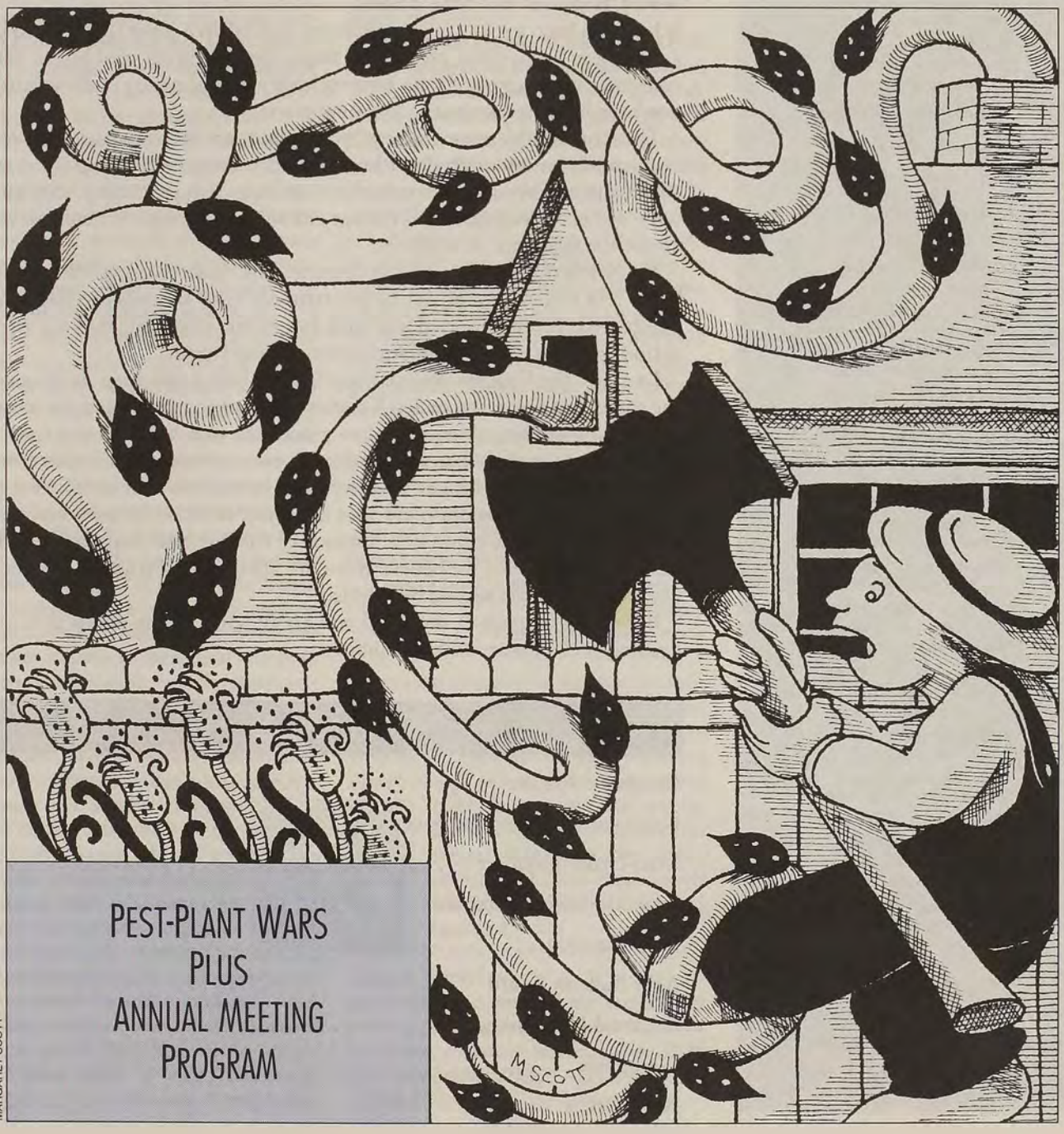
NEWS EDITION

American Horticulturist

March 1995 A Publication of the American Horticultural Society $2.00



PEST-PLANT WARS
PLUS
ANNUAL MEETING
PROGRAM

MARGARET SCOTT

American Horticulturist

Volume 74, Number 3 March 1995

ARTICLES

When Beauties Become Beasts

It has long been a joke among gardeners that when a plant is described in a catalog as "a vigorous grower," it means that it will eat your house. But conservationists charged with keeping large tracts of nature under control don't see invasive plants as a laughing matter.

The most troublesome of these "pest" plants are far from home, moved accidentally or intentionally from their native range. Free from the constraints posed by natural enemies and champs at reproducing, they can wipe out other vegetation, drive out animal life, dry up wetlands, or increase the incidence of wildfires.

Many interlopers are popular ornamentals. Concerned wildlife managers and others would like to see stronger laws to keep meddlesome plants from being imported and sold, but in the meantime, they say education can help keep the situation from getting worse.

Last fall, the Virginia Native Plant Society held a day-long meeting on the topic. Ted Scott, the society's conservation chairman, began the meeting by emphasizing that most alien plants are well-behaved and have a place in our gardens. The society doesn't even advocate abstinence from using many of those on its "invasive" list, he told us. "We do think that those who recommend a plant that is subject to being invasive have an obligation to advise caution in disposal of cuttings and seed pods. In the case of some plants, we believe there are adequate substitutes, in which case the bad actors should be avoided."

Beginning on page 6, we'll tell you about some of the plants that are causing problems around the country.

DEPARTMENTS

MEMBERS' FORUM

Environment "Not A Luxury"

I could not believe the petty hostility expressed in the survey comments regarding environmental issues that appeared in the January "Members' Forum."

As gardening is essentially a process or method of managing, altering, or developing the environment we live in, it is impossible to garden without considering the environment. The environment is a vital part of our everyday life and the quality of it. To be tired of hearing, learning, knowing, or thinking about the factors and problems involved is to be tired of living. Those "tiresome" environmental issues are about sustaining the quality of life by preserving our natural resource diversity for the benefits of beauty, interest, and economic values stored in the global genetic bank.

I fear the real problem might be that some people are tired of thinking. Unfortunately, the world has become too small and crowded with people, too cluttered with the unrestrained expansion of human civilization, for very many of us (if any) to continue to blindly, selfishly, and irresponsibly waste, abuse, or destroy the gift that God has given us—the complex web of life that makes our earth more than just another barren rock in space. How foolish and short-sighted we would be to allow personal greed, comfort, or convenience to cheat our children of the natural resources that could sustainably benefit future generations—that is, if we can restrain ourselves from the mindless waste and destruction all too common right now.

The environment is not a luxury, it is a necessity, regardless of one's politics. I for one thank AHS for the progressive stance taken. I applaud the enlightened policy of educating your readership by making appropriate use of botanical and biological science (i.e., environmental data) on topics relevant to the practice of the horticultural arts. I feel truly sorry for those who fail to understand or appreciate the fine efforts made—an excellent publication. *Ronald J. Beavers Jr.*
Reeders, Pennsylvania

The Learning Never Stops

When you talked about retired gardeners learning all over again in your November "Members' Forum," you didn't go far enough south for this Illinois retiree in Florida—Zones 10 and 11! But we had a freeze even here.

I purchased a beautiful little plant called desert rose, said to be a succulent. I am on my third plant now. The first died, although it was in the same location as a neighbor's. I put the next in a drier spot, and it got yellow leaves. This one is under the eaves of the house on the south in the midst of vegetation and is doing well.

I have had exceptional luck with stephanotis vines, which flower and produce pods with about 90 seeds that all germinate in 10 days or so, and a hanging begonia that produces sprays of tiny pink flowers, luxuriant growth, and is easily propagated. Neither plant seems to have enemies.

I planted two southern magnolias at the same time. Both of them flowered, but the one on an east-west swale looks anemic and the one on a north-south swale is huge and robust. Both have scale. The latter doesn't mind the high winds it gets.

Amaryllis are a joy. Snails are a pest.

Rhea Brennwasser
Fort Lauderdale, Florida

When we promised to write more for Zone 9 gardeners, we should have said "and south"! You might try dormant oil for the scale on your magnolias. Three different succulents are called "desert rose," but it looks like you have that one figured out. In fact, it sounds like the rest of us could learn quite a bit from you. (Miss Brennwasser tells us she is a retired attorney, aged 88.)

Please Write!

Every day we pounce on our mail carrier looking for a letter from you! *Address it to: Editor,* American Horticulturist, *7931 East Boulevard Drive, Alexandria, VA 22308-1300.*

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William Byrd Press, Inc.

Back issues of AMERICAN HORTICULTURIST News Edition are available at a cost of $3 per copy. The opinions expressed in the articles that appear in AMERICAN HORTICULTURIST are those of the authors and are not necessarily those of the Society. Botanical nomenclature in AMERICAN HORTICULTURIST is based on HORTUS THIRD. Manuscripts, artwork, and photographs sent for possible publication will be returned if they are accompanied by a self-addressed, stamped envelope. We cannot guarantee the safe return of unsolicited material.

AMERICAN HORTICULTURIST, ISSN 0096-4417, is the official publication of the American Horticultural Society, 7931 East Boulevard Drive, Alexandria, VA 22308-1300, (703) 768-5700, and is issued 12 times a year. The American Horticultural Society is a nonprofit organization dedicated to excellence in horticulture. Membership in the Society includes a subscription to AMERICAN HORTICULTURIST. National membership dues are $45; two years are $80. Foreign dues are $60.

Second-class postage paid at Alexandria, Virginia, and at additional mailing offices. **Postmaster:** Please send Form 3579 to AMERICAN HORTICULTURIST, 7931 East Boulevard Drive, Alexandria, VA 22308-1300.

Produced in U.S.A.

GARDENERS' INFORMATION SERVICE

Q: *I loved sweet peas when I was growing up in the Midwest and would like to plant them in my garden this spring. Can you give me some tips for planting them?*

—T.G., Washington, D.C.

A: Sweet peas *(Lathyrus odoratus)* require three things that you may have a hard time providing in the mid-Atlantic region. They like cool conditions, slightly alkaline soil, and excellent, deep drainage. Look for newer cultivars specifically developed for warmer temperatures, such as 'Burpee's Galaxy Mixed' or 'Giant Late Heat Resistant Mix'. They are said to bloom not only in spring, but continue into summer. We haven't tried these, so we don't know how they stack up to the old-fashioned variety in terms of fragrance.

