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Bug Buddies

In the garden, we are never alone. Easterners have Japanese beetles, Northwesterners their giant slugs, and the West is jumping with grasshoppers. In the hustle to run these menaces out of our personal Edens, it's easy to overlook all of their cousins who pitch in to assist us.

For instance, we all know that the honeybee may help pollinate many of our garden plants. But there are many lesser-known native bees that are closely interdependent with our native plants to the point that the extinction of one will mean the end of the other. Even spiders and ants have important roles to play in horticulture.

Letting insects do the work of chemical pesticides and herbicides isn't some new-fangled notion concocted by new age organic purists. The U.S. Department of Agriculture has been putting serious money into distributing and importing beneficial insects for a century. Parasitic wasps and lady beetles are a frequent choice for their studies. But lacewings, spiders, ants, and some nematode species are also nice to have around.

The first rule in making your garden a hospitable place for these allies is to go easy on the poisons. Not only chemical toxins, but many "natural" pest controls kill helpful insects, too; bees are especially sensitive. It is important to plant flowers that are rich in nectar and pollen for the adult insects to feed on. Queen-Anne's-lace, goldenrod, and evening primrose are three good choices.

An entomological note: Few of the animals we have written about in this issue are technically bugs. Bugs are of the suborder Hemiptera, and have mouth parts adapted for piercing and sucking. Some of our best friends in the garden—the spider and the centipede that helps worms convert organic wastes—aren't even insects. So think of them, if you prefer, as invertebrate amigos.



DAVID CLARK

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Spiders for the Garden

New research by a University of Tennessee, Knoxville professor shows spiders can make a tremendous dent in garden pests. Insect damage in zoology professor Susan Riechert's vegetable test plot decreased 60 to 80 percent when spiders were present.

Since most spiders balloon into gardens from far away, luring them is not hard. But conditions must be just right or they'll move on. "They are going to come in naturally," says Riechert, "and if you offer them the appropriate habitat you are going to have more than enough, unless you're in the middle of a city."

The most important thing gardeners can do to make it cozy for spiders is to give them mulch. A loose mulch applied in early spring will make the temperature and humidity attractive to spiders. Riechert used grass hay mulch, about four inches deep, but other materials will work if they provide structure. "It has to have lots of little nooks and crannies," she says. "Bark mulch is too compact." Mulch attracts other insect predators besides spiders, but by removing the spiders later, Riechert was able to determine that they were the ones consuming most of the insects.

Spiders work best as a preventative control against pests—you can't call them in once your garden is infested. This makes it imperative for gardeners to mulch when they are planting, and to replenish when needed.

Riechert assures those wary of sharing a garden with eight-legged creatures that garden spiders are not poisonous. Half are not web building. "Most of these spiders people won't ever see." She observed spiders from 11 different families feeding on her garden pests. Two well-represented families were the Linyphidae (sheet-line weavers, very small spiders that weave webs at the bases of plants) and the Lydosidae (wolf spiders).

California State University, Fresno is also conducting research on spiders in integrated pest management for field crops. According to one of the overseers of the study, School of Agricultural Sciences and Technology research scientist Bill Roltsch, "Spiders have really been out of the mainstream of research for all but a very few ecologists and taxonomists."

The focus of their current work is to document and describe spider activity, "so we know what's out there, when it's out there, and what kind of numbers we're dealing with," says Roltsch. Preliminary results indicate that three spider family groups predominate—the Agelenidae (grass and funnel web

spiders), Clubionidae (hunting spiders), and Salticidae (jumping spiders). Spiders of the latter two families venture out and hunt their prey, while most species of the Agelenidae build a web to trap insects. A majority of the spiders of all three families are small, ranging from one-quarter to one-half inch in length.

Ants Plant, Too

The next time you're poised, leg cocked, ready to crush the ant that has joined your picnic, consider this: many types of ants provide a vital role in dispersal and planting of thousands of plant species. Don't kill your fellow cultivator!

