location may not fare well in another. (Remember my mountain ash!)

Space is a primary factor. No matter how much you may admire a bull bay magnolia, for instance, in its native setting, there is no point in planting one if your space is very limited. That's like trying to squeeze a size twelve foot into a size five shoe, especially after the tree begins to spread out as nature intends it to do.

Become familiar with natives of your area. These plants will give you the greatest return for the least amount of effort and money. Most natives will outdo themselves when given a little TLC.

Alice B. Yeager is a free-lance writer whose articles on Arkansas native plants have appeared in several gardening magazines.

New Shapes *for* NEW USES

*Modern hybrids offer alternatives
to roses that stand stiffly at attention
or climb to the rafters.*

BY ROBERT L. STATON

“If it takes nearly ten years to bring a new rose onto the market, what are the hybridizers working on today?”

“We seem to have reached near perfection in form in roses. What is next?”

“Why can’t we get roses that are more disease and insect free? What are hybridizers doing about those problems?”

These questions and statements came at an international symposium on roses held in Chicago in 1974. Hybridizers from around the world were gathered there, and fielded the questions with ease. What were some of the promises? Have they come true? And, more importantly, where does mankind’s favorite flower go from here?

Hybridizers said they were on the way to discovering roses with far more uses in the home landscape than the then-popular hybrid teas, floribundas, and grand-



MICHAEL S. THOMPSON



'Bonica' was the first shrub rose to receive the All-America Rose Selections award. It is compact, vigorous, and resistant to cold and disease. The pale pink flowers have a long blooming season.

Right: 'Scarlet Meidiland' grows to four feet and spreads like a ground cover. Opposite: 'New Beginning', an AARS winner in 1989, is an excellent container plant.



PAMELA HARPER

ifloras. They envisioned roses that made better companions for other plantings, provided an abundance of blooms, and required little maintenance on the part of the home owner. From crosses made about that time, these roses are now reaching the market. Have hybridizers lived up to their promises?

With a few qualifications, the answer seems to be a resounding yes. Roses that were not dreamed of twenty years ago have reached the market: roses that can be used in the home landscape as shrubs, ground covers, climbers, and patio roses.

Holding the most promise for new landscape uses are the shrub roses. These have some of the characteristics of wild roses—a broad upright shape, arching canes, and colorful hips—but breeders are giving them some of the modern rose's colors and repeat flowering. To produce a winner in this category, it's not enough to give the gardening world a novel color: shrub roses must meet standards of almost total perfection in categories such as hardiness, floriferousness, disease resistance, and rebloom.

The first of these to make the horticultural world sit up and take notice was 'Bonica', which in 1987 became the first shrub rose ever to win the coveted All-America Rose Selections (AARS) award. Entrants are judged over a two-year period on fifteen qualities, and because they are grown in twenty-five gardens throughout the United States, more than prove their adaptability to many climates. 'Bonica'

represented a departure for the rose-growing public, with its shrublike form, tiny flowers, and only a hint of fragrance. But with its trouble-free nature and pale pink, full-petaled flowers, produced bountifully on gracefully arching stems, this five-by-five-foot plant quickly captured gardeners' hearts and has found niches in thousands of yards.

Last spring another shrub appeared in local nurseries, ready to prove its worth. 'Carefree Wonder' was the highest scoring rose in trials for the 1991 AARS honors. With bigger flowers than 'Bonica'—three to four inches across—and more attention-getting colors—shocking pink with cream reverse—it has proven even more disease resistant. And some will prefer its shape, which is rounded and more manageable than 'Bonica'. It still lacks the high-centered form of America's beloved hybrid tea, but this is perhaps a price worth paying for such a carefree rose.

Another shrub rose garnering quite a bit of attention is 'Lavender Dream'. Coming out of Europe (as did 'Bonica' and 'Carefree Wonder'), this may be the most abundant blooming of the new landscape roses. The flowers are not as lavender as the hybrid tea 'Blue Nile', but lavender pink with a bit of cream at the eye. The flowers are small and rounded, not much more than one-inch across, but borne constantly in huge pyramidal clusters from early spring until killing frost. 'Lavender Dream' is a rose for the back of the peren-

nial border, as it will reach five to six feet in height and will arch out to nearly the same width with its gracefully cascading canes. The color is a wonderful foil for a lot of perennials—but don't try it with the old-fashioned orange-colored red-hot-poker (*Kniphofia* spp.)!

Next spring, nurseries will welcome yet another AARS-winning shrub, 'All That Jazz', with a sunset orange and yellow color new to shrub roses. The flowers are single and borne in huge clusters. It should make some stunning hedges. If used in a deep mixed border, its height will dictate placement toward the back.

The members of another group of shrubs that has hit the market in the past few years are called ground covers by some because of their horizontal growth habit. However, the tallest of these can reach four feet in height. This is the Meidiland series, created by the House of Meilland in France, which also brought us 'Bonica' and 'Carefree Wonder'. The Conard-Pyle Company, the American introducers of these roses, give us a pronunciation guide ("say May-D-Land" their promotional materials advise us) but nowhere in their brochure do they mention that these offerings are roses! They are simply called "flowering shrubs." Disease resistance has been good on all of them. Conard-Pyle recommends spraying them twice throughout the growing season. Many of these have the added bonus of brightly colored rose hips that last well into winter, bringing a bright touch to Northern gardens in January. The following are on the market so far:

'White Meidiland': An arching plant reaching two feet high and five feet wide, this has the largest flowers of the group, three to four inches across, and with the most petals. In fact, 'White Meidiland' blossoms have a unique appeal for a modern rose in that they have the quartered shape of an old-fashioned rose. They are abundantly produced, and there is but one fault with this plant. The roses do not fall off, but remain on the plant until pushed off by new blooms. This can be unsightly between cycles.

'Pink Meidiland': Sure to be popular once it becomes known, this rose looks like a pink dogwood. In fact, the single flowers look so much like those of a pink dogwood that gardeners have been known to swear they are seeing a shrub dogwood and not a rose at all. It is an upright, narrow grower—three to four feet high and two to three feet wide—and should be placed

closer to other plants than are other Meidilands. It is perfect for parking lot dividers, but equally lovely if you have room for only one, for its individual blooms are striking in their appeal.

'Scarlet Meidiland': This one is probably more of a ground cover than a shrub. It is the tallest of the group at four feet, but also spreads all over the place. The color is screaming scarlet, so bright it almost hurts the eyes, and demands a place for just such a color.

'Red Meidiland': Definitely a prostrate ground cover, staying under two feet tall and spreading to five feet, with an abundance of orange-red hips extending color into winter.

'Pearl Meidiland': An "in betweener," this rose reaches two-and-one-half feet in height and spreads about four feet. The large, white flowers have a delicate pink blush.

'Alba Meidiland': This is one of the most interesting of the newcomers in that it can root itself along its stems to quickly establish a stable ground cover for hillsides, slopes, and banks. It, too, is of a middling height. Flowers are small but appear in huge clusters.

Still largely unavailable in this country are landscape roses that almost anyone would be willing to categorize as ground covers, since they remain under a foot tall. Europe has many such hybrids, which fail to bloom when they reach our shores. The United States has an excellent spreader—although it may grow to a foot and a half or even two feet tall—in 'Ralph's Creeper'. No romantic name here, but the creator, Californian Ralph Moore, considered it good enough to bear his name, and that says something. Known for his miniatures, such as 'Magic Carousel' and 'Rise 'n' Shine', this phenomenal breeder has also worked with moss roses, hybrid rugosas, and striped roses.