To create the drainage they need, most authorities recommend preparing a trench of amended soil 18 inches to two feet deep. If a soil test confirms that your soil is acid, you will want to add lime as well as organic matter.

The seeds can be started indoors in peat pots six weeks before the last frost, which for you is generally around April 15. If you start seeds outdoors, plant them two inches deep as soon as the soil can be worked in spring. They can be planted in fall if they have excellent drainage. In the *Hearst Garden Guides: Annuals,* editor Ted Marston recommends adding sand to the trench for autumn planting.

Sweet pea seeds have a hard seed coat, so whether you are starting them indoors or directly in the garden, you'll have better results if you first soak them in water for 24 hours or nick the seed coats with a knife.

Sweet peas need full sun, a support to grow on, plenty of water, and occasional feeding with a complete and balanced fertilizer.

Sources of the heat-resistant cultivars include W. Atlee Burpee, 300 Park Avenue, Warminster, PA 18974, (800) 888-1447; and Park Seed Company, Cokesbury Road, Greenwood, SC 29647, (803) 223-7333.

Q: *I would like to collect some* Camellia japonica *seeds from my mother's house. Will they need any special treatment?*

—B.B., Charleston, South Carolina

A: Michael Dirr and Charles Heuser Jr., in *The Reference Manual of Woody Plant Propagation,* recommend that you collect the seeds in fall before the seed coats become hard and impervious to water. The seeds will still need to be soaked in warm water for 24 hours before they are sown. The manual mentions that one nursery chills the seeds, planting those that develop a root radicle and throwing out any that fail to do so. You can check on this development most easily if you sow the seeds inside a damp, folded paper towel. Keep them moist by storing them in a plastic sandwich bag in your refrigerator.

Q: *The lettuce and spinach seeds that I started last spring had very poor germination rates. I sowed them directly in the ground and made sure they were kept moist. What went wrong?*

—R.P., Indianapolis, Indiana

A: Both vegetables are cool-season crops, so the seeds should be sown directly in the soil as soon as it can be worked in early spring. They will not do well if you wait until the soil temperature warms to 65 degrees or more.

Lettuce seeds need light to germinate, so don't cover them with soil—just lightly press them onto the soil surface. Sow spinach seeds a half-inch below the soil surface.

Several seed germination books recommend that you refrigerate lettuce seeds for one or two days. Spinach seeds should either be soaked in water for a day or chilled in a moistened medium for a week before sowing.

With any type of seed, make sure it is fresh seed from a reputable company, or if it was collected by a home gardener during the previous growing season, that it was stored in a cool, dry place.

FRIENDLY ADVICE

Take advantage of your membership in the American Horticultural Society by calling or writing us with your gardening questions. Our Gardeners' Information Service is staffed Monday through Friday from 11 a.m. to 3 p.m. Eastern Time. Use our toll-free member number, (800) 777-7931, or write us at 7931 East Boulevard Drive, Alexandria, VA 22308-1300.

Q: *I would like to try growing some old garden roses in my backyard. Could you recommend some pink and white ones?* *—O.V., Portland, Oregon*

A: To best answer your question, we called the American Rose Society (ARS). The ARS Roses in Review program rates all roses on a 1 to 10 scale, in which 10 is the highest score. The results are obtained from rosarians nationwide, who evaluate roses on color quality, growth habit, disease and pest resistance, fragrance, and overall vigor.

Among old roses (generally defined as those developed before 1920) that have received ratings of 8.5 or higher, pink ones include 'Apothecary's Rose', 'Baronne Prevost', 'Celestial', 'Celsiana', 'Champney's Pink Cluster', 'Empress Josephine', 'Félicité Parmentier', 'Ispahan', 'Marchesa Boccella', 'Pink Pet', and 'Rose de Rescht'.

White old rose cultivars receiving 8.5 or higher are 'Alba Semi-plena', 'Great Maiden's Blush', 'Lamarque', 'Mme. Hardy', 'Mme. Legras de St. Germain', and 'Stanwell Perpetual'.

Sources for these roses include: Heirloom Old Garden Roses, 24062 N.E. Riverside Drive, St. Paul, OR 97137, (503) 538-1576; and Roses of Yesterday and Today, 802 Brown's Valley Road, Watsonville, CA 95076-0398, (408) 724-3537.

—Maureen Heffernan
Education Coordinator

MAIL-ORDER EXPLORER

Northern Delights

Northern gardeners—those often-neglected inhabitants of Zones 1 through 5 who struggle with short growing seasons, bitter winters, and a lack of horticultural variety—have discovered a champion in Kristl Walek, owner of Gardens North near Ottawa, Ontario. Although this is only the fourth year of operation for Gardens North, Walek has already established a core of staunch supporters among gardeners in both the United States and Canada. Gardeners on both sides of the border are attracted by the variety of rare and northern-hardy perennial seeds in Walek's catalog, by the level of personalized service she provides, and by her attempt to develop hardiness ratings more useful for cold climates, based on the experiences of a network of about 500 northern gardeners.

ARTIST: ANTHONY D. WILLIAMS

"I think this woman is marvelous—she really cares about what grows here and what doesn't," says Deborah Niedermeyer, a contract lawyer who lives in Fairbanks, Alaska. "It's a challenge to garden up here, but there's a lot more latitude for variety than we have ever realized. Most gardening magazines say that something is very hardy when it survives to 35 degrees below zero. Well, we just laugh at that. We're about in Zone minus-1!"

Considerably farther south is Carolyn Hoagland, owner of the Country Farm, a nursery in Covington, Indiana, near the border between Zones 5 and 6. Hoagland says Walek "offers a lot of very attractive perennials that are not available through standard catalogs, particularly plants native to the northern prairies and woodlands. She has *Cimicifuga racemosa*, which is often available as rooted cuttings but rare to find seed for, and a large selection of alliums."

Stephanie Cohen, a horticulture professor at Temple University in Philadelphia and a writer for gardening magazines, says Walek "offers the type of plants that people who are passionate about horticulture covet. She has *Lychnis chalcedonica* in salmon, the only time I've seen it except in society seed exchanges. She also has depth in a lot of genera you don't see elsewhere, like heucheras."

James Bowick, who runs a nursery and nature preserve called the Conservancy Nursery and Seed Company in Sherwood Park, Alberta, says Walek "has gone out of her way to obtain hardiness data. She's set up a network of people across the country to provide her with data on what grows where." Bowick, whose nursery is in the coldest part of Zone 3a, has had success with a number of Walek's plants, including *Allium acuminatum,* native to the West Coast, and *Gaura lindheimeri*, native to the southern United States. He ascribes the plants' ability to survive to the protection of the heavy snow cover in central Alberta.

Originally a civil litigation lawyer, Walek adjourned her law career 10 years ago when the first of her two children was born. An avowed "seed-aholic," she became frustrated by the limited range of hardy seed available from North American seed companies. "Unless you were a really experimental gardener, you had to stay with the same old safe things everybody had been growing for years. The business developed out of my own frustration in going to the bank for money orders to buy seed from sources in Japan, Iceland, and Sweden. One day the light went on, and I realized I had more species of perennial seed sitting in my house than anyone in Canada."

The final impetus came when a Canadian Broadcasting Corporation (CBC) camera crew toured her garden. A reporter mentioned that Walek was thinking of starting a seed company, and the CBC phone lines lit up with people requesting catalogs. "Of course, the catalog was not even developed at that point," Walek says.

Walek and her husband, Edmund Roderique, got a second mortgage on their house in order to put out the first catalog in 1992. In late 1993, the family moved to an eight-acre property in North Gower, about 20 minutes outside Ottawa. The family home and the nursery office are bookends for 13 display gardens framed against a backdrop of rolling hills. About half of the 800-odd seeds offered in the catalog are produced by Walek; the rest are from the most northerly sources available, since Walek is a firm believer that hardiness is related to seed source.

Gerald Taafe, an Ottawa-based writer for Canadian and American gardening magazines, uses Walek's seeds in his own garden. Among his favorites are *Aquilegia fragrans*, a hard-to-find columbine from northern India, bearskin fescue *(Festuca scoparia)*, and the Japanese bellflower *(Campanula takesimana)*. Of Walek, Taafe says, "I think she's simply in love with plants. It's a totally different experience dealing with her than with most other firms."

—David J. Ellis
Assistant Editor

For a catalog ($4 Canadian, or convert to U.S. dollars at prevailing rate), write Gardens North, 5984 Third Line Road North, RR #3, North Gower, Ontario K0A 2T0, Canada, or call or fax (613) 489-0065.

Barbarians at Our Gates

Americans have been fighting invasive exotic weeds since the first colonists planted vegetable gardens with seeds from their homelands. But never have so many individuals and organizations been worrying about and working on the issue. "This is part of a whole greater awareness of global environmental change, a realization that things are changing and we have an effect on that," says John Randall, the California representative of the Nature Conservancy's Exotic Species Program.

Although invasives, or pest plants, may be getting increased attention because of environmental awareness and concern for endangered natives, some naturalists think this explanation may be too idealistic. Dan Thayer is director of vegetative management for the South Florida Water Management District, which is responsible for the Everglades. "In the past, we've had so little in the way of financial resources because these plants tend to be a problem in natural areas, not in corn fields or golf courses." Now, he says, the environmental damage is too widespread and costly for anyone to ignore.

"I think the bottom line is going to have to be the bottom line," says Richard Moyroud, chair of the Endangered Plant Advisory Council for Florida Agriculture and Consumer Services. "When we're spending $100 million a year on aquatic plant control in the United States, that's hitting my pocketbook."