Steven N. Handel and Andrew J. Beattie reported in the August 1990 *Scientific American* that more than 3,000 flowering plant species belonging to over 60 families are known to be distributed by ants—"a major force in the spread of plants around the world."

Ants disperse seeds in two ways. Harvester ants, while gathering large quantities of seeds to take to their nests to eat, drop some along the way. Other ants may be lured to the seeds of plants that produce elaiosomes—a fat body near or attached to the seed. The ants carry the seed back to their nests to eat the elaiosome and then toss the seed away unharmed. Elaiosomes seem to have evolved for the sole purpose of providing food lures for ants. They are commonly found among plants of the moist woodlands of eastern North America and Europe, in the dry shrub communities of eastern Australia, and in plant communities of southern Africa.

Unlike birds and mammals, which scatter seeds widely in their habitats, ants bring seeds to their carefully sited colonies. These colonies accumulate waste—remains of prey, fecal matter, ant corpses, and other organic material—which may give germinating seeds and seedlings a nutrient boost.

Other physical characteristics of the ant colony soil may also help the seedlings survive. Nest building often improves soil friability and increases its water-holding capacity. Some researchers suspect that the real benefit of some nests is to give the seedling a water supply until its roots are developed.

So give the ants their due. They are helping such beauties as trillium (*Trillium petiolatum*), Dutchman's-breeches, and the yellow prairie violet (*Viola nuttallii*) to survive.

The Versatile Wasps

Parasitic wasps have high reputations as controls of caterpillar-type pests. But they may also help nurserymen wreak vengeance on the whitefly and lay low the Russian aphid that has become the bane of the wheat farmer.

Some wasp species lay their eggs inside the eggs of their prey; others deposit their eggs in their hosts' larvae. You needn't worry about stings if you see them in your garden, but you probably won't. The brachonid wasp, whose targets include aphids, hornworms, cutworms, gypsy moths, and tent caterpillars, can be up to five-eighths of an inch long. Members of the *Trichogramma* family—the wasp most widely studied and commercially available as a control—are only one-fifth of an inch long.

There are about 500 species of *Trichogramma* in 75 genera identified worldwide; about 30 are found in North America. Those most widely available for sale to gardeners and farmers are *T. minutum*, recommended for ornamental plants and orchards, and *T. pretiosum*, for vegetable and field crops. The trichogrammas will go after some 200 moth and butterfly eggs that hatch into worms. This includes cabbage loopers, codling moths, corn borers, cutworms, earworms, spruce budworms, and fruitworms.

The wasps are shipped as eggs inside the eggs of a host, sometimes attached to a card that is set out beside the infested plants. When wasps emerge as adults, they parasitize other eggs in the garden or field. The predator eggs never get to hatch. Where wasps have been used as controls, they reduced pests by 80 percent or more. The wasps breed throughout the season, although suppliers recommend more than one release. Those using the wasps for vegetable plants will want to have some type of flowers nearby for the nectar-sipping adults to feed on.

Other parasitic wasps are being studied for their potential in controlling particularly troublesome pests.

Encarsia formosa is a natural enemy of greenhouse whitefly. They deposit their eggs in the white fly nymph. Another genus, *Eretmocerus*, may be more effective on the sweet potato whitefly. The whiteflies attack poinsettias, geraniums, fuchsias, begonias, gerberas, hibiscus, petunias, and ageratum.

Wasps also parasitize gypsy moths, and if a way can be found to spread them more systematically, may offer an alternative to widespread spraying for the oak tree nemesis. Paul Schaefer, an Agricultural Research Service (ARS) researcher

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A *Trichogramma* wasp deposits her eggs into that of a cotton bollworm.

in Newark, Delaware, is studying the *Ooencyrtus*, a genus that attacks 20 to 30 percent of gypsy moth eggs during the summer and fall and then again in the spring; wasps and flies that prey on the moths in the larval stage; and the *Coccynomimus* genus, a larger wasp that kills in the pupal stage. *C. disparis* is a recently introduced species that has just established itself in North America, and Schaefer hopes it will have a significant impact on gypsy moth pupae. David Reed, an ARS researcher in Stillwater, Oklahoma, is looking at yet another wasp, *Diaeretiella rapae*, as a control for the destructive Russian wheat aphid.