His 'Creeper' is a bright, cherry red with a yellow reverse and yellow eye. Its canes grow less than two feet high but spread to six feet in a circular pattern. Constantly in bloom from spring to fall, it has a bonus of fresh green apples for fragrance and is very hardy. It seems to be at home on rocky hillsides, a difficult spot for many landscaping plants.

Probably the most ground-hugging rose available on the American market is 'Nozomi', whose abundant, single white blooms are produced only once a year. 'Red Cascade', a rebloomer that is a true red, is a bit taller at about one foot. Because these ground covers are bred from miniature



JERRY PAVIA

'Pink Meidiland' is a narrow, upright shrub growing up to three or four feet high and two to three feet wide. Its blossoms resemble the flowers of pink dogwood.



PAMELA HARPER

roses, their flowers and leaves are small, even on the wide spreaders. These are not ground covers that can be walked upon, but no one walks on junipers either! Gardeners may have second thoughts about having chosen these plants when it's time to remove crabgrass from under their canes, but due to the ground covers' parentage, it is not likely that a thornless ground-cover rose will appear in the near future. The roses will produce some weed reducing shade—'Ralph's Creeper' is less effective at this than the other two—but of course, weeds can get a start while the roses are dormant.

The variety doesn't end with shrubs and ground covers. There have also been exciting developments in miniature roses. Miniatures aren't new, of course; there is evidence that a miniature rose, apparently of Chinese origin, was being grown in Europe in the nineteenth century and possibly the eighteenth. The history of its cultivation is credited to a Colonel Roulet, who reportedly was struck by its potential when he found it growing in a window box in Switzerland about seventy years ago. The fact that miniatures are easier and faster to hybridize than most roses has brought some to market that perhaps should have stayed home. But while they were once a novelty, they are now taken seriously enough to compete with their bigger relatives. Three—'Debut', 'New Beginning', and 'Pride 'n' Joy'—have now won the AARS award. They have shown

their value as flowering container plants, perfect for today's apartment and condo owners whose gardening is confined to balconies and patios.

But the real news with miniatures is how hybridizers are crossing them with the modern hybrid tea and floribunda roses, with shrub roses (new and old-fashioned), with species roses, and with climbers. The resulting hybrids are roses that fit no existing classification but warrant attention.

Although miniatures are usually described as being less than two feet tall, most growers categorize roses as miniatures because of the size of the bloom and foliage, not the size of the plant. Thus we will soon see what are essentially miniature shrubs, with flowers no bigger than a fifty-cent piece on shrublike plants that are four to five feet tall. These plants should generally be disease resistant, rebloom quickly, and lend themselves well to restricted spaces.

This trend will continue. The big news out of the trial grounds in England last year was that the top award went to a miniature climber! A miniature climber may sound like an oxymoron, but it is a class of roses undergoing dramatic change. While the British award winner isn't available in the United States, Ralph Moore has introduced one here called 'Work of Art', which occupies a space five to six feet high by only two feet wide and produces thousands of golden orange blooms over months and months of blooming time. This one can be

useful for both the apartment dweller and the home gardener with more room.

Roses have long offered versatility in color, and an Australian company has been promising the arrival in a few years of the first true "blue" rose. This will be accomplished by gene splicing, and will be a blow to those hybridizers who have worked for years to attain this breakthrough by their own back-breaking efforts. But no doubt within ten years blue roses will abound.

What else is left? A plant that has it all: one hybridizer recently forecast a big, perfectly shaped hybrid tea-type bloom on a shrub so healthy it will never need spraying. The market for such a rose in the United States is vast. Americans still love their big, dinner plate size roses, but are becoming more and more aware of chemical sprays that pollute the environment.

Ask the question today "What do you see in the world of roses in ten years?" and you had better have an hour set aside to listen to the answer! Roses are undergoing vast and dramatic changes. The future for these versatile plants is limitless.

Robert L. Staton, assistant professor of landscape horticulture at DeKalb College in Decatur, Georgia, died last December. A memorial rose garden is being established in his memory at the Fernbank Science Center in Atlanta. For information write 1788 Ponce de Leon Avenue, Atlanta, GA 30306.

SOURCES

Milaeger's Gardens, 4838 Douglas Avenue, Racine, WI 53402, (414) 639-2371. 'Alba Meidiland', 'Bonica', 'Care-free Wonder', 'Lavender Dream', 'Ralph's Creeper', 'Red Meidiland', 'Scarlet Meidiland'. Catalog \$1.

Sequoia Nursery, Moore Miniature Roses, 2519 East Noble Avenue, Visalia, CA 93277, (209) 732-0190. 'Debut', 'New Beginning', 'Nozomi', 'Ralph's Creeper', 'Red Cascade', 'Work of Art'.

Wayside Gardens, Hodges, SC 29695, (800) 845-1124. 'Bonica', 'Red Cascade', 'White Meidiland', 'Pink Meidiland', 'Scarlet Meidiland'.

Check with your local nursery retailer to special order 'Red Meidiland' and 'Pearl Meidiland'. Roses are generally shipped in the spring. 'All That Jazz' and 'Pride 'n' Joy' will be available at nurseries and garden centers in the spring of 1992.

Comely COMPANIONS

STORY BY RAYFORD REDDELL
PHOTOS BY ROBERT GALYEAN

It's a myth that roses have to be segregated in the landscape.

Here are a few plants with which they fraternize beautifully.

Although I happen to believe that a well-grown rosebush, even one stripped of its finery after proper pruning, is one of the loveliest sights I've ever seen, I reluctantly admit that most rose bushes aren't inherently beautiful. Several varieties of short-stemmed old garden dowager roses do mature into handsome shrubs, but modern hybrids all too often form awkward bushes. Even a stately grower like the magnificent 'Queen Elizabeth' doesn't look so pretty if you bother to glance at her gangly feet. Similarly, floribundas that appear compact in spring begin looking ratty by summer's end, when one's greed for cut blooms leaves telltale disparate spurts of foliage. Nevertheless, when I first cultivated roses, I vowed that no other plants would share their space.

"Roses are persistently thirsty—hungry too," I rationalized. "Why should I plant annuals or ground covers that deliberately rob sustenance from my treasured roses? Besides, thick carpets of mulch are downright handsome."

When I tried my hand at landscaping



Lavender is a terrific companion to roses when planted at a different level. Left: 'Hidcote' handsomely sets off a potted miniature rose.

Right: *Linarias* are workhorses among companion plants for roses.

Here, spurts of bloom both camouflage gaps in foliage and exalt the color of their rosy neighbor.

Far right: Clematises have been favored companions for rambling roses ever since gardeners first discovered how to intertwine them.



with the queen of flowers, I quickly hummed a different tune. Suddenly bare earth, even that which had been luxuriantly mulched, no longer seemed appealing.

If you, too, decide to grant your roses companions, after giving careful consideration to when and how often these chosen neighbors bloom, you will also want to pay close attention to their favored growing conditions, purported heights, and, above all, color.

For the most part, you will want to choose plants that share roses' appreciation for a long drink and frequent feeding, and with roots that won't compete for either. Roots won't usually be a problem, since those plants short enough to be planted under roses tend to have shallow roots, and taller plants, in order to have any head room, will be planted outside the roses' drip line (that imaginary circle around rosebushes from which a thoroughly drenched plant would drip water). Color and height are, of course, a

matter of personal taste. Blue flowers can be striking because roses don't come in that color, but so also can many other colors, both pale and fiery. Likewise, you may want a blooming ground cover to replace that mulch, a same-size companion, or a tall backdrop.