Around the country, conservationists and land managers are seeing parks, preserves, and refuges infested and sometimes destroyed by imported plants that spread rapidly, have no natural enemies or diseases, and out-compete native species. Although many of the worst invasives are accidentally introduced weeds like leafy spurge *(Euphorbia esula)*, which infests millions of acres of rangeland in the northern plains and Canada, others are ornamentals, such as Japanese honeysuckle *(Lonicera japonica)* and English ivy *(Hedera helix)*, that have escaped from cultivation. Problems have reached epic proportions in some states, particularly California, Florida, and Hawaii, whose mild climates have opened a Pandora's box of ecological devastation by tropical plant species. In Florida, melaleuca or paperbark tree *(Melaleuca quinquenervia)*, a spiny small tree or shrub indigenous to Australia and New Guinea, is spreading rapidly in wetlands. In the West and Southwest, salt cedar or tamarisk *(Tamarix* spp.) is aggressively displacing native trees and shrubs in desert river communities. And in the Northeast, porcelain-berry *(Ampelopsis brevipedunculata)*, mile-a-minute vine *(Polygonum perfoliatum)*, and a host of other exotic vines are choking out native vegetation in woodlands.

COURTESY OF VA. DEPT. OF CONSERVATION & RECREATION

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Kudzu, above, is a well-known pest plant. Porcelain-berry, right, is still widely sold as an ornamental.

Historically, the U.S. Department of Agriculture (USDA), through its Animal and Plant Health Inspection Service (APHIS), has overseen the regulation and control of noxious weeds, but its primary focus has been reducing their impact on agriculture. Proposed new policies and laws (see "Weed Them Their Rights," page 12) may strengthen APHIS's ability to keep invasive weed species out of the country and quicken the agency's response to new species that show invasive tendencies.

Pressure from nonprofit groups, such as the Nature Conservancy, the Exotic Pest Plant Council (EPPC), and the Weed Science Society of America (WSSA), is one reason APHIS is re-evaluating its priorities. As a steward of natural ecosystems, the Nature Conservancy, headquartered in Arlington, Virginia, fights an expensive, uphill battle against exotic invasives on the more than eight million acres it manages across the United States and Canada. The conservancy is compiling a database of invasive weed species found on its preserves and is seeking and sharing information on the best ways to control them.

The first EPPC was founded in Florida in 1984 in response to the onslaught of numerous exotic invasives on native habitats (see "Clouds Over Florida," page 9). Since then EPPCs have been formed in California, Tennessee, and the Pacific Northwest. A national umbrella EPPC was recently formed to promote sharing of resources among regional and state councils. Faith Campbell, governmental liaison of the national EPPC, is compiling a list of the most threatening exotic invasive plants in the United States. Many EPPC members, like Randall, past president of the California council, are conservationists or land managers.

The 40-year-old WSSA, headquartered in Champaign, Illinois, is composed of 2,200 scientists and university researchers devoted to improving weed science and

technology. It is working with the EPPC to lobby for tighter regulation of invasive plant species.

Another organization supporting those in the trenches of this battle is the North American Weed Management Association, based in Fort Collins, Colorado. Formed three years ago, it helps link land managers battling invasive weeds for county, state, and federal governments, mainly in the western United States and Canada. An affiliated lobbying group, the Intermountain Noxious Weed Advisory Council, advances the association's agenda in Congress.

Many state and regional native plant societies have begun compiling lists of invasive exotic species and alerting their memberships to the growing threat these plants pose to native species. The Virginia Native Plant Society held a conference last fall on invasive alien plants, at which a list of the state's top invasives was distributed.

Since the 1940s, the USDA's Agricultural Research Service (ARS) has been evaluating various means of controlling invasive weeds. Much of the research is being done in agricultural and plant science programs at land grant universities throughout the United States. The primary targets of the research are nonindigenous invasive weeds such as leafy spurge, Canada thistle *(Cirsium arvense)*, and several knapweeds *(Centaurea* spp.) that infest rangeland and agricultural areas in the West and Midwest. At North Dakota State University in Fargo, weed science professor Rod Lym has devoted 14 years to working on ways to control leafy spurge, which infests nearly a million acres in the state. Montana State University (MSU) in Bozeman is preparing to build a regional bioscience facility to improve its ability to isolate and test potential biological controls and plant pathogens for use against invasives. P. Charles Quimby Jr., research leader for the ARS Rangeland Weeds Laboratory at MSU, says leafy spurge, various knapweeds, sulfur cinquefoil *(Potentilla recta)*, and Canada thistle are among the program's target species, but adds, "We would have 30-something potential targets if we had the resources."

Randall says that what is being described as "biological pollution" has been, at least in the short term, more damaging to the environment than more publicized problems like the greenhouse effect and ozone depletion. "If we want these areas to remain as we would like, we have to manage them," he says. "I think people are beginning to realize that we can't just put up a fence around an area and expect it to remain natural." —*D.E.*

All That Glitters. . .

Few gardeners are apt to plant field bindweed around an arbor, choose leafy spurge for the perennial bed, or establish a lawn of quack grass. Hey, we know a weed when we see one!

But while some invasive alien plants came to our shores accidentally, and others were introduced for forage crops or to stop erosion, a large number were brought to this country purely to beautify our gardens. The melaleuca, which has white bark much like a birch's, was introduced into Florida as an ornamental around the turn of the century and has since cost the state millions in eradication efforts. Ted Scott, conservation chairman of the Virginia Native Plant Society, observes that kudzu was introduced as a curiosity at the Japanese Pavilion of the Philadelphia Centennial Exposition in 1876. He recalls seeing it deliberately planted to grow up strings around southern porches in the 1920s, as a living awning of glossy foliage. It now stretches across seven million acres of the Southeast and extends from the Everglades to New York.

In the 1980s, sale of the beautiful but pernicious purple loosestrife was made illegal in four states, but cultivars were still widely sold to gardeners in the belief that they were sterile. In 1992, researchers showed that cultivars could cross with the blacklisted *Lythrum salicaria.*

In fact, the list of alien species deemed troublesome in at least one state, being compiled by the newly formed Environmental Pest Plant Council (EPPC), reads a lot more like a landscaping manual than a list of noxious weeds. California is up to here in cotoneaster, *Potentilla recta* is out of control in Montana, and Japanese barberry (both *Berberis thunbergii* and *B. japonica)* is plaguing the Northeast. Alabama reports problems with both heavenly bamboo *(Nandina domestica)* and that ubiquitous bed edging, liriope. Virginia and Maryland are complaining about, of all things, our grandmothers' spirea.

Not only are the offenders widely available in the horticultural trade but many are still highly praised in books and articles. Some of them don't even have a reputation for spreading rapidly.

Bamboo, famous for destroying relationships between neighbors with its tendency to crawl under fences, is listed as a problem plant only in Maryland. But numerous states are reporting problems with one of five species of privet *(Ligustrum* spp.), usually considered the most genteel of evergreen hedges. In his *Manual of Woody Landscape Plants,* Michael Dirr does give both barrels to the worst of these, *L. sinese:* "It has a tenacious constitution that allows it to thrive in concrete crevices in back alleys and flood plains along rivers. It thrives in heavy shade and

WE 'FESS UP

We can't criticize others for praising and offering potentially invasive plants without making a clean breast of our own shortcomings. Among offerings in our 1995 Seed Catalog are:

Cynara cardunculus (cardoon or artichoke thistle), an herb related to artichokes. The Exotic Pest Plant Council lists it as a problem only in California.

Daucus carota (Queen Anne's lace). This wild carrot is one of those plants that has been around so long we tend to think of it as a native. But according to the EPPC, naturalists in Iowa, Massachusetts, Michigan, Minnesota, and Ohio think it's getting out of hand.

Dioscorea batatas (Chinese yam). A vine related to the yam, it is seen as a pest in Illinois and Virginia. It reproduces from small tubers that appear in its leaves' axils and, if not controlled, shades out other plants.

Orders for potentially invasive plants will be filled, but will be accompanied by material urging caution in their use.

full sun and forms impenetrable thickets." The EPPC lists it as invasive in Florida, Louisiana, North Carolina, Tennessee, and Virginia. The Andersen Horticultural Library's *Source List of Plants and Seeds* says it's sold by six wholesalers—two in Tennessee, one in Virginia, two in Alabama, and one in Oklahoma. There are also two cultivars available.

Dirr dismisses *L. vulgare* (invasive in Ohio and Virginia) as disease-ridden, but describes *L. japonicum* (Georgia, Louisiana) and *L. ovalifolium* (Louisiana) as handsome and *L. obtusifolium* (Virginia) as "my favorite for northern gardens."

This regional variation is just one of the many complicated facets of pest plants. Species beyond restraint in one state, or one type of habitat, can be as meek as lambs somewhere else. Those creating havoc in Florida and California freeze in South Carolina; seeds of others causing consternation in Minnesota or Pennsylvania don't get cold enough to germinate in Arizona.

In a lecture that opened a meeting on invasive aliens last fall in Charlottesville, Virginia, Scott revealed the uncivilized nature of some other favorites of gardeners and garden writers. *Euonymus alatus,* for example, is a wildly popular shrub because of its blazing red fall foliage. Scott said that when he moved to Virginia in 1979, he planted a seedling that had volunteered in a thick, deciduous wood at his former home in eastern Massachusetts. "In 1982 I found seedlings popping up in woods at the edge of the lawn. We removed the parent plant and each year remove all the seedlings we can find, but every year we find more." Scott notes that when the shrub is used in highway and other public plantings, seedlings can often be found along nearby woods or fence edges, probably spread by birds. This species is classed as invasive in Connecticut, Illinois, Maine, Maryland, Ohio, and Virginia. *E. fortunei* has become troublesome in Ohio.

Vines took a big share of Scott's rogues' gallery. When ground-hugging plants run amok, they may choke out delicate woodland denizens, but unconstrained vines can gobble the whole forest.

The five-leaved akebia, *Akebia quinata,* is widely available and touted in the nation's most popular garden catalogs as "handsome" and "the perfect choice to grow on a trellis." North of Charlottesville, the vine has covered four solid acres.

Scott notes that the porcelain-berry, *Ampelopsis brevipedunculata,* was featured on the cover of the American Association of Botanical Gardens and Arboreta newsletter in July 1991 as a plant being promoted by the nursery industry in the Midwest. (We confess that its beauty has been extolled in our own pages even more recently.) At Wave Hill in the Bronx, it has been clocked at 17 inches a week and is a pest throughout the Northeast.