Research being conducted at the University of California, Santa Cruz, illustrates the complexity of the relationship between plants, prey, and predators. In this case, the species

involved are cole crops, the diamond-back moth larvae that munch their way through millions of acres of them, and the *Diadegma insulare* wasps that parasitize the moths. Scientists found that collard plants higher in nitrogen attracted more of these beneficial wasps. On plants with nitrogen levels as little as three to five percent higher, the ratio of newly hatched female wasps was much higher, resulting in more wasps to lay eggs and further reduce the moth caterpillars. Female moths—seemingly aware of their enemies' preference for high-nitrogen plants—prefer to lay their eggs on low-nitrogen cole crops. Researchers don't know if the insects are aware of the nitrogen per se, or some plant property that the nitrogen changes, or how the insects pick up these cues. This preference occurs only with cultivated crops, and not wild members of the cabbage family.

The researchers are particularly excited by the potential of this wasp since the moth has developed resistance to essentially all synthetic insecticides. Making the relationship even more intriguing—and apparently demonstrating the co-evolution of parasite and host—is the fact that the moths found in California are more vulnerable to parasitism by California wasps than others of the same species from outside the state.



Wasps Shop Till Mealybugs Drop

The struggle between good and evil has taken a new turn at the Midway Mall in Sherman, Texas. Parasitic wasps, wearing the white hats, are trying to run the mealybugs out of town.

Dr. Mike Merchant, a Dallas entomologist, and Gary Bomar, a Grayson County extension agent, developed the pilot program in an effort to replace pesticides in indoor landscapes. One year ago they released 200 parasitic wasps in the Midway Mall, hoping to control mealybugs on 49 ficus trees. After two months the mealybug population was significantly reduced; three months later the wasps had spread to the five atrium areas within the mall and had the mealybugs under control.

"Mealybugs are the most common problem in these shopping areas, and the most difficult to control with insecticides," Merchant said. The mealybug

forms a cottonlike egg mass on the twigs of ficus trees and its whitish, waxy fluff protects it from most chemicals. "While the ficus trees don't die from mealybugs, their egg masses and the honeydew produced by their feeding make an unsightly landscape plant—not very appealing to shoppers."

The thought of 200 parasitic wasps buzzing around the mall might cause some consumers to shop armed with bug spray, but the tiny wasps—each smaller than the head of a pin—do not sting people.

The successful program convinced mall managers to continue with the biological control program. According to Bomar, the procedure costs about \$300 per year, "far less expensive than either repeated pesticide use or eventual replacement of the trees."

Save the Bees, Save the Plants

Over 65 percent of all flowering plant species depend on insects for pollination and reproduction. Bees are the single most important pollinators: except for masarid wasps and a few beetles, only bees rely solely upon pollen and nectar for food throughout their life cycle. Some plants depend exclusively on bees, and some on a single type of bee, for pollination. *Pedicularis* (lousewort) species, for example, are pollinated only by bumblebees.

This means that plant conservation efforts must sometimes be tied to the preservation of certain species of bees. Unfortunately, bees are very susceptible to insecticides and habitat destruction, and many species of bees, especially in the Western United States and the tropics, are vulnerable to extinction. Vincent J. Tepedino, Agricultural Research Service entomologist, predicted in a 1979 article in the *Great Basin Naturalist Memoirs*: "There is little doubt that in

North America we will lose many bee species and other pollinators as well, particularly from the Western states. As a result of these extinctions, we will probably see some gradual transition in the composition of our flora."