While the English have the luxury of ancient yew hedges against which to display blossoms, we are rarely so fortunate. One of the tallest desirable companions to plant behind or around roses for its range of pastel-to-bright shades is *Watsonia*, particularly the evergreen *W. beatricis*. If you live where winters are severe, however, skip this one, for these South African sun lovers won't tolerate freezing. On the other hand, if you're after good cut flowers, you may well decide to endure the bother of lifting and storing bulbs, in which case there are *Watsonia* species ranging in color from white, peach through apricot, to scarlet.

Hemerocallis have been classic companions to roses ever since gardeners first

planted mixed borders. Both Gertrude Jekyll and Vita Sackville-West chose them, not only for their bloom time corresponding to that of early roses, but also for their strong form, so different from that of roses. Unless your heart is set on one-time bloomers like *H. fulva*, the tawny daylily, or *H. lilioasphodelus*, the divinely fragrant lemon daylily, consider the more modern hybrids. Unlike their predecessors, they blossom repeatedly in a wide array of hues and bicolors. Many are evergreen. They tolerate any soil, and even accept moderate shade.

Iris make fine companions for roses for three good reasons. First, irises predominate in the one color roses don't—blue. Second, irises commence blooming at the same time roses do. Finally, modern hybrids, especially bearded irises, are available in heights ranging from six inches to four feet.

When I planted a stand of the lovely 'Nevada' rose in my garden, I decided the bushes were destined to become so graceful



that another plant growing alongside would be insulting. Then, while flipping through the many-colored pages of a nursery catalog, I spotted the iris variety 'Mary Frances'. I was swayed primarily, I think, by the thought of planting a tribute to my friend M. F. K. Fisher, but reasoned that the lovely soft blue color of the variety would flatter my 'Nevada', and that, after all, 'Mary Frances' would bloom at the same time. The combination is a smashing success.

Delphiniums make fine companions for roses, not simply because of their elegant spikes in a myriad of colors, but also because they like the identical growing conditions that roses prefer—full sun, rich soil, and plenty of water. Although delphiniums are technically perennials, they're more usually treated as annuals because they tend to be short lived. If flower stalks are cut to the ground after spring's bloom, leaving only foliage, and if fertilizer is applied, new flower spikes form for a second crop of bloom in late summer or early fall.

If you yearn for taller spikes of bloom than delphiniums provide, by all means consider *Alcea rosea* (hollyhock). For years, these biennials have been restricted to back border plantings because of their lofty aspirations, often to nine feet. However, recent hybrids rarely grow taller than two feet and vary in color from white to purple, with handsome pinks and apricots in between. Be forewarned though that, like roses, hollyhocks are prone to rust.

Few perennials are as carefree or faithful in their repeat blooms as *Achillea* (yarrow). Although there are more than seven species including *A. filipendulina* (the fern-leaf yarrow with bright yellow clusters of flat-topped blooms), the most commonly grown along with roses is *A. millefolium*, which grows erect to three feet, has gray green fernlike leaves on slender stems, and clusters of white flowers that are useful both fresh and dried. The extremely flat form makes a particularly striking contrast to the fuller rose blossoms. If you prefer a

brighter color for contrast with a white or yellow rose, *A. millefolium* 'Rosea' has rosy flower heads, while those of 'Cerise Queen' are bright red.

Perfectly at home growing underneath yarrow, equally trouble free, and also complementary to most roses are the ground cover species of *Oenothera*, particularly *O. berlandieri*, the Mexican evening primrose, which has survived temperatures of 10 degrees above zero here. But the primary reason for choosing this warm-climate perennial is that its rose pink flowers atop ten-inch stems blossom nonstop throughout the summer.

Another happy-go-lucky perennial that doesn't mind competing for root space is *Erigeron*, commonly known as fleabane. If you're not certain which color to mix with your roses, try *E. karvinskianus*, since its white, sometimes slightly pink, flowers blend well with any colors nearby. This plant is hardy for us here forty miles north of San Francisco. Those who have grown

it or its cultivar 'Profusion' elsewhere say it reseeds for them. Be sure to cut back plants after they flower and remember that all fleabanes are potentially invasive.

Both annual and perennial forms of *Linaria*—particularly the annual *L. maroccana*, commonly known as baby snapdragons—make fine companions to roses. Individual plants seem rather languid, but planted in masses, linarias will create dense blocks of color. Strains from 'Fairy Bouquet' blossom in pastel shades, whereas those from 'Northern Lights' bloom in hot colors.

Cheiranthus (wallflowers) have been favored companions to roses for centuries in England, but they're only now becoming popular in America. Although I've grown wallflowers both as annuals and biennials because I love their sweet fragrance and the rich deep colors of their charming flowers, none can compare to a perennial form I discovered recently. This variety, known commonly as 'Bowles Mauve', is virtually never out of bloom from early spring until late fall, and its light violet flowers complement every pink rose nearby. After growing this stunner for two seasons, I replaced my 'Bowles Mauve' plants, not because they had bloomed themselves to death (although I feared they surely would) but rather because their growth had become leggy. Now 'Bowles Mauve' has become my favorite companion plant for roses that have only one flush of bloom each year. Not only does this wallflower blend well with dowager rosebushes also in blossom, but I'm never without its easy-on-the-eye color from April until frost. ('Bowles Mauve' is sometimes marketed as an *Erysimum*, a genus that is related to the *Cheiranthus* and differs only in some technical differences in its ovary and fruit.)

Although the idea is as obvious as blossoms on bushes, many gardeners overlook miniature roses as companions to larger flowering rosebushes. Miniature roses have enjoyed a heyday in the last decade, as each year hundreds of varieties have been introduced, ranging in size from diminutive plants that produce tiny blossoms to bushes that rival floribundas. "Minis," as they're commonly called, are available in every color and bicolor known to rosedom.

If you yearn to grow herbs amidst your roses, and I can't imagine why you wouldn't, there are two facts you should commit to memory. First, most herbs require less water than do roses. Not only do

they need less irrigation, but if overwatered they won't bloom at all and their growth becomes rank or woody. Second, if you spray your roses, you must swear never to eat the leaves or flowers from herbs planted nearby. Chemical drifts from even properly sprayed rosebushes travel considerable distances, certainly far enough to render nearby herbs inedible.

The irrigation pitfall is easily avoided. If you encircle rosebushes with a band of flexible metal, you create a moist, fertile blanket from which water will not spread. Bands of aluminum sheet metal work well, especially those that are six inches wide. Form rings equal to drip lines and insert half of each ring's width underground. The three inches remaining above ground provide a boundary from which moistened mulch will not leach. The most satisfactory herbs to cultivate outside this fertile field, as far as companions to roses are concerned, are lavender, rosemary, and salvia.

Choose varieties of lavender according to the height most complementary to the roses they surround. *Lavandula angustifolia*, commonly known as English lavender, is the tallest and most vigorous—to four feet high and as wide. *L. dentata*, or French lavender, is somewhat shorter, and *L. stoechas*, or Spanish lavender, seldom grows above two feet. Both of these are more tender than *L. angustifolia*, however. There are also dwarf varieties, the best of which are hybrids of *L. angustifolia*—'Compacta', which rarely grows above eight inches, 'Hidcote', which tops off at one foot, and 'Munstead', which reaches eighteen inches.

Bushes of rosemary make handsome companions for roses, primarily because of their terrific green foliage. In California, rosemary has the added advantage of being carefree. It does flower, and its lavender-to-violet blossoms are attractive, but unlikely to occur when roses are also blooming. For reliable green accents, however, variations of *Rosmarinus officinalis* are second to none, and available in a range of heights, from *R. officinalis* 'Prostratus', which hovers no more than two feet above ground, to *R. officinalis* 'Tuscan Blue', which staunchly thrusts its fragrance-laden branches upright to six feet. We have the prostrate grower along the edge of a raised bed of roses, while the 'Tuscan Blue'—whose branches are frequently harvested—marches down a path with rugosas of a similar height alongside.