Along the Blue Ridge Parkway, oriental bittersweet *(Celastrus orbiculatus)* is beginning to choke out native flame azaleas. The EPPC lists it as invasive from the Northeast west to Minnesota and south to North Carolina. "Garden clubs have urged members to protect 'bittersweet,'" says Scott, "meaning our native *Celastrus scandens,* which is less common, but members do not distinguish between the two." The orange berries are attractive to birds, but its patterns of spread indicate that it's probably being scattered by humans, Scott says.

Bittersweet is hardly alone among these rambunctious plants in being useful for wildlife. Japanese honeysuckle has been deliberately planted for deer, and in North Dakota, efforts to mow scurrilous leafy spurge from the roadside were seen by some naturalists as destruction of bird habitat. Charles Williams, another speaker at the Charlottesville conference and an assistant professor of biology at Clarion University of Pennsylvania, notes that many shrubs and vines with bright berries owe some of their reproductive success to their popularity with the avian set. A study by Rutgers University ecologist Edmund Stiles found that by spreading throughout the Northeast, multiflora rose may have brought about an increase in mockingbirds.

Scott cites an article in a February 1991 magazine urging park employees to plant

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Japanese honeysuckle is delightfully fragrant, offers shelter to wildlife—and gobbles entire forests.

autumn olive for wildlife. The tree, *Elaeagnus umbellata,* is a problem throughout the Northeast west to Illinois, Indiana, and Missouri. It was banned in West Virginia in 1976. Scott complained to the state fish and game department and was told that the agency would probably continue to plant invasive game covers when nothing else was available. "No one has yet answered the question, 'What did wildlife feed on before the Europeans arrived?'" The Russian olive, *E. angustifolia,* often recommended for its salt tolerance and silvery foliage, is listed as a pest in Kansas, Idaho, Nevada, and Utah, as well as the Northeast and mid-Atlantic.

Home gardeners can hardly be blamed for the wide range of these unfettered aliens. While a poorly chosen plant or two may jump an urban fence to attack the adjacent quarter-acre, landscape architects and government agencies still order invasives for large private projects, public grounds, and highway plantings. Nor are for-profit nurseries the only providers.

Plant society seed exchanges offer invasives, and the American Horticultural Society's 1995 Seed Catalog offered some dubious choices (see sidebar, page 7).

Those spearheading the battle to control pest plants hope they can work peacefully with the nursery industry to limit their availability. "We're hoping to work with the California Association of Nurserymen," says John Randall of the California EPPC. "One idea would be for us to contribute an article to their trade magazine listing our concerns in a nonconfrontational manner."

Dan Thayer of the Florida EPPC says they're looking at developing a matrix that would realistically indicate a plant's invasive potential. "We don't want to do battle with the nursery industry. We want them to be involved. We recognize that they feel pressured to sell these plants because their competitors do. At this point they have no incentive to not carry them and shift to other plants."

In Virginia, representatives of the state's Natural Heritage Program met in January with representatives of the state nursery association. They included its executive director, Jeff Miller, and Jim Snyder, owner of Riverbend Nursery in Riner, Virginia—a wholesale nursery that makes most of its profits growing plants requested by landscape architects. "We think they should be educating the source and not the middleman," Snyder says.

He and other nursery owners take issue with some of the plants on the Virginia list, such as English ivy and periwinkle *(Vinca minor)*. Riverbend carries some 40 varieties of the former. "There are some plants that you don't use in just any location. Ivy is ideal for a planter, although maybe not for a woodland area with low or no maintenance," Snyder says. "You find *Vinca minor* everywhere, but it's not choking out trees and it doesn't always win out over other plants. And yet the state highway department is applying crown vetch seeds to all the slopes, and nothing can kill it." Crown vetch, *Coronilla varia,* is listed as invasive in Illinois, Louisiana, Massachusetts, Minnesota, and Virginia.

Snyder and Miller were to meet again with Natural Heritage staff in late February. "We're asking that before they develop any more handouts on invasive plants that they get information supported by the nursery industry," Snyder says. "We're not against publicizing that these plants can become a problem. We are asking that they highlight alternatives that people can plant."

—Kathleen Fisher
Editor

Clouds Over Florida

It is probably not surprising that the Exotic Pest Plant Council (EPPC), which hopes to raise concern about invasive non-native species on a national scale, was born in Florida.

In 1993 the Florida EPPC listed 125 species that are a problem; a new one being prepared will list 150. About half of those are ornamental plants, some known to northerners only as common and docile house plants. Reading the Florida invasives list is a bit like learning that your pet kitten has been transformed into a saber-toothed tiger and has started multiplying like the brooms in "Fantasia."

The state divides its invasives into three categories: Category I are those widespread in Florida with an established potential to invade and disrupt native plant communities; Category II are those that are still localized but with a rapidly expanding population or an established potential to disrupt native vegetation elsewhere; and Category III are those that are widespread and capable of forming dense, monotypic (single species) populations, primarily on disturbed sites.

Among the plants in Category I are lantana *(Lantana camara)* and schefflera *(Schefflera actinophylla)*. According to Richard Moyroud, owner of Mesozoic Landscapes, Inc., in Lake Worth, Florida, schefflera is invading scrub habitat, one of the state's most endangered ecosystems. Category II includes such living-room standbys as asparagus fern *(Asparagus densiflorus)*, weeping fig *(Ficus benjamina)*, and India rubber tree *(F. elastica)*. In Category III is castor bean *(Ricinus communis)*, grown as an annual elsewhere for its mammoth leaves.

Doria Gordon, an ecologist with the Florida chapter of the Nature Conservancy, has recently written a report for the state legislature on the environmental and economic impact of invasive species and their pathways of introduction. She observes that the southern part of the state is put at peril by both nature and industry.

Its combination of mild temperatures and high humidity are comparable only to Hawaii, she says, "and possibly southern Texas in wet spots. South Florida has invasive plants that are not a bit cold tolerant and drop out as you move north."

According to the U.S. Office of Technology Assessment, she says, the Port of Miami is the port of entry for 85 percent of all nonindigenous plants, "so if you're going to have an escape, it's highly likely to be here."

And Florida is also home to a huge number of professional growers, so that new ornamental and agricultural plants have been likely to find their first homes here. "My study showed that of 96 plants on the category I and II list, 92 percent for which records still exist were purposefully introduced," says Gordon. Of those, records show that 45 percent were introduced as ornamentals.

The state has a vast network of wetlands that hasten the spread of exotic wetland plants and water-borne seeds. The population is growing rapidly, leading to the environmental disturbances that welcome floral opportunists. And successionally, Florida's is a young landscape, leaving it vulnerable to pioneering species.

"The Everglades are only about 11,000 to 15,000 years old," says Dan Thayer, director of vegetative management for the South Florida Water Management District and chairman of the Florida EPPC. "That's a relatively young age, and in certain niches, such as the sawgrass marshes that are devoid of trees, exotic plants have a competitive edge."

Thayer says concern about damage to the Everglades by the melaleuca *(Melaleuca quinquenervia)* sparked the organizational efforts that led to the formation of the EPPC in 1984. The melaleuca was introduced as an ornamental in the early 1900s and planted extensively in the Everglades to drain what was then viewed as useless swamp. Today, the tree is present on 500,000 acres in southern Florida, and control efforts cost the state more than $2.2 million annually. Volatile oils in its crown make it a fire starter: During a melaleuca fire in 1985, 2.3 million people

lost power, and the resulting economic losses were estimated at more than a billion dollars. Some 250,000 residents of southern Florida are believed to be allergic to the tree's pollen.

In many cases, these plants were introduced at a time of biological naiveté and spent many years masquerading as respectable citizens of the horticultural community. Thayer says one of the worst offenders, the Brazilian pepper *(Schinus terebinthifolius),* is listed in seed catalogs from the mid-1800s. "It's so widespread that people think it's native. It gets bright red berries at Christmastime, and it's often called the Florida holly." Moyroud, a member of the Florida EPPC's pest plant subcommittee, says the Brazilian pepper "reached a critical mass, literally, about 1959 or '60, suddenly spreading everywhere a bird might perch, along roadsides, under power lines, along canal banks."

The northern part of the state is not without problems. The Chinese tallow tree, *Sapium sebiferum,* is often referred to as the "melaleuca of north Florida." (It's also causing grief in Texas and Louisiana.) A subtropical, deciduous tree in the spurge family, it has aspen-shaped leaves and off-white seeds that have given it the name "popcorn tree." It is now found in 38 of 67 Florida counties. Some escapees are in undisturbed areas, indicating a particularly aggressive species.

"It has really nice fall color, and we don't get a lot of that down here," says Debbie Butts, an environmental specialist with the Hillsborough County Parks and Recreation Department in west central Florida. "Especially people who have moved here from other states like to have some fall color."

Butts and Moyroud say that efforts to address the invasives issue through trade groups have met with failure. Many nursery owners resent what they see as increasing pressure to grow natives, and it's no secret that endangerment of natives in the wild is a major factor driving concern about pest plants.

COURTESY OF THE EXOTIC PEST PLANT COUNCIL

The flower of the melaleuca tree, which was imported from Australia and is invading the Everglades.

Some growers of imports, Moyroud says, "think we're being whimsical, that we just don't like exotic plants." But he grows many exotic plants in his own nursery, he continues. "There are many exotics that will never become a problem. The banana is sterile, reproduced from root pieces, and easy to control. Other plants die in the first freeze, or they take 50 to 60 years before they attain fruiting size."

He feels more can be accomplished by educating consumers through groups like the EPPC. "If the public realizes what they're buying, it may dry up the market."

In the long term, he believes that biological control probably holds the answer. An Australian weevil that eats melaleuca is due for release soon. Other promising controls will probably come from Down Under, given that the continent is the source of many other Florida pests, including the number-two menace, Australian pine *(Casuarina* spp.).

Aussie scientists may soon be searching Florida for a control to take the other direction. In January the *Palm Beach Post* reported that the pond apple, a small Florida wetland native taken home by an Australian rancher, has become "a highly aggressive tree-shrub invading a wide range of habitats." Most seriously, Australians complain, it is taking over coastal lands supporting mangrove and melaleuca. —*K.F.*

RESOURCES

A national **Exotic Pest Plant Council** (EPPC) is being formed to serve as an umbrella group for regional and state EPPCs. For information about the national EPPC, contact Faith Campbell, Governmental Liaison, 8208 Dabney Avenue, Springfield, VA 22153.