Concern about the harm that insecticide spraying for grasshoppers might have on insect pollinators and endangered plants led Tepedino and the Agricultural Research Service in Logan, Utah, to an ongoing research project to determine the relationship between rare and endangered plants and their insect pollinators. As a part of a larger grasshopper Integrated Pest Management project, Tepedino and the ARS staff are studying federally listed threatened or endangered plants in Nebraska, Colorado, Utah, Idaho, Arizona, and New Mexico.

To date, they have studied 15 species of plants. All but two require insect pollinators and several are pollinated by rare species of bees. For example,

the clay phacelia (*Phacelia argillacea*), a purplish blue wildflower once thought to be extinct, is pollinated by the rare *Hylaeus granulatus*.

Since many of the bees have never previously been studied, and some never even discovered before, Tepedino is hesitant to conclude that rare plants are being pollinated exclusively by rare insects. But the study seems to be moving towards that conclusion for some of the species. Says Tepedino, "There is more than a moderate possibility that some endangered plants have pollinators that rely on them for most, if not all, of their pollen and nectar. If our additional studies corroborate this idea, then the insects are also endangered."

The bee species identified display a remarkable diversity. They are all natives (unlike honeybees or bumblebees) and include species that nest in the ground or in dead twigs, branches, or stumps; some carry pollen on hind legs and others on the underside of

The Hairy Hymenoptera

by Vincent Tepedino and Susan Geer

Eccentric humans roaming the hinterlands in scruffy hiking boots, hand lenses and plant presses at the ready, are not alone in their fondness for native plants. Other enthusiasts, bootless but winged, noisily investigate flowers with organic lenses and, in place of plant presses, carry built-in pollen baskets and nectar buckets into which they pack their booty.

Our native bees were fostering plant abundance and diversity long before humans could point to plants and give them names. These six-legged soul mates of native plant lovers are members of the Hymenoptera, the large insect order that also includes wasps and ants. More than 3,000 species strong nationwide, they range from two to three millimeters to about 20 millimeters long, and in color from drab brown or black through red, yellow, and orange, to bright metallic blue and green. Some are slight in shape while others bring the burly football player William "Refrigerator" Perry to mind.

Yet several common attributes render them immediately recognizable: a Dolly Parton-like "wasp waist" (albeit without the exaggerated anteroventral



COURTESY OF ARS, UTAH STATE UNIVERSITY

An alkali bee returns to her nest with a load of pollen.

prominence); four wings (two more than flies, which also visit flowers with great frequency); a sting (most noticeable if you attempt to pat them on the back or bottom); and general hairiness. If bees were the size of beavers, they would be prized for their fur. They are most easily confused with the stinging wasps, their close but much less hairy and more pugnacious relatives. However, these strict vegetarians are uninterested in meals of flesh and do not sting offensively.

The impressions most people have of bee life are based on the ubiquitous honeybee, which is neither native nor typical. Unlike the honeybee, most bees are not social: there is no hive, no honey,

no workers, no caste system. There are queens in a manner of speaking, but in contrast to the honeybee queen whose command is the workers' wish, solitary bee queens can expect no help in foraging nor in nest construction and upkeep. No kamikaze viragoes take to the air in defense of her or her nest. Nor is support forthcoming from the queen's rakish consort who, free of guilt and threat of a garnished salary, provides only a brief moment of passion and then moves on to try to impassion others.

These solitary queens construct or select nests of three broad types. Some excavate tunnels in soil or wood. In soil, side branches usually emanate from the main tunnel and end in one or more cells, but the variety of floor plans is endless. Hard, bare ground like that of infrequently used dirt roadways is preferred by some excavators; others are enamored of ground in sparsely to heavily vegetated areas. Soil texture, temperature, slope, and aspect may also help determine whether a site is attractive. The alkali bee, *Nomia melanderi*, a species sometimes used for the commercial pollination of alfalfa, uses the same alkaline sites from year to year and may build up huge noisy aggregations of independently nesting females.