Few herbs are as widely divergent as





Not all climbing roses should be coupled with the voracious wisteria, but Rosa banksiae 'Lutea' can be. Both house eaters smother anything you plant them over and bloom at the same time.

Right: Many old garden roses grow to heights that permit foreground as well as background neighbors. Here, dianthus and an array of linarias handsomely keep company with a dowager rose. Far right: Although a garden full of hot spots could be dangerous, if you're as clever as Vita Sackville-West at mixing reds and yellows, you can control dynamite color combinations



Salvia (sage). Not only are there annual, perennial, and shrub varieties of sage, but their blossoms range in color from deep blue and bright red to pure white. *S. officinalis* (garden sage) is the most ubiquitous, but the height and color of *S. clevelandii*, a California native with sky blue flowers atop rounded, four-foot plants, make it a more comely companion for roses. Gardeners in cooler climates grow it as an annual. Be sure also to consider *S. leucantha*. This species doesn't usually bloom until late summer or early fall—a welcome sight—but its slender, velvety purple or deep rose stems are attractive all season long. It is even less hardy than most sages, but can be grown as an annual north of USDA Zone 9.

Although gardeners usually think that rambling roses require nothing growing alongside, there are two flowering vines that nicely complement climbing roses—wisteria and clematis.

The most successful combination I've

ever seen of roses and wisteria smothers a tiny Sonoma County cottage that passersby never notice except in late April or early May, when its floral extravaganza explodes. The rose is *Rosa banksiae* 'Lutea', the yellow version of the famous banksia rose; the wisteria is *Wisteria sinensis*, the most commonly planted wisteria in the Western United States. The wisteria always starts the show, but before its outrageous bounty is over, the rose begins its display. For more than two weeks each spring, the combination literally brings traffic to a halt.

Although wisterias are wonderful, trouble-free scramblers, their vines are too ambitious to accompany most roses. These veritable house eaters take over most arbors and pergolas, allowing only equally vigorous rambling roses to coexist. If, however, you cultivate stalwart roses like the banksias or popular vigorous species like *Rosa eglanteria*, *R. canina*, or *R. virginiana*, wisterias make stunning neighbors.

One need exercise far less caution where clematises are concerned. Except for rambunctious varieties like the evergreen *Clematis armandii* or the anemone clematis, *C. montana*, most clematises are modest in their growth habits. Then too, clematises offer a far wider array of colors than do wisterias, which only bloom in shades of lavender, purple, violet, rose, and white. Clematises extend this color range to include deep shades of red, true blues, yellow, and mauve. If you ever have spare time while visiting London and want to see climbing roses and clematises perfectly content alongside each other, be sure to visit the famous pergola walk at the Royal National Rose Society's gardens at Saint Albans.

Now that you've pondered which plants should companion your roses, double your efforts in choosing their colors. By definition, companion plants should be comrades, not adversaries.

Every gardener knows of Gertrude



Jekyll's dictum that reds and yellows are for "hot" borders, while blues and lavenders are for "cool" beds, but sufficient attention is not yet paid to these seemingly simple rules of garden decorum. Red is not simply hot, it's riveting—the first color eyes fix on in a spectrum. Especially when combined with yellow (an abrupt contrast), red should be used sparingly, especially in small gardens, where drama is out of place. Similarly, most blues are at odds with yellow, and orange fights with mauve.

An interior designer once taught me a trick for assuring that strongly contrasting colors "work" in the garden. "Make certain that some, however small, portion of a vividly colored flower relates to a color element of its neighbor," she said.

"For instance, if you want brilliant blue underneath that stark white 'Iceberg' rose of yours, then plant a lobelia as blue as you like, as long as it has a white center. You can't imagine what a difference those white

eyes will make." She was correct, of course, and even though I understood why it happened, I stood amazed that clumps of azure blue lobelia so nicely complemented icy white roses.

Test this scheme yourself. If you love your beds of yellow roses, but think they look lonesome, try planting fleabane at their feet. Although the pinkish white petals might at first seem out of place, the yellow button-eyed centers are certain to triumphantly unite the combination.

The plants I've suggested barely scratch the list of suitable companions for roses; they're simply the ones with which I've had success. Next season, I intend to explore the world of *Nepeta*, especially after discovering that white forms are available. Similarly, I plan to test more varieties of *Chamaemelum* (chamomile), *Dianthus*, *Stachys* (lamb's-ears), *Cotinus coggygria* (smoke bush), *Cotoneaster*, *Lantana*, *Heuchera*, *Monarda* (bee balm), and *Phlox*.

Now that I've learned there is more to

roses than roses themselves, when I think of my first garden (the one in which I vowed nothing but roses would ever grow), I imagine how frustrated Napoleon became with Josephine—the most single-minded rosarian of all time. In some ways, of course, I bless the tunnel vision of the greatest benefactress to roses ever, for Josephine's blessed "rosarie," housing the finest roses of the time from all over the world, set the stage for a rose revolution that culminated in 'La France', the first hybrid tea rose.

They say that Napoleon divorced his empress because her devotion to roses outweighed hers for him. Maybe she should have tried companion plants. You certainly should.

Rayford Reddell of Garden Valley Ranch in Petaluma, California, is the author of Growing Good Roses and co-author, with Robert Galyean, of Growing Fragrant Plants.

“We have bird song from sunup until sunset,” Lee Larson says of the purple martin colony that graces his specimen plant garden in Columbus, Ohio. The martins chirp, squeak, and trill as they glide through the air in pursuit of food. “And each one of these birds,” he boasts, “can literally eat its weight in flying insects.”

Larson, a representative for Monrovia, a wholesale nursery company, has created a garden refuge for his family that is pleasing to birds as well as people. He admits to a low sales resistance when new products are offered, so his garden has grown and grown into sweeping graceful lines around his property, encompassing and enfolding an open area to one side where his thirty-six pairs of songbirds reside. The purple martins’ diet consists entirely of flying insects, so it’s imperative that they have free space to dive and swoop. The graceful, sweeping lines of flight seem to imitate the Larson garden as a whole.

How does one attract purple martins? “Put up a purple martin house in an open area,” advises Larson. The house should

have forty feet of open space in each direction. “And keep the English sparrows away.” English sparrows are a natural enemy to the martins, occupying their nests in early spring before the martins arrive. They may be controlled by removing their nests from martin houses and by trapping them and transporting them to some distant area. It may take several seasons before a martin colony discovers the house—it took Larson three years—so it is also important to be patient.

Martins probably originally nested in tree cavities, but today virtually all purple martins in America nest in housing provided by humans. Multiple-room martin houses, of aluminum or wood, are usually mounted on poles fifteen to twenty feet above the ground, with rigging that allows them to be raised and lowered much as flag poles are raised and lowered. This provides easy access for cleaning and maintenance after the martins, members of the swallow family, have migrated for the winter. It is advisable to cover the doors to the martin houses during this time to keep the houses available for the martins’ spring return. “I also dust the interiors with Sevin or sulfur

to control lice and mites,” Larson adds.

These lustrous, purple-black and gray birds seem to like people and live harmoniously in the human environment. Extremely family oriented, the colony becomes a swirl of activity during the summer months after the eggs have hatched, with the parents constantly swooping and landing with food for their offspring. Frequently martin houses have railed balconies that allow the fledglings to emerge from the nest and safely totter about. By mid-August the babes have grown and they all set out on their annual flight to the agricultural regions of southern Brazil, faithfully returning the following spring to the same house to raise a new brood.