California EPPC: Sally Davis, 448 Bello Street, Pismo Beach, CA 93449.

Florida EPPC: Allen Dray, University of Florida, 3205 S.W. College Avenue, Fort Lauderdale, FL 33314.

Pacific Northwest EPPC: Lou Whiteaker, 2795 Anderson Avenue, Building 25, Klamath Falls, OR 97603.

Tennessee EPPC: Brian Bowen, Department of Environment and Conservation, 401 Church Street, Nashville, TN 37243-0447.

The Nature Conservancy, 1815 North Lynn Street, Arlington, VA 22209; (703) 841-5300.

North American Weed Management Association: Charles Henry, Executive Director, 2305 Nottingham Court, Fort Collins, CO 80526.

Weed Science Society of America: Robert Schmidt, Business Manager, 1508 West University Avenue, Champaign, IL 61821-3133.

A listing of state native plant societies is available through the American Horticultural Society's Gardeners' Information Service. To receive this listing, please send $1 with your request to AHS, GIS, 7931 East Boulevard Drive, Alexandria, VA 22308-1300; or for additional information, call (800) 777-7931.

Born to Be Wild

Grows rapidly," the catalog says. "Flowers its first year. Produces abundant fruit loved by birds. Tolerates drought and a wide range of soils. Pest and disease free."

To a lot of gardeners this may sound like a dream plant. To many wildlife biologists, it sounds like trouble. "We know that any plant with those characteristics is a potential problem," says Richard Moyroud, conservation chair of the Florida Native Plant Society.

It has taken up to a century for some plants to become identified as environmental pests, and biologists are still unable to say with a great deal of surety which plants will run wild where. Nevertheless, there are a number of characteristics that many pest plants share:

They reproduce sexually, and prolifically. They begin reproducing at an early age, with heavy fruit set or a short period between fruit sets; produce a large number of seeds that are easily spread by wind, water, or birds; and show a potential for seed banking—producing seeds that stay viable for several seasons.

The melaleuca, the scourge of southern Florida, may flower within three years of germination and up to five times a year. Its seed capsules produce 200 to 300 small seeds and can hold them on the branch up to a decade. If a tree is killed, all its capsules will dry out, releasing up to 200 million seeds at a time. It also resprouts from its base and comes back with a vengeance when cut, burned, or frozen.

Purple loosestrife, rampant in the northeast and north central United States, is similarly adept at both vegetative and sexual reproduction. A broken stem or any portion of the rootstock will sprout, and in six weeks the plant can be flowering, eventually producing 300,000 tiny seeds that are easily carried on the feet of birds, or that sprout underwater, floating downstream as seedlings.

A large number of vines appear on invasive species lists. A study by Rutgers University researchers in the 1950s showed that Japanese honeysuckle "essentially shuts down the plant community, by not allowing young woody plants to develop," says Charles E. Williams, assistant professor of biology at Clarion University of Pennsylvania.

COURTESY OF VA. DEPT. OF CONSERVATION & RECREATION

The tree-of-heaven pioneers disturbed areas and leaches a toxin into the surrounding soil.

Of course, many of our native plants also produce tiny seeds or clamber up trees. "But if you see poison ivy in a forest, you will see only one or two vines on a tree," says Williams. "And if you see mayapples, you will see them in a patchy pattern. But pest plants annihilate everything else."

It is not just a pest plant's own biology, but also the environment we have given them that makes them so destructive. Most are pioneers of disturbed ground, and there is no lack of that. An environment can be disturbed by natural causes such as forest fires, ice storms, or floods. But often it has been devastated by an imported pest, such as the gypsy moth, or human activity, from highway construction and subdivision development to farming.

When a native pioneer species moves into a disturbed environment, it is usually replaced by other natives over time. Grasses and flowers are replaced by shrubs, which are replaced by trees. But pest plants change the rules so that the natural order of succession doesn't take place.

Some, like the tamarisk, change the moisture level, while others, like the Norway maple, shade out light. In western rangelands, cheat grass *(Bromus tectorum)* increases the frequency of fires from once every 60 to 110 years to once every three to five years, observes John Randall of the Nature Conservancy in California, and candleberry myrtle *(Myrica faya)*, introduced to fix nitrogen in the soil, encourages the growth of weeds with high nitrogen needs. The tree-of-heaven keeps out other plants through allelopathy—toxins from its stems, roots, and leaves leach into the soil, making it, in Williams' words, "a botanical *blitzkrieg*." Any of these changes can alter natural progression, he says, "or shut down the whole process."

Then there is the trait that can both make an exotic ideal for the garden and create nightmares if it leaps the fence into the wild—it may have no natural enemies. "These plants are so far removed from their natural contexts—not only insects but bacterial and fungal controllers," says Moyroud, "that they're almost like organisms being raised in a petri dish."

Biological control is one answer, but it takes about 10 years to find an effective and safe natural enemy to import for a single species.

In some cases, the alternative for gardeners will be to eschew the species and plant sterile cultivars. "Most of our agricultural crop plants," notes Moyroud, "are so highly modified that they rarely survive on their own."

But in the case of purple loosestrife, gardeners were advised that it was safe to plant cultivars that later proved to be crossing with the invasive species. "We're not very good at predicting these things," says Doria Gordon, ecologist with the Nature Conservancy in Florida. She notes that Brazilian pepper, one of the most invasive plants in her state, is used ornamentally in California with, as yet, no problems. No one is sure why. —*K.F.*

Weed Them Their Rights

Land managers and conservationists are blunt about what is lacking in the battle against invasive exotic weeds—effective laws. "Without a methodical and thorough presence at our borders we are only playing a delaying game—trying to minimize impacts in the short term in the hope of finding long-term effective methods to control these invasives," says Chuck Dale, who supervises noxious weed and seed programs for the Minnesota Department of Agriculture.

Charles Henry of the North American Weed Management Association, an organization formed to link weed management professionals around the country, says weed laws at both the state and federal levels are outdated and the agencies that attempt to enforce them are feeling the pinch of federal budget cuts. "No federal agencies have line items to fund invasive weed management, although many fund it through habitat improvement funds," says Henry.

At the federal level, the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (APHIS) is responsible for regulating nonindigenous invasive plant species entering the country and for controlling invasive weeds that become established on private land. Individual federal agencies, such as the Bureau of Land Management and the Forest Service, are responsible for controlling noxious weeds on the public land under their jurisdiction. In 1974, enactment of the Noxious Weed Act provided a mechanism for APHIS to list plant species banned from sale or import into the United States. The current listing includes about 200 species, but most are weeds that are prone to infest cropland, rangeland, and waterways rather than natural areas and parks.

The federal government has drawn fire for APHIS's focus on agricultural weeds, its inability to regulate interstate trade of noxious weeds, its shrinking budget, and what critics describe as its slow-moving bureaucracy. "We need better controls over what gets in and faster reaction when we find something. We need more care on the part of the people who are introducing plants," says Faith Campbell, governmental liaison of the Exotic Pest Plant Council (EPPC), a national umbrella group for several regional and state EPPCs.

Randy Westbrooks, a regulatory weed specialist with APHIS's Plant Methods Center in Whiteville, North Carolina, says that a 1993 report by the federal Office of Technology Assessment, "Harmful Nonindigenous Species in the United States," has been a catalyst for the changes within the agency. "The report shows we are only doing about half of what we should be doing," he says. "We're realizing now that agriculture and the environment are inseparable and we just can't ignore natural areas anymore."

Westbrooks says current laws give the agency little power to identify or control potentially aggressive weeds. "It's easy to regulate something that's a vector of plant disease, but with weeds, even seriously nasty weeds like the soda apple, it takes months to get them on the noxious weed list." The soda apple *(Solanum viarum)*, believed to have entered the United States in the early 1980s in grass seed, has spread rapidly through Florida and Mississippi pastures through ingestion by cows and in bags of manure. After 14 months, the agency still has not completed the steps needed to get the weed included on the noxious weed list. The EPPC and the Weed Science Society of America (WSSA) are lobbying to streamline the listing process.

Campbell says the EPPC also "would like to see expansion of the noxious weed list in an orderly scientific process," as well as inclusion of exotic species that are invasive in natural habitats. "We'd also like to see a change in the regulations, as currently understood by APHIS, that the noxious weed law doesn't apply to seed shipments," she adds.

Westbrooks says APHIS is considering a risk assessment system under which new plant species would be evaluated for various invasive characteristics and their history carefully scrutinized for invasive tendencies. "We want to work toward a time when any new species would be treated in basically the same way the Environmental Protection Agency treats new chemicals. We don't want to prevent the introduction of useful ornamentals. I feel we could work with the horticulture industry to make sure everybody buys into what we do," he says.

Working with the horticulture industry would also alert nursery owners to the truly noxious weeds that occasionally find their way into catalogs and seed exchanges. Because the agency also suffers from the inability to regulate interstate trade in noxious weeds, when it does see noxious weeds for sale its only recourse is to request that the company stop selling the item. Westbrooks says an American plant society has offered two federally banned noxious weeds, goat's rue *(Galega officinalis)* and giant hogweed *(Heracleum mantegazzianum)*, in its seed exchange in the last two years, and a New York state nursery offered goat's rue in this fall's catalog.

The effort to keep invasive weeds from ever entering the country has become more critical because land managers are finding that weed control methods are either ineffective or prohibitively expensive. Biological control holds promise for the future, but developing new biocontrols is time-consuming and costly. Land managers are also realizing that weed control has to be coordinated to be effective. As Westbrooks puts it: "Either you control these species everywhere, or you don't control them." Toward that end, the EPPC is working to create a position within the federal government to coordinate invasive weed control on the millions of acres of land managed by federal agencies.