Other species seek vacant holes—frequently made by beetles—in dead twigs, branches, or stumps. These species typically produce linear, unbranched nests in which one cell is

their abdomen. Some of the bees are generalists, frequenting a variety of plants, and others are more selective and will forage only from flowers of a specific genus.

Narrowly specialized bees are the most vulnerable to disruptions in habitat. To slow the rate of endangered plant and pollinator extinction, several steps can be taken. Parks and botanical preserves can be created to safeguard endangered species. Since native bees like native plants, gardeners can provide pollen and nectar sources by using plants native to their region. Cultivated plants that have resulted from extensive plant breeding are often unattractive to bees since breeders select for human aesthetics rather than nectar and pollen production.

Gardeners can also construct nesting sites for some species of bees. Pine blocks drilled with various size holes—from three to eight millimeters in diameter and 50 to 140 millimeters deep—and set in the back yard or garden just like bird houses will attract different bee species. Those that use such nests are not aggressive and will not sting unless handled.

directly behind another. *Megachile totundata*, the alfalfa leafcutting bee, and the blue orchard bee, *Osmia lignaria*, a pollinator of apples, are among those that use existing holes. Such beneficial species are easily persuaded to use artificial nesting blocks in back yards or agricultural fields.

Those species classified as mason bees construct hard, heavy nests of mud. In areas with moist, clayey soil they can be seen rolling little balls of mud with their mandibles and feet and tucking them up under their chins for transport back to the nesting site. Nests may be attached to rocks, twigs, or branches, or to the walls, eaves, or roofs of houses. In rural areas of southern Europe, accumulations of nests over many years have been heavy enough to collapse less sturdy roofs.

The "queen" toils alone to furnish the nest and feed the offspring, which are raised in separate rooms or cells. The cells may be lined with leaves or coated with waterproof glandular material from the female mouthparts. Nectar gathered from frequent foraging trips is carried internally in the cop; pollen is carried on hairy pollen baskets on the hind legs or on the underside of the abdomen. The female molds a provisional loaf of the food from several trips, and when it is large enough to support the maturation of single offspring, lays an egg on it and immediately seals the cell and starts another in the same nest. Mother and offspring never meet; by the time the baby is an adult, mom is long since dead.

The Naturalization of Enemies

The cactus moth became a hero in Australia when it was brought there in 1925 to control *Opuntia* cacti that were overtaking grazing land. Over the next 35 years, it was invited from its native South America to South Africa, Hawaii, and the West Indies for the same purpose. But last year, it somehow found its way into Florida, and now threatens to wipe out Florida's semaphore cactus (*Opuntia spinosissima*), of which only a dozen individual plants survive.

The number of insects and arthropods being brought to the United States as biological controls is on the rise. For weed control alone, the U.S. Department of Agriculture shipped 33 times more biological controls into the country in 1990 than it did in 1980. In 1980, its Rome lab shipped 2,377 individuals of seven weed-attacking species. Ten years later, it imported more than 80,000 representing 28 species.

How do we know that one of these imports won't be a turncoat like the cactus moth? According to Richard

Bees are enthusiasts of flowers for compelling reasons: over the last 100 million or so years, their very existence has come to depend almost exclusively upon the nourishment offered by pollen and nectar. Not unexpectedly then, they are admirably attuned, morphologically, physiologically, and behaviorally, to manipulating flowers. But the bees that rapidly expanded into these new niches eons ago have not remained simple exploiters. They have become winged appendages of flowering plants. Indeed, it was really the plants that started the whole business, probably because attracting insects was an effective way for them to trade gametes with another member of the species. After all, plants can't just retract their roots and boogie down to the nearest gathering place for some socializing. To get their genes next to some fresh (not to mention attractive) genetic material, they need a go-between, a matchmaker.