Their diet includes a broad array of insects such as flies, moths, dragonflies, flying beetles, locusts, and even butterflies and bees. While martins do specialize in flying insects—many insect-eating birds eat other foods, but purple martins and swifts eat only airborne insects—it is a widespread myth that they consume vast quantities of mosquitoes. According to the Purple Martin Conservation Association, mosquitoes account for less than 3 percent

A GARDEN FOR *Purple Martins*

*These cousins
of the swallow make
themselves right
at home with
an Ohio plantsman.*

STORY AND PHOTOS BY JEANNE CONTE



of their diet. The idea that martins can keep your back yard free of bugs is also unfounded—you won't even notice a dent in the flying insect population—but they are still a delight to have around.

The martins, on the other hand, *will* notice a dearth of flying insects. Prolonged periods of wet and cold when insects are hard to find can do serious damage to a martin colony. Larson tells of one cold spring after the martins returned to his garden. The weather was not conducive to insects, so the martins were having a bad time of it. They were so quiet and scarce that Larson took a closer look at their houses and noticed tail feathers protruding from a door. He lowered the martin house and discovered eighteen birds crammed into one six-inch-square compartment. They were literally starving and chose to stack themselves in this way to keep warm, lowering their metabolism, in a desperate effort to stay alive.

Larson took the eighteen birds into his house and placed them on heating pads. He and his family force-fed them raw hamburger and egg yolks for several days before releasing them. They all survived.



Below: Lee Larson cradles a purple martin fledgling in the crook of his arm. Larson's martin colony enjoys spacious quarters (top) framed by a lush perimeter (above) of blooming redbud and Canadian hemlock.



The garden area in which this annual purple martin drama takes place is like an amphitheater, providing both privacy for the family and the open sweep so necessary to the martins. Larson has surrounded the purple martin colony with a rich array of specimen plants chosen for their beauty and their suitability for perimeter planting.

A trumpet honeysuckle (*Lonicera sempervirens* 'Magnifica') greets visitors at the mailbox by the curb, with ground-hugging evergreens at its feet. A little closer to the house, a decorative group of stone outcroppings lies amid shrubby Swiss mountain pine (*Pinus mugo*), juniper (*Juniperus sabina* 'Broadmoor'), spirea (*Spiraea japonica* 'Little Princess'), and a weeping evergreen (*Picea abies* 'Pendula').

Towering paper birch (*Betula papyrifera*) and variegated American sweet gum trees (*Liquidambar styraciflua* 'Variegata') create a splendid color display through the seasons on the Larsons' front lawn.

A perennial garden lies to one side of the house, close to a rear door with easy access for flower cutting. Hostas line a pathway to the rear garden, threading through purpleleaf euonymous (*Euonymus fortunei* 'Colorata') under a rugged river birch (*Betula nigra*).

Azaleas, spireas, redbuds, and rhododendrons that curve around the rear yard in the company of junipers offer their bloom in season. Mature hedges of Canadian hemlock (*Tsuga canadensis*) give continuity to this line of specimen plants for which they form an evergreen backdrop. The hedges also serve as a screen and as a frame for the purple martin colony.

In the meadowlike side yard, close to the birdhouses where the purple martins fly, an arbored bench nestles among tall maiden grass (*Miscanthus sinensis* 'Gracillimus'). It is a pleasant place to sit amid this beauty, watching the parent birds feed their young and listening to their cheerful chatter.

Jeanne Conte is a free-lance writer and photographer who lives in Columbus, Ohio.

Anyone interested in learning more about purple martins should contact the Purple Martin Conservation Association, Edinboro University of Pennsylvania, Edinboro, PA 16444, (814) 732-2610. The PMCA is devoted to aiding martins through public education and research. They publish a quarterly magazine, *The Purple Martin Update*, and a catalog of martin houses, books, tapes, and other products. Annual dues are \$16.

It was a hot day in late July and a number of us, all potential docents, were following tour guide Anne Tansey through the University Botanical Gardens in Asheville, North Carolina. Suddenly she stopped beside a propagation bed and pointed to a tall tomato vine hung low with round and full fruits, each the size of a Ping-Pong ball.

"These originally came from my grandmother's garden," she said, "where they grew for over forty years. I've never found them offered in any of the seed catalogs. Just try them."

She was right that they were uncommonly juicy and sweet, a delightful treat when even the deep shade of the woods felt like a closed car left in the summer sun. We were all promised seeds of that special tomato and as a result, that particular strain should be in no danger of disappearing, at least for the next few years.

But many other seeds of farm and garden—and those of us who might have eaten them—have not been so fortunate. More than 90 percent of the vegetable and fruit varieties available at the turn of the century now appear to be extinct.

One hundred and twenty-five years ago, according to Fearing Burr's *Field and Garden Vegetables of America*, 151 varieties of peas were being grown, eighty-two different turnips, an astonishing eighty-six types of broccoli, and 112 kinds of lettuce.

This year, one major seed catalog listed only six broccolis and twenty lettuces. Although some small seed companies still carry a much larger number of cultivars, the majority of American gardeners aren't exposed to these more diversified lists.

Even in 1865, Burr noted that some popular and hardy varieties were disappearing from the market, and unfortunately, the trend to fashionable plants continues. Every year, new cultivars are brought in to replace the old in the belief that gardening consumers, just like automobile drivers, must have a new model every year. Every species, variety, and cultivar that disappears is a loss of a link with the past, a link that is not only important in a cultural and aesthetic sense, but biologically as well. It means a loss of germplasm, or genetic material, that can never be replaced.

Just as in the animal world, the heredity of plants is controlled by the genes and chromosomes found in the nucleus of the cell. It is these encoded combinations of amino acids that enable one tomato to

A Hedge Against Starvation

The germplasm in the world's edible plants is more valuable than money. But seeds are having their own savings and loan crisis.

BY PETER LOEWER

develop firm flesh that will resist unnecessary bruising when shuffled about during shipment to the market, and another, which perhaps can't withstand being moved farther than from back yard to dinner plate, to be sweet and juicy like Anne Tansey's grandmother's.

Even more important in terms of ensuring food quantity are genes that may make wheat resistant to drought or corn resistant to fungus. The decreasing diversity among the world's agricultural plants has frightening implications. About one-fourth of the human energy demands of the United States and three-quarters of the human diet of the rest of the world are provided by cereal seeds. We also consume vast numbers of unprocessed seeds such as pecans, peanuts, and pistachios. We mash, grind, boil, and compress other seeds into margarine, medicines, cosmetics, and alcoholic beverages.

The seeds of wheat provide more food for the human race than any other plant or animal. Wheat originated in Mesopotamia and the Mediterranean. For centuries, its

germplasm moved through generations of farmers, and into new environments, being altered not by human manipulation, but the principle of survival of the fittest. These primitive cultivars, called landraces, possessed great advantages for their limited ranges. Wheat grown in dry climates tended to become drought tolerant. Wheat that could be successfully grown where certain pests prevailed was naturally tolerant to those pests.

But around 1930, the genetic sciences began to come of age. Breeders developed hybrids for higher yields, and made them widely available. Even as the amount of land being farmed went down, production soared—and old varieties, with the disease and drought resistances they had built up over centuries, began to disappear.

What can happen when natural diversity disappears is illustrated by the Irish potato famine of the 1840s, when nearly two million of Ireland's poor starved to death because none of the handful of potato varieties on which they depended for sustenance were resistant to a Mexican potato



*Research leader
Dr. Eric Roos and
Lana Wheeler,
another researcher
at the National
Seed Storage
Laboratory, store
seed samples in
cryogenic vats of
liquid nitrogen.*



Top: Visiting researcher Cecil Stushnoff examines grafted apple buds following cryogenic storage.