Managers at both state and federal levels agree that the issue needs greater public awareness. "Education has become as critical a part of dealing with this as anything, because biological pollution is one of the major catastrophic events occurring in our time," says Westbrooks. Government money alone won't solve it. "It's the responsibility of the public to help out." —*D.E.*

American Horticultural Society

50th ANNUAL MEETING

Philadelphia, Pennsylvania

June 22 to 24, 1995

Philadelphia is one of the horticultural crossroads of America and home of the country's oldest botanic gardens. This grand city features historic gardens surrounding historic buildings, dozens of historic sites open to visitors, and is central for excursions to gardens in the surrounding countryside.

Doe Run, the garden of Sir John Thouron, contains an extraordinary collection of rare plants. The stable area is a striking example of a low-maintenance perennial garden containing flowers of brilliant color and pleasing texture. In addition to a spectacular meadow garden containing poppies, cornflowers, and daisies, there are herbaceous borders and alpine, sunken, and moss gardens.

MT CUBA CENTER

FOR THE STUDY OF PIEDMONT FLORA

Mount Cuba, the magnificent 230-acre estate of Mrs. Lammot du Pont Copeland, is the setting for the gardens of the Mount Cuba Center for the Study of Piedmont Flora. The naturalistic gardens have matured to provide the largest and most spectacular display of native plants under cultivation in the mid-Atlantic region.

René van Rems, of the American Institute of Floral Designers, is an innovative floral designer whose spectacular creations have been featured at San Francisco's De Young Museum of Art and the San Diego Museum of Art. He trained at the Floral Institute in his native Holland. He will be creating a "Floral Fantasy" demonstration for our members.

Program

WEDNESDAY, JUNE 21

President's Council Dinner, *City Tavern*

❧

THURSDAY, JUNE 22

8:30 a.m. to 5 p.m.
Optional Tour: Longwood Gardens
and Winterthur Museum and Gardens

Lunch at Longwood

7 p.m.
Members' Forum, *Sheraton Society Hill*

❧

FRIDAY, JUNE 23

7:45 to 8:45 a.m.
Continental Breakfast

8:45 to 9:45 a.m.
"Philadelphia: Cradle of American Gardening"
Jane Pepper,
Pennsylvania Horticultural Society

10 to 11 a.m.
Bus trip to Mount Cuba garden

11 to 2 p.m.
Tour of Mount Cuba garden and Lunch

2 to 2:30 p.m.
Bus trip to Sir John Thouron's garden,
Doe Run

2:30 to 4:30 p.m.
Tour of Doe Run

5:15 to 6 p.m.
Cocktails, *Kennett Square Country Club*

6 to 6:30 p.m.
"Creating Special Places"
Richard Lighty, Mount Cuba Center
for the Study of Piedmont Flora

6:30 to 8:30 p.m.
Dinner

9:30 p.m.
Arrive back at hotel

❧

SATURDAY, JUNE 24

8 to 9 a.m.
Continental Breakfast

9 to 10:30 a.m.
"A Floral Fantasy," René van Rems,
American Institute of Floral Designers

10:45 to 11:45 a.m.
"Planning and Planting the Garden"
Isabelle Greene and Kurt Bluemel

12 noon to 1 p.m.
Lunch, *Sheraton Society Hill*

1 to 5 p.m.
Garden Tour of Bucks County, Pennsylvania

6:15 to 7:15 p.m.
Chairman's Reception

7:15 to 9:30 p.m.
AHS Annual Awards Banquet

❧

SUNDAY, JUNE 25

Optional Tour: Gardens in the Western Suburbs

Meeting Highlights

Join us in Philadelphia, Pennsylvania, for our 50th Annual Meeting. We promise you a golden experience that will produce 24-karat memories. We have gathered a terrific group of speakers to inform, educate, and excite you about the world of gardening.

Speakers

Richard W. Lighty is director of the Mount Cuba Center for the Study of Piedmont Flora in Greenville, Delaware. He serves on the board of directors of the Garden Conservancy, the scientific advisory board of the Center for Plant Conservation, and the council of the Pennsylvania Horticultural Society. Previously, Dr. Lighty was in charge of research at Longwood Gardens and was on the University of Delaware faculty.

Kurt Bluemel is a landscape designer and nursery grower by trade. He apprenticed in horticulture and landscape design in West Germany and Switzerland before coming to the United States to found Kurt Bluemel, Inc.—a landscape design company and perennial nursery. He is a botanical explorer who makes at least one major "plant safari" a year, searching for new plant varieties. A recent project of Kurt Bluemel, Inc.—a two-acre wet meadow—was featured in the November 1994 issue of *Garden Design* magazine.

Jane Pepper is president of the Pennsylvania Horticultural Society, where she supervises production of *Green Scene* magazine and Philadelphia Green, the society's acclaimed neighborhood and public landscape greening program. She also supervises the production of the Philadelphia Flower Show—the world's largest indoor flower show. Ms. Pepper contributes a twice-weekly gardening column to the *Philadelphia Inquirer.*

LESLIE HOLTZMAN

Isabelle Greene, Santa Barbara landscape architect, has designed more than 400 gardens, from elegant commercial designs to intricately planned estates and public gardens. Her designs take advantage of existing forms, allowing buildings, gardens, and adjacent features to appear as one. She has been the subject of feature articles in several leading garden and design magazines. She designed the "Silver Garden" at Longwood, featuring cacti and succulents.

Garden Tour

Our Saturday tour will take us into Bucks County, north of Philadelphia. We will view gardens featuring rockeries, large perennial borders, daylilies, wildflowers, and other interesting plants. We will tour the beautiful countryside and visit specialty gardens created in challenging sites.

Members' Forum

All members are invited to join AHS President Dr. H. Marc Cathey and members of the AHS Board and staff, Thursday, June 22, at 7 p.m. for an open discussion of issues in American horticulture today.

1995 Chairman's Reception and Awards Banquet

Join AHS Board Chairman Sarah Boasberg for dinner and presentation of awards. Recipients will be honored for their contributions to horticultural excellence.

Optional Offerings

Thursday, June 22, depart Sheraton Society Hill at 8:30 a.m. for a bus ride to Longwood Gardens in Kennett Square, Pennsylvania. Longwood Gardens has been described as "the finest formal gardens in the western hemisphere." A guided tour will be followed by free time to explore the outdoor acres and 20 indoor gardens. Longwood boasts more than 11,000 different kinds of plants, an excellent topiary display, and a 600-foot-long flower walk. We will lunch at the Terrace Restaurant.

After lunch, we take a short trip to Winterthur Museum and Gardens. Our docent will give us a guided tour of 14 rooms in the estate and will leave us free to roam the gardens until the bus ride back into the city. (15 person minimum required; 47 maximum.)

Sunday, June 25, we have arranged a tour of private gardens in the western suburbs of Philadelphia. Included will be Longview Farm, home of renowned herb grower Joanna Reed. Her gardens include herb borders, mixed shrub and herbaceous island beds, meadows both wet and dry, a lily pond, and a wooded area.

Registration

As in years past, the meeting will begin with our Members' Forum on Thursday evening, June 22. Members will have the opportunity to make a brief presentation (contact AHS President Marc Cathey directly if you wish to make a formal presentation) and to enter into a discussion of issues involving the horticultural community. The discussion will be led by members of the AHS Board of Directors.

Friday will begin with an address by Jane Pepper, president of the Pennsylvania Horticultural Society. The group will then travel out of the city for a day in the country, touring two major gardens—Mount Cuba Center for the Study of Piedmont Flora and Sir John Thouron's Doe Run. The evening culminates with a solid-gold dining experience at the charming Kennett Square Country Club.

On Saturday, world-class floral designer René van Rems will create a "Floral Fantasy." Landscape architect Isabelle Greene and perennial plantsman Kurt Bluemel will join forces for an informative discussion on planning and planting your own golden garden.

As in the past, we are offering an optional trip before and after the official program. Thursday is set for a full day visiting Longwood Gardens and Winterthur Museum and Gardens. On Sunday, we will tour private gardens in the western suburbs of Philadelphia, including Longview Farm, home of famed herb grower Joanna Reed.

Registration Fee

Full registration fee covers all daily programs as listed—from Thursday evening through Saturday evening. Also included are registration materials, all meals on Friday and Saturday, ground transportation to events, and the 1995 Chairman's Reception and Awards Banquet. Not included are hotel, airfare, personal items, and optional tours.

Cancellations

A full refund, less $50 for booking expenses, will be made if written cancellation is received by June 5, 1995.

Hotel

Our headquarters hotel is the Sheraton Society Hill Hotel, One Dock Street, Philadelphia, PA 19106, (215) 238-6000, FAX (215) 922-2709. Rates for AHS members are $125.00 single/double. Be sure to mention that you are with the American Horticultural Society and reserve by May 25 to guarantee the special meeting rate.

Official Airline

American Airlines and VIP Travel, in cooperation with AHS, are offering special rates to the meeting, based on American Airlines' published round-trip fares. Certain restrictions apply, and seats are limited. To take advantage of these discounts, call Ellie Turner, VIP Travel, at (800) 451-5439, 9 a.m. to 5 p.m. (Eastern time).

Ground Transportation

The hotel is 15 minutes from Philadelphia International Airport and may be reached by taxi or airport shuttle. The hotel has an indoor parking garage where space is available for a nominal fee.

AHS Annual Meeting Registration Form

Register early! 10% discount for registrations postmarked before April 15.

NAME: _____

ADDRESS: _____

CITY/STATE/ZIP: _____

DAYTIME PHONE: (___)_____ AHS MEMBER #: _____

SPOUSE/GUEST NAME: _____

ADDRESS: _____

		Number of Participants	TOTAL
Full Registration			
Includes all events June 22 evening to June 24	$380	_____	$ _____
OR			
Single Day Registration			
Friday, June 23	$190	_____	$ _____
Saturday, June 24	$190	_____	$ _____
Nonmembers must add annual dues of $45 per household			$ _____
Optional:			
Tours:			
❑ Longwood and Winterthur	$80	_____	$ _____
❑ Sunday Garden Tour	$80	_____	$ _____
President's Council Membership			
❑ $1,000 or more per year			$ _____
Minus discount (10%) prior to April 15, 1995			$ _____
Total Enclosed			$ _____

Special Services Needed (please specify): _____

Return this form with your payment to: AHS Annual Meeting, 7931 East Boulevard Drive, Alexandria, VA 22308-1300. For more information, call (800) 777-7931.

GARDENING BOOKS

AHS brings you the best in gardening books with the convenience of mail-order and the added benefit of significant discounts from retail prices. Order today from our list of favorites.

Title	Book Code	AHS Price
The American Gardener's World of Bulbs, *Glattstein*	LIT 395	$22.45
Backyard Fruits and Berries, *Smith*	ROD 395	$23.25
Beatrix: The Gardening Life of Beatrix Jones Farrand, *Brown*	VIK 395	$45.00
Bedding Plants IV, *Holcomb*	BAL 395	$49.50
Best Borders, *Lord*	PEN 395	$27.00
The Border Book, *Pavord*	HOU 395	$26.95
Border Pinks, *Bird*	TIM 395	$26.95
Color Echoes, *Harper*	MAC 395	$31.50
Colorful Gardens, *Herwig*	STE 395	$22.45
Eyewitness Handbooks: Herbs, *Bremness*	DOR 395	$16.00
Flowering Crabapples: The Genus Malus, *Fiala*	TIM 395	$44.95
A Gardener Obsessed, *Charlesworth*	GOD 395	$22.45
Gardening with Water, *van Sweden and Oehme*	RAN 395	$36.00
Gardens in Provence, *Jones*	ABB 395	$45.00
Gardens of the French Riviera, *Jones*	ABB 395	$45.00
The Inward Garden, *Messervy*	LIT 395	$40.50
Manual of Climbers and Wall Plants, *Burras*	TIM 395	$35.95
Manual of Grasses, *Darke*	TIM 395	$35.95
The New Orleans Garden, *Seidenberg*	MIS 395	$17.00
The New Terracotta Gardener, *Keeling*	TRA 395	$26.95
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AHS BULLETIN BOARD

FREE ADMISSION TO MORE SPRING FLOWER SHOWS

Most gardeners have already planned their 1995 gardens, but there are still a few flower shows during the months of March and April for those needing an imagination jumpstart. The following shows have offered free admission to American Horticultural Society members displaying membership cards:

California

The San Francisco Landscape Garden Show, April 26 through 30, will celebrate its 10th anniversary with the theme "A Garden Party." Held in the Herbst and Festival Pavilions (Piers 2 and 3), the show is the major fund-raiser of the Golden Gate Park and is sponsored by Friends of Recreation and Parks. There will be an opening night party April 25.

This year's theme will be carried out in an array of gardens designed and constructed by local landscape professionals. Both these gardens and other exhibits will emphasize plants that thrive in California. There will also be lectures, tips for creating better gardens, exhibits by nurseries and plant societies, and retail products in The Marketplace. For more information, call (415) 750-5108.

New York

"Prelude to Spring," the Greater Rochester Flower and Garden Show, will be March 16 through 19 at the Dome Center in the Rochester suburb of Henrietta. Show visitors will be able to pick up gardening advice through educational seminars conducted by garden and landscape experts. The show will feature a planted entryway, a large feature garden just inside the entrance, and display gardens throughout the hall. The gardens will be designed and installed by leading nurseries, garden centers, landscape contractors, garden clubs, and plant societies.

The show is sponsored by the Genesee Finger Lakes Nursery and Landscape Association. Proceeds support the association's scholarship fund for local horticulture students and its public education programs. For more information, call (716) 225-8091.

Michigan

The Ann Arbor Flower and Garden Show has selected "A Little Water Music" as the theme for this year's show, March 23 through 26 at the Washtenaw Farm Council Grounds. The show is produced by the University of Michigan's Matthaei Botanical Gardens and includes a Standard Flower Show as sanctioned by the Federated Garden Club of Michigan. There will be an opening-night gala March 22.

Landscapes bursting with springtime color, flowering trees, dramatic waterfalls, and delicate wetlands set the mood in the show's 11 majestic garden exhibits. For those seeking advice or wishing to replicate one of the gardens, professional nursery owners and horticulturists will be available throughout the show to answer questions. More than 500 dramatic floral design displays and plant classes will interpret this year's theme. Visitors can purchase garden accessories, services, orchids, statuary, and more at The Marketplace, which will feature more than 45 booths. Back by popular demand will be the antique area, featuring distinctive ornaments, furniture, and garden supplies. For more information, call (313) 998-7002.

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KEYNOTE SPEAKERS

George Ball, Jr., *President and CEO*
W. Atlee Burpee & Co.
Warminster, PA
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Brian Holley, *Executive Director*
Cleveland Botanical Garden
Cleveland, OH
"A Reality Check — Gardening With Children Isn't Just Gardening With Children"

Bill Lucas, *Director*
Learning Through Landscapes
London, England
"Grounds for Change: The British Example"

Dr. Gary Nabhan, *MacArthur Fellow and Science Advisor*
Arizona-Sonora Desert Museum
Tucson, AZ
"Planting the Seeds of Ecological Literacy: Children, Gardens, and Biodiversity"

Catherine Snead, *Director*
The Garden Project
San Francisco, CA
"Creating Community Gardens For Youth"

Jane Taylor, *Curator*
4-H Children's Garden
Adjunct Faculty
Michigan State University
Director of Annual Gift Programs
Michigan 4-H Program, East Lansing, MI
"The Dirt on Grass Roots Fund-Raising Plans for Your Garden"

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REGIONAL HAPPENINGS

Mid-Atlantic

✦ **Mar. 9. Garden Pleasures, Garden Treasures.** Tidewater Horticultural Symposium. The Virginia Beach Club. Norfolk Academy, Norfolk, Virginia. Information: (804) 491-6884 or (804) 625-3598.

✦ **Mar. 11. The Garden.** Middleburg Horticultural Symposium. Middleburg Community Center, Middleburg, Virginia. Information: (703) 364-2440 or (703) 592-3382.

✦ **Mar. 17-19. 17th-Century Moghul Gardens.** Flower and garden show benefitting the Hospital for Sick Children. Georgetown Visitation Preparatory School, Washington, D.C. Information: (202) 362-1138.

✦ **Apr. 7-9. American Orchid Society Judged Show.** Virginia Center Commons, Richmond, Virginia. Information: (804) 740-8846.

✦ **Apr. 22. Rare Plant Auction and Gardeners' Plant Sale.** National Arboretum, Washington, D.C. Information: (202) 544-8733.

✦ **Apr. 22. Plant Identification Workshop.** The State Arboretum of Virginia. Blandy Experimental Farm, Clarke County, Virginia. Information: (703) 837-1458.

✦ **Apr. 22-23. Fifth Annual Flower and Garden Festival.** Historic Leesburg, Virginia. Information: (703) 777-1262.

✦ **Apr. 22-May 6. Maryland House and Garden Pilgrimage.** Various tours in Baltimore and other areas of Maryland. Information: (410) 821-6933.

North Central

✦ **Mar. 4-12. 1995 Cleveland Flower Festival.** Cleveland Botanical Garden. Cleveland Convention Center, Cleveland, Ohio. Information: (216) 721-1695.

✦ **Mar. 18-26. International Builders Home, Flower, and Furniture Show.** Builders Association of Southeastern Michigan. Cobo Conference-Exhibition Center, Detroit, Michigan. Information: (810) 737-4478.

✦ **Mar. 22. Gardening in the Nineties: Go Wild with Prairie Plants.** Seminar. Olbrich Botanical Gardens, Madison, Wisconsin. Information: (608) 246-4550.

✦ **Apr. 8. Growing with Master Gardeners.** Seminar. Master Gardeners Association of Wayne County. Mill Race, Northville, Michigan. Information: (313) 277-3983.

✦ **Apr. 8-June 4. Flora: Contemporary Artists and the World of Flowers.** Leigh Yawkey Woodson Art Museum, Wausau, Wisconsin. Information: (715) 845-7010.

Northwest

✦ **Apr. 1. Ninth Annual Spring Plant Sale.** The Rhododendron Species Botanical Garden. Weyerhaeuser Corporate Headquarters, Federal Way, Washington. Information: (206) 838-4646 or (206) 927-6960.

Northeast

✦ **Feb. 18-May 29. Butterflies Alive.** The Academy of Natural Sciences, Philadelphia, Pennsylvania. Information: (215) 299-1000.

✦ **Mar. 7, 14, 21. Planning the Year-Round Garden.** Lecture series. The Worcester County Horticultural Society. Tower Hill Botanic Garden, Boylston, Massachusetts. Information: (508) 869-6111.

✦ **Mar. 10-12. Capital District Garden and Flower Show: A Garden Kaleidoscope.** Knickerbocker Arena, Albany, New York. Information: (518) 356-6410 or (518) 786-1529.

✦ **Mar. 23. Transplanted Gardeners: Jamaica Kincaid.** Lecture. Wave Hill, Bronx, New York. Information: (718) 549-3200.

✦ **Mar. 24. Inspirations for Putting Plants Together.** Symposium. Copeland Lecture Hall, Winterthur Museum, Garden, and Library, Winterthur, Delaware. Information: (302) 831-2517.

✦ **Apr. 22. Beginner Rose-Growing Seminar.** Long Island Rose Society. Hofstra University, Hempstead, New York. Information: (516) 773-7936.

✦ **Spring 1995. World's Largest Garden Party.** The Gardens Collaborative. 34 gardens, historic homes, and arboreta in the Delaware Valley. Information: (215) 247-5777, or send $3 and SASE with 2 stamps to The Gardens Collaborative, 9414 Meadowbrook Ave., Philadelphia, PA 19118.

AN OCCASION IN SPRING

The Alexandria Council of Garden Clubs and the American Horticultural Society will hold a spring Flower Show and Plant Sale on April 21 and 22 at River Farm, headquarters of the American Horticultural Society. Representatives of several plant societies will be on hand to answer questions, and a wide range of plants, crafts, and refreshments will be on sale.

A judged flower show by the Yacht Haven Garden Club of Mount Vernon will be on exhibit in the house.

Plant sale hours are 9 a.m. to 3 p.m.; the flower show opens at 1 p.m. on Saturday after judging.

For more information, call (703) 768-5700.

South Central

✦ **Mar. 4-5, 11-12. The 60th Annual River Oaks Garden Club Azalea Trail.** Houston, Texas. Information: (713) 523-2483.