Center: Potato cuttings being grown out in test tubes.

Bottom: Chemist Sharon Sowa prepares bean seedling extract to study seed deterioration and genetic changes during storage.

Opposite: Okra seedlings during germination testing.

blight, *Phytophthora infestans*.

The United States' most famous crop disaster was less tragic, but it did sound a warning. In 1970, a fungus, the Southern corn leaf blight (*Bipolaris maydis*), was able to wipe out 15 percent of the nation's corn crop because nearly all the varieties being grown had come from the same parent. The blight was quickly brought under control by replanting corn fields with older hybrids that remained in seed company reserves.

The presence of these seeds in commercial labs was fortunate. In the United States, very few crop seeds are ours for the collecting. Not a single major food or fiber plant grown in this country today originated here. Wheat arrived via Europe and southwest Asia, rice from southeast Asia, and corn from Central America. About the only native plants now used for food in any significant way are sunflowers, Jerusalem artichokes (*Helianthus tuberosus*), blueberries, cranberries, some nuts, and a few beans and squashes.

Even in their countries of origin, the wild relatives of our crops are disappearing. Destruction of habitats such as rain forests and fields, and replacement of indigenous crops by American hybrids, is causing valuable genetic material to disappear at an alarming rate.

The same scientists who were creating the hybrids that drove natives to extinction finally awakened to the problem of lost germplasm: They saw that they would soon breed their products into an evolutionary corner. In 1944, the National Research Council recommended that the U.S. Department of Agriculture establish what would essentially be a bank to preserve plant genetic material in case it should be needed in the future. Two years later, Congress passed the Research and Marketing Act, giving the federal government responsibility for obtaining foreign seeds and plants, and giving states the duty to evaluate them. In 1947 and 1948, four regional plant introduction stations opened, in Ames, Iowa, Pullman, Washington, Geneva, New York, and Experiment, Georgia. In 1956, Congress authorized \$450,000 to build the National Seed Storage Laboratory in Fort Collins, Colorado.

Until then, says Dr. Steve A. Eberhardt, the national lab's director since 1987, when people did realize that seeds contained characteristics worth preserving, the seeds were sent to the federal Bureau of Plant Industry outside Washington, or to research workers in state experimental stations. But neither

of these groups had adequate storage facilities. If the seeds had no obvious outstanding attributes, he says, "they were either discarded or tossed in a drawer and left there until all viability was lost."

The corn blight disaster of 1970 shocked policymakers into creating a more formal network, the National Plant Germplasm System, which, in addition to the national lab and regional stations, encompasses ten clonal germplasm repositories for plants that can't be reproduced from seed, several crop-specific seed and genetic stock collections, and a laboratory and quarantine center at Beltsville, Maryland.

The National Seed Storage Laboratory, it is said, is the biggest seed bank in the world, but it is not nearly big enough. After decades of underfunding, however, it recently received a shot in the arm in the form of funding for a long-awaited expansion.

Completed in 1958 and operating on a budget of about \$2 million a year, the National Seed Storage Laboratory (NSSL) consists of a nondescript three-story yellow brick building housing offices and laboratories and nine storage vaults that are accessible from a common corridor. The vaults hold more than 250,000 seed samples representing over 600 genera and 1,300 species, including all major crops grown in the United States.

Most of the seeds in the collection come from public agencies, primarily the federal plant introduction office. The lab is most anxious to obtain wild species and landraces, such as corn from Central and South America, before their centers of origin are destroyed by development. Gene banks in other countries sometimes use the American lab as a backup for their collections. Other depositors in this national seed bank—strictly on a voluntary basis—include commercial seed firms, and individuals involved in plant breeding or in seed research.

Contributions from seed companies and breeders, says Eberhardt, include newly released cultivars, those approaching obsolescence, and those already obsolete. The corn blight proved the value of the latter group. "No one can tell that a cultivar that is susceptible to certain existing pathogens would not be resistant to a new race of pests that might show up in the future," Eberhardt says. "We frequently receive requests for seeds of cultivars that have been missing from the agricultural community for thirty to fifty years."

The needs of farmers can change because a new pest has accidentally entered the

country, because a strain at first immune to a domestic disease loses its immunity, or because of permanent changes in the world's weather caused by the greenhouse effect. But more frequently and less dramatic are the demands brought about by cyclical and expected changes in weather patterns. In North Carolina, for example, farmers have been facing periods of drought for the past few years. They are trying a new tropical corn developed for Central and South America that is more tolerant of insects, diseases, and heat than the varieties presently grown. This is the second year of raising about 3,000 acres of tropical corn, planted after the wheat and barley harvests of mid-June.

Dr. Loren Wiesner, NSSL curator, says the lab also accepts heirloom seeds from individuals who have a variety not already in the collection. The only requirement is adequate documentation, consisting of descriptions of the varieties or the breeding lines, or references to publications in which such descriptions can be found. Because few gardeners have such documentation on seeds passed down within a family or a community, there are few American heirlooms in the NSSL collection.

Nor can home gardeners make withdrawals from this bank. The lab exists to preserve seeds, not provide them. Individuals wanting seeds to grow will probably be directed toward one of the private seed savers groups. "We're not a procurement agency," says Eberhardt, "but we will advise individuals as to sources of seeds stored in the laboratory." But any bona fide research worker in the United States or its territories can obtain nominal amounts of seed without charge, provided supplies are unobtainable elsewhere.

Before storing the seeds, scientists test them for viability much as a gardener would, by placing them on moist paper towels. This paper toweling, specially made for germination testing, is rolled and then placed on end in stainless steel chambers that keep the seed at an optimum temperature. If a majority germinate, the remaining seeds are placed in drying rooms, where their moisture content is reduced to 5 or 6 percent—about half the usual amount.

After drying, the seeds are hermetically sealed in seven-ounce paper bags that have been moisture-proofed with a foil and plastic film lining. These are arranged in numbered trays filed in numbered steel racks; their code numbers and vital statistics are entered in the



NSSL computer. Most of the seeds are kept in conventional cold storage rooms with temperatures of 18 degrees below zero.

The lab is also experimenting with cryopreservation, through which some 2,000 varieties of seed or other genetic material have been stored in tanks of liquid nitrogen at 196 below zero. Such frigid temperatures slow the metabolism within the seed so that the aging process almost comes to a halt. Seeds that remain viable after this treatment can be stored for much longer periods without losing viability.

For most accessions, such as seeds of named varieties and of self-pollinating plants, the lab usually stores about 1,500 seeds. With varieties of cross-pollinating plants, they store 3,000 seeds. Since only a low percentage of hybrid seeds reproduces the qualities of the parents, the NSSL does not store such seeds but does attempt to obtain each of the parents used to produce such hybrids.

The regional stations, says Wiesner, like to have about 7,000 seeds, because it is from there that seeds are distributed to researchers

and breeders. However, they lack the refrigeration facilities to store seeds for long periods. The regional stations' working collections have been compared to checking accounts, in relation to the NSSL's base collections, which are long-term savings accounts. The base collection serves primarily as a reserve in case the working collection is damaged or destroyed.

But there are also some differences in the types of seeds found in each. In Colorado, the largest quantity of seeds in storage are in base collections of small grains, cotton, soybeans, maize, sorghum, and tobacco. Each regional station specializes in certain types of plants, depending on climate and the economic importance of a crop to its region. If you wanted to donate tomato seeds to the system, you would be referred to Geneva. Beans? Pullman. Cantaloupes go to Ames, and okra, to Experiment, Georgia.