✦ **Apr. 1. Herb Market.** Texas Herb Growers and Marketers Association. Plano Centre, Dallas, Texas. Information: (214) 924-3703 or (210) 399-9510.

✦ **Apr. 8-9. National Wildflower Research Center Grand Opening.** Austin, Texas. Information: (512) 292-4200.

Southeast

✦ **Mar. 9. Ferns and Shade Gardening.** The Crosby Arboretum, Picayune, Mississippi. Information: (601) 799-2312.

✦ **Mar. 11. The Worlds Within Roman Gardens.** Lecture and reception. The State

Botanical Garden of Georgia, Athens, Georgia. Information: (706) 542-1244.

✦ **Mar. 11-12. Spring Plant Sale.** Mobile Botanical Gardens, Mobile, Alabama. Information: (334) 342-0555.

✦ **Mar. 14, 16. Shigo on Trees with Dr. Alex Shigo.** National Arbor Day Foundation. Atlanta, Georgia (14), and Orlando, Florida (16). Information: (402) 474-5655.

✦ **Mar. 17. Third Annual Bougainvillea Conference.** Fort Lauderdale Hilton, Fort Lauderdale, Florida. Information: (813) 582-2456 or (904) 997-2596.

✦ **Mar. 23. Native Azaleas.** Workshop. Callaway Gardens, Pine Mountain, Georgia. Information: (706) 663-5153.

✦ **Mar. 23-25. Jasper Mall Daffodil Exhibit.** Jasper Mall, Jasper, Alabama. Information: (205) 387-2250.

✦ **Apr. 1, 8. 60th Annual Walking Tour of Private Houses and Gardens.** The Garden Club of Charleston. Charleston, South Carolina. Information: (803) 795-4337.

✦ **Apr. 7-9. New Bern Historic Homes and Gardens Tour.** New Bern Preservation Foundation and New Bern Historical Society. New Bern, North Carolina. Information: (919) 638-8558.

✦ **Apr. 22. Dance with the Muses Gala.** Brookgreen Gardens. Murrells Inlet, South Carolina. Information: (803) 237-4218.

Southwest

✦ **Mar. 23-26. Hydroponic Society of America's 16th Annual Conference and Trade Show.** Holiday Inn City Center, Tucson, Arizona. Information: (800) 852-4251.

✦ **Apr. 1-2. Cactus and Succulent Show and Sale.** Albuquerque Garden Center, Albuquerque, New Mexico. Information: (505) 296-6020.

West Coast

✦ **Mar. 4-8. Pier 39's Tulipmania.** Pier 39, San Francisco, California. Information: (415) 705-5512.

✦ **Mar. 24-26. Santa Barbara International Orchid Show.** Earl Warren Showgrounds, Santa Barbara, California. Information: (805) 967-6331.

✦ **Apr. 1. Wildflower Festival '95.** Santa Barbara Botanic Garden, Santa Barbara, California. Information: (805) 682-4726.

✦ **Apr. 22-23. Green Scene Plant Sale.** Fullerton Arboretum, Fullerton, California. Information: (714) 773-3404.

✦ **Apr. 22-23. Rose Festival.** The Huntington Botanical Gardens, San Marino, California. Information: (818) 405-2140.

✦ **Apr. 23. Propagation Pointers.** Workshop. Descanso Gardens, La Canada Flintridge, California. Information: (818) 790-5414.

FIRE AT COSTA RICA RESEARCH SITE

On November 23, a fire at the Las Cruces Biological Station in San Vito, Costa Rica, destroyed facilities valued at $500,000. The station is the site of the Robert and Catherine Wilson Botanical Garden, established by the Wilsons in 1962. The 330-acre station, which consists of 30 acres of developed gardens and 300 acres of undisturbed submontane rainforest, is owned and operated by the Organization for Tropical Studies (OTS), a non-profit consortium of 50 universities and research institutions, many of them in the United States.

Losses included the living quarters for researchers, students, and natural history visitors, as well as the kitchen, dining hall, library, and an adjacent laboratory. Station Director Luis Diego Gomez reported that none of the resident students were injured and that the garden's extensive plant collections were not affected.

OTS Director Donald Stone has issued an appeal for emergency funds to sustain the garden's operations. Contributions should be sent to OTS/Save the Garden Fund, Duke University, Box 90630, Durham, NC 27708-0630.

MASTER PLAN FOR REDDING ARBORETUM

A master plan was completed last fall for the Redding Arboretum by the River Natural Park and Gardens in Redding, California. The arboretum is a project of the Shasta National Science Association and the McConnell Foundation, a private foundation that funded the purchase of the arboretum's land. Situated on more than 200 acres along the Sacramento River, the arboretum encompasses several natural habitats including riparian, woodlands, and wildflower meadows.

The finished arboretum will feature 30 to 40 acres of intensively developed gardens with a primary and unifying design concept that emphasizes regional native plants, shrubs, and trees. The plan also calls for an education center containing indoor and outdoor classroom areas, a library, and herbarium. Specialty gardens include wedding, kitchen, wildflower, restoration, native, and herb gardens. Several of the intended paths and trails through the grounds are already in place so the public can enjoy the grounds even before the formal gardens are installed.

"We are beginning a process that will never end," Arboretum Director Marcia Howe says. "There will always be growth and change, but we want to make some improvements so that residents of all of northern California can begin enjoying and using the arboretum right now."

The staff and a planning committee are still developing fund-raising plans for this long-term project. Howe estimates that completion could take up to 10 years.

MISSOURI TO BUILD MAZE OBSERVATORY

The Missouri Botanical Garden recently announced plans to build a Victorian observatory overlooking the Jennie Kaeser Memorial Maze. The new observatory will be similar in design to one that Henry Shaw, the garden's founder, constructed in 1863. Apparently the idea of viewing a maze from on high was so popular that Shaw later built another tower in the center of the maze in Tower Grove Park. These structures and the original maze were destroyed around 1912 during major renovations.

Philip Cotton, the architect who designed the new observatory, was inspired by a photograph of the 1877 observatory in the garden's archives. The octagonal wooden structure will be open to the weather, and a staircase circling the interior will lead to the upper viewing gallery. The vantage point of the observatory will allow visitors to watch others struggle through the maze, while cameras in the observatory will display the best views on a video screen on the main floor for those unable to climb the stairs.

The new observatory is made possible by a gift from a private donor. Groundbreaking for the project will take place in the spring.

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FOUR GET PENNSYLVANIA GOLD

Three native trees and an import from China are the recipients of this year's Gold Medal Plant Award from the Pennsylvania Horticultural Society.

The Chinese plant, seven-son flower *(Heptacodium miconioides),* was recently introduced into cultivation by the Arnold Arboretum and the U.S. National Arboretum. It can be grown as a tall shrub or trained as a 15- to 20-foot tree, and tolerates a wide range of soil conditions. It bears small, fragrant white flowers in late summer, long-lasting rose to rose-purple fruits, and has exfoliating bark that makes it attractive in winter. It is hardy to USDA Zone 4.

The red buckeye *(Aesculus pavia)* is suitable for larger landscapes, since while it may not exceed 20 feet tall in cultivation, its rounded crown will reach an equal spread. Its vivid coral-red panicles are three to six inches long, making it a "marvelous hummingbird tree," according to judges, who say it can be grown in sun or at the edge of a wood.

Like the buckeye, the large-flowered Florida silver bell *(Halesia diptera* var. *magniflora)* can be grown through Zone 6. It grows two to three feet a year, up to 50 feet tall, and for two weeks in mid-May is covered with white bell-shaped flowers, larger than those of other Halesia species. Two-winged brown fruits remain on the branches through winter.

Hardy through Zone 4 is the 'Winter Red' cultivar of winterberry, *Ilex verticillata.* Winterberry, a deciduous holly, is known for its tolerance of shade and soggy ground, and its persistent red berries. Those of this cultivar, which grows to 10 to 12 feet, are especially large, according to judges.

For more information, including a source list, write the Pennsylvania Horticultural Society, Gold Medal Plant Award, 325 Walnut Street, Philadelphia, PA 19106-2777.

SPLASHING IN THE GENE POOL

Geneticists have made recent findings that they hope will result in longer-lasting cut flowers and more colorful orchids.

Researchers at Purdue University, led by William Woodson, say they have found genes that cause flowers to produce ethylene when they are cut or pollinated, triggering a wilting response. So far, they have genetically engineered carnations that will last up to three weeks after being cut.

At the U.S. Department of Agriculture, a team led by Robert Griesbach, a plant geneticist, is using a corn gene to predict the color of new orchid hybrids. By coating microscopic pellets with corn DNA and shooting them into petals of a potential parent plant, they can find out if the flower has genetic flaws that would make it unsuitable for breeding.

It can take at least three years for a hybrid orchid to bloom and show its true colors, says Griesbach. By watching for color changes in the petal after being shot with his pellets, the scientists can see evidence of color mutations within three days.

CRUCIFERS TO THE RESCUE

Apparently it's not only children and ex-presidents who don't like broccoli. Studies by researchers at the University of California-Davis indicate that ground-up broccoli, applied fresh or dried to the soil before planting, kills verticillium wilt, a fungal pathogen that attacks a large number of important vegetable, fruit, and ornamental plants.

The preliminary results are good news for farmers and gardeners. The fumigant methyl bromide, a standard treatment for many soil-borne pathogens, is to be restricted and eventually phased out to comply with international efforts to eliminate use of ozone-depleting chemicals.

In a lab experiment last year, Themis Michailides, a Cal-Davis plant pathologist conducting research at the Kearney Agricultural Center near Fresno, applied a concentrate of dried, ground broccoli to soil before planting eggplant. The incidence of verticillium wilt was reduced by more than 80 percent. Separate field tests done on cauliflower by Krishna Subbarao, a plant pathologist who works at Cal-Davis's Salinas research station, indicate that fresh broccoli may be even more effective than dried in discouraging the fungus.

Subbarao and Michailides suspect the decaying broccoli may give off a gas that either inhibits or kills the fungus. The team tested several cruciferous vegetables, such as cabbage and cauliflower, for fungicide potential because they had shown resistance to verticillium wilt. So far, broccoli has yielded the most promising results.

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