The National Seed Storage Laboratory, like most undertakings of the U. S. government, has not been free of criticism. For example, not all of the seeds at the regional

station are backed up with base collections in Colorado. Wiesner calls this goal a "first priority."

In 1988, Associated Press science writers Lee Mitgang and Paul Raeburn wrote an award-winning series in which they reported that many of the seeds held by NSSL were dead or dying. Jeremy Rifkin, known best for his stand against genetic manipulation, filed a suit charging that gross negligence on the part of the National Plant Germplasm System was harming the environment. While the latest criticism, from the National Research Council, revolves around the system's "cumbersome administrative structure," what nearly all of these critiques come down to is lack of funding. Seed storage and collection is so low priority in Washington that it doesn't even have its own line item in the federal budget, and there are no Capitol Hill staff assigned to the issue.

Far from being blamed for NSSL's

problems, Eberhardt and Henry L. Shands, head of the overall germplasm program, are credited with a number of recent improvements. In 1988 the lab's budget doubled to its current \$2 million level. The system's computer system, the Germplasm Resources Information Network, is said by researchers to be keeping much better track of the system's inventory.

But the most pressing need has been space. The storage vaults in Fort Collins are so full, according to Wiesner, that eight major crops are being stored at regional labs rather than NSSL. In April, construction was to have begun on an expansion that will increase storage space from 5,000 to 20,000 square feet, and total space from 20,000 to 85,000 square feet. Already, \$12,250,000 has been allocated for the expansion and completion is expected in late spring of 1992.

But bricks and mortar aren't the only things our country's seed storage system

needs. It needs staff and physical space in the regional stations and elsewhere to do the studies—evaluation and "growing out"—that will ensure that each line of germplasm in the NSSL vaults is kept alive and unaltered. "Regeneration of seed lots with low germination is a continuing need," read a report from the National Plant Germplasm System called *Managing Genetic Global Resources*. "A large proportion (almost 50 percent) of the accessions at NSSL are below the minimum desired size (550 seeds). Regeneration of these samples is urgently needed."

Every five to ten years the seed is retested. If viability drops to 60 percent or below, the appropriate regional curator is responsible for producing a new generation of seeds with the same genetic composition as the original accession. But this is easier said than done.

Like people, seeds carry a number of genetic traits—some good and some bad—

SAVING SEEDS FOR HOME GARDENERS

You probably won't find 'Bulls Blood' beet, 'Pearl Harbor' tomato, 'Austrian Wild Boar' Jerusalem artichoke, 'Grandpa Admire's' leaf lettuce, or 'Flossie Powell's' lima bean in the National Seed Storage Laboratory, and if you did you couldn't get them for your home garden. But these and thousands of other open-pollinated garden varieties are being preserved, and are available through a grassroots gardeners' collective called the Seed Savers Exchange.

Alarmed by the rapid disappearance of nonhybrid vegetable and fruit varieties, Kent Whealy founded the Seed Savers Exchange in 1975 to preserve America's vanishing garden heritage. Today the nonprofit organization boasts a membership of 5,000, and an active membership of 900 gardeners who grow out, save, and exchange over 6,000 different varieties of edible plants, from amaranth to yskrud (*Mesembryanthemum crystallinum*, an old-Europe vegetable with salty tasting leaves). Family heirlooms, native American and other ethnic varieties, and those dropped from seed catalogs make up the bulk of this expanding, decentralized collection.

Membership works like this: Anyone can join and receive the organization's publications, but seeds are more expensive to those who don't become active members and offer their own seeds for exchange. The lifeblood of the exchange is the 900 members who save their seeds (or scions or tubers) and offer them, via an annual yearbook, to the rest of the membership, along with occasional advice ("plant tomatoes at an angle"), history ("grandfather brought it back from the Civil War"), and mystery ("from a Russian sailor"). In contrast to the National Seed Storage Laboratory's white lab coats, clipboards, and officials, the Seed Savers Exchange is a great big county fair of American gardeners. It even sponsors an annual barn dance.

In spite of the informality of the organization, it has a very serious purpose—to rescue from extinction what many believe are the best vegetables and fruits available to home gardeners. Whealy estimates that 80 percent of the open-pollinated varieties that Americans depended on before the advent of hybridization are lost forever—dropped from seed catalogs or simply not passed down from previous generations. New is not necessarily better. "Most of the commercial breeding being done is almost entirely for commercial application," explains Whealy. "So much of the material we are keeping are the varieties best suited for the back-yard gardener."

Commercial growers want uniform size and ripening so they can harvest their crop all at once; they want tough skins that will ship well. As a result, taste is often sacrificed—the thick-skinned supermarket tomato and the uniformly bland head lettuce are the most notorious examples. Seed companies like to sell hybrid varieties, not simply because they may be more productive, but also because they will not produce viable seed, guaranteeing that their customers will return each season with new orders. And as the seed industry becomes more consolidated—according to *Shattering: Food, Politics, and the Loss of Genetic Diversity*, Cary Fowler and Pat Mooney's recent book on the erosion of food-plant germplasm, there have been over 1,000 seed company takeovers since 1970—it becomes unprofitable for large conglomerates to offer regional specialties and less-popular plants. None of this is in the interest of the home gardener.

To remedy this, the Seed Savers Exchange has amassed a cornucopia of shapes, colors, tastes, and regional peculiarities. Although they have purchased many commercial varieties discontinued from catalogs, the bulk of their new accessions comes from members hunting down family heirlooms and local varieties "like an army of plant explorers" as Whealy puts it. "I really think that that's the most exciting part of our work."

but not every seed holds every desirable attribute. And as seeds age their ability to germinate begins to fail, eventually reaching a point at which they will no longer germinate at all.

If a seed sample has declined with age, genetic diversity can be compromised. Which of the seedlings from those seeds that survive best represents the parents? This is not too difficult when dealing with differences relating to the color or size of fruit, but what if the changes are not immediately apparent? What if they concern the ability to withstand a certain number of hours of below-freezing temperatures or live through three weeks without water? So the very act of choice leads to a potential genetic drift, and the danger of losing many small but nonetheless important individual traits in the plant's genetic history.

But if deterioration rates are only allowed to fall to, say, 10 percent before new germination is required, as many critics



Kent Whealy of the Seed Savers Exchange beside a pepper pollination cage, which protects varieties from inadvertently becoming cross-pollinated.

DAVID CAVAGNARO

A browse through the annual seed listing reveals the power and scope of this army. Plants come, almost literally, from everywhere: "Originated in the Cedar Rapids Czech community," "from the heart of the Chihuahuan Desert in Mexico," "found growing wild at 2,500 feet in Sierra foothills," "brought to America in 1901 from a little village twenty miles from Budapest," "heirloom from central New Hampshire," "seeds from Bengal, India, via father-in-law of Hare Krishna devotee," "have been raised by a family near Lexington, Kentucky, for about 100 years and given to them by an Indian," "heirloom brought here on the Mayflower," "comes from a 90-year-old farmer named Walker Cannon who got it from his father," "from Vietnamese grocery," "from Nashville, Tennessee, crafts show," "given to me by Haitian friend," "I found them in a market in Port Antonio, Jamaica," "from the late Old Joe Concha," "from the crop of a goose," "found in a bucket."

Because up to 80 percent of the varieties in the network are available from only a single source, the Seed Savers Exchange set up a two-tiered curatorial network to ensure the systematic preservation of the collection. The entire collection is maintained by primary curators specializing in certain types of plants. For example Heritage Farm, the headquarters of the Seed Savers Exchange, maintains tomatoes, beans, lettuce, and peppers. Suzanne Ashworth, a resource teacher for elementary schools in Sacramento, California, maintains eggplants (seventy-three varieties), as well as ground cherries (*Physalis* spp.) and tomatilloes (*P. ixocarpa*). Secondary curators back up the primary collections by growing key rare varieties.

The Seed Savers Exchange's ability to grow out the bulk of its collection annually means that, unlike seeds in the National Plant Germplasm System, these are living varieties, evolving with their environment, gradually changing over time, and building up new defense mechanisms for new conditions. There

is no substitute for this type of germplasm and plant conservation. Evolution stops for seeds that are simply tucked away in cold storage for long periods of time. Once grown, such plants may not be able to withstand new generations of pests and diseases or changed environmental conditions. But perhaps more importantly, the plants in the Seed Savers Exchange are not just grown to be museum pieces; they are used by the gardeners who grow them—and as long as they are useful they are more likely to be conserved.

Like the plants they are devoted to, the Seed Savers Exchange is evolving. Although several heirloom seed exchanges and small seed companies specializing in regional varieties have disappeared in the last five years, Whealy's group is getting larger and stronger. The number of people offering seeds has doubled, and the number of seed accessions has tripled in the last five years. The exchange has received good publicity and has been very successful in fund raising—most recently Whealy received a MacArthur Fellowship so-called "genius" grant of \$275,000.

This makes Whealy enthusiastic about the organization and optimistic about its mission, but he does not forget that garden conservationists are still a very rare breed: "I've read that only 10 percent of the people that garden write away for seed catalogs. If only one in ten really cares about the varieties that they're growing, then what a tiny percentage it must be of those who are concerned enough to keep certain varieties alive."

—Thomas M. Barrett

To receive a four-page color brochure detailing the projects and publications of the Seed Savers Exchange, send a self-addressed stamped envelope and \$1 to them at Rural Route 3, Box 239, Decorah, IA 52101. To obtain the Gardeners' Information Service resource bulletin, Heirloom Seed Sources, Exchanges, and Resources send 50 cents to the AHS address.

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have suggested, the samples will be disturbed more frequently and more seeds lost simply by the act of handling them. The growing out process itself can alter the genetic material. Ideally, seeds should be grown under conditions similar to those where they were native, but since seeds are collected from all over the world, that isn't always possible. Once again, a problem of genetic drift.

So while the eleventh-hour expansion of the main lab marks a brief victory for butter over guns, funding is still appallingly low for staffing and acquisition.

What will it take to make Congress aware of the importance of our national seed bank? Eberhardt points to the outrage that was generated among Americans a couple of years ago when Congress proposed that taxes from interest on checking accounts be deducted directly by banks. The idea provoked a torrent of letters to Washington, and died on the vine. That was merely a privacy issue. "Americans," says Eberhardt, "must realize that germplasm preservation will eventually become a survival issue."

Peter Loewer's latest book, The Wild Gardener, will be published by Stackpole in September. The American Horticulturist staff contributed information to this article.

SOURCES & RESOURCES

Diversity, a 36-page quarterly news journal for the international plant genetic resources community, covers policy and research relating to the preservation of germplasm. Individual subscriptions are \$35 a year. *Diversity*, 727 8th Street S.E., Washington, DC 20003, (202) 543-6843.

Shattering: Food, Politics, and the Loss of Genetic Diversity. By Cary Fowler and Pat Mooney. University of Arizona Press, 1990. AHS member price, hardcover: \$21.20 (Order code: UAR001); softcover: \$11.00 (Order code: UAR002).

Life Atop the Food Chain: How the Loss of Wild and Forgotten Plants Threatens America's Food Supply. By Paul Raeburn. To be published by Prentice-Hall in mid-1992.

The National Seed Storage Laboratory. Visitors are welcome, but the staff asks that tours be arranged as far in advance as possible. Contact the Research Leader, ARS-USDA, National Seed Storage Laboratory, Colorado State University, Fort Collins, CO 80523.

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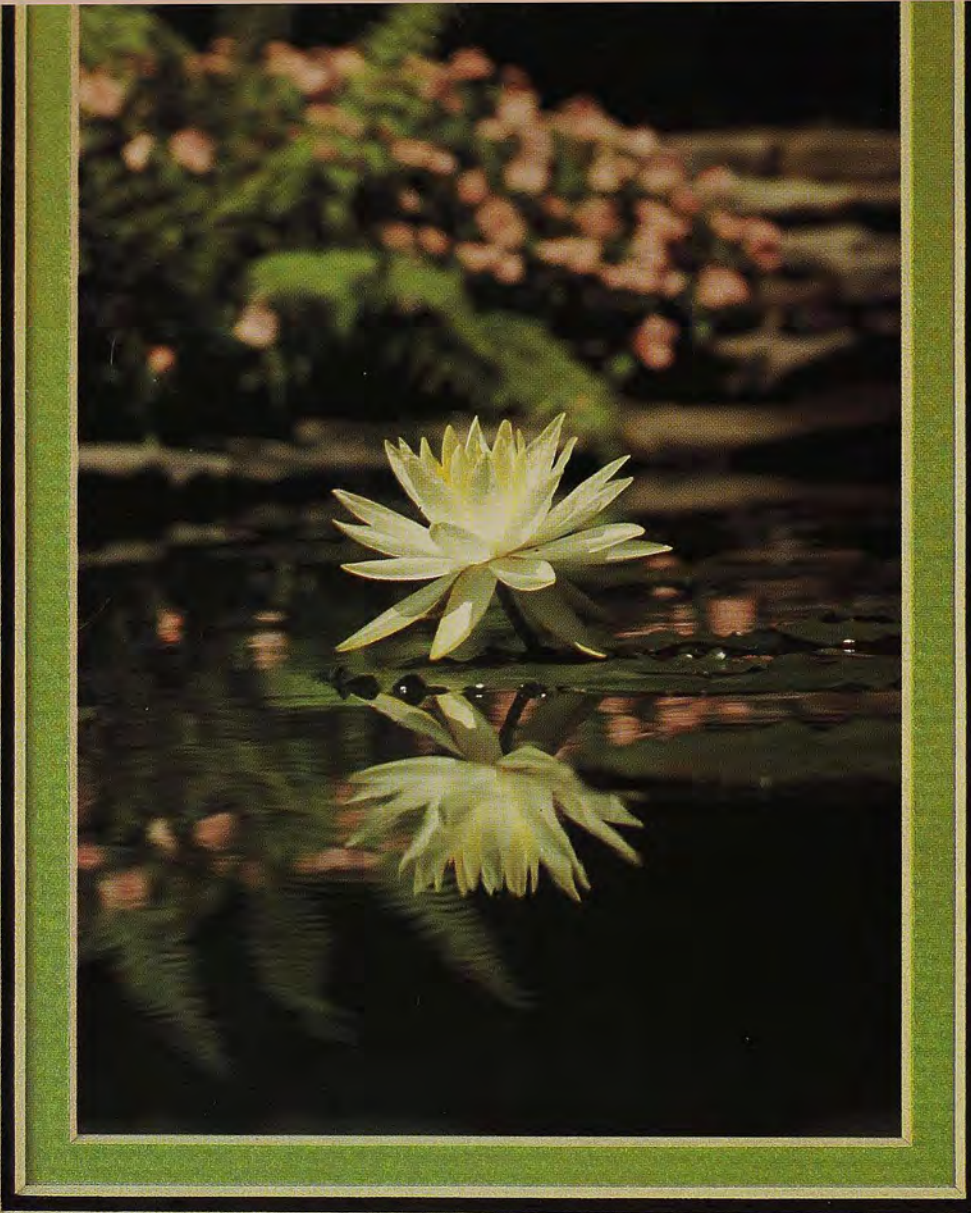
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