If flowering plants are the organic world's Miles Standishes, then bees are the flowering plant's John Aldens. Remember that the next time you want to swat one.

Vincent Tepedino, of the USDA's Agricultural Research Service, and Susan Geer are with the Bee Biology and Systematics Lab of Utah State University. A version of this article first appeared in the Sego Lily Newsletter of the Utah Native Plant Society.

Soper, national program leader for biological control with the Agricultural Research Service, the United States' track record for intentionally imported biocontrols is virtually unblemished. "There has never been one case in 100 years of a deliberately imported biocontrol turning into a pest," he said. If anything, the procedures to keep this from happening make importation painfully slow and cumbersome for scientists. "It has taken us as long as 10 years to complete the process. The quickest was two years."

The first step is to send the protocol—the step-by-step study plan, which is frequently an inch or more thick—through an advisory committee with representatives from such groups as the Fish and Wildlife Service and the Environmental Protection Agency. In the case of a weed pest, if the protocol is approved, the weed is grown under quarantine conditions and various insects forced upon it. "Some insects would rather die than eat the weed and in fact, do die," said Soper. If the potential biocontrol can be turned loose because it is already occurring naturally in an overseas ARS study area, it will next be tested in an open environment to see how readily it attacks the target pest. Where that can't be done, the studies are carried out under quarantine in the United States.

The scientists next throw the biocontrol together with relatives of the target pest to make sure that its tastes won't generalize to endangered species. If the predator's diet is too broad, said Soper, "we simply eliminate it from consideration." Scientists also make sure that the predator isn't carrying any hitchhikers—parasites that might attack beneficial insects like bees.

Although the search for a biocontrol is more likely to be launched by concern for an agricultural crop, the ARS can also be an ally to the nursery business. The agency's Korean laboratory recently discovered that a tiny beetle appears to be effective against euonymus scale. Its release in the U.S. National Arboretum appears to have saved a number of trees that horticulturists there were preparing to cut down, according to Soper.

These safeguards also allow safe commercial production of biological controls. Soper said that the farming or collecting of beneficial insects is currently only about a \$2 million dollar a year business in this country, but that some of the agricultural chemical companies are beginning to diversify into this area.

That Was No Bug But It Was a Lady

The lady beetle—entomologists beg us not to call her a ladybug, no matter how we learned the “fly away home” rhyme as children—is not one beetle but 399 species in just the United States and Canada.

There are a few black sheep among them. The Mexican bean beetle and the squash beetle, both members of the *Epilachna* genus, are both major crop pests. But for the most part, their prey reads like a virtual Most Wanted of garden marauders: aphids, scales, whiteflies, mites, and leafhoppers.

More than a century ago, one of them, the Vedalia beetle (*Rodolia cardinalis*) from Australia, saved California's budding citrus industry from the cottony cushion scale, which was resistant to chemicals. Another Aussie, *Cryptolaemus montrouzieri*, has been introduced into more than 40 countries, and has been used to control the citrus mealybug and the boisduval scale on orchids in San Francisco greenhouses.

More recently, the seven-spotted lady beetle, *Coccinella septempunctata*, has become the great orange hope of the Agricultural Research Service as an alternative to pesticides for controlling the severely damaging Russian wheat aphid. Scientists discovered that the beetle had immigrated to North America in 1973 and at first collected it to speed its spread across the country, but found its natural dispersion surpassed their efforts. Paul Schaefer, an ARS researcher in Newark, Delaware, has followed the course of the beetle for a decade and found it to be a successful control of aphids on alfalfa and peas, and hopes that it will become a significant control on forage and garden crops as well. There is a drawback, he notes, since the seven-spotted lady beetle is “so aggressive that it outcompetes the native species,” but he adds that there is not much scientists can do about that since the beetle is here to stay.

Studies in China showed that release of this beetle reduced the average number of aphids on crops by 60 percent two to five days after release and 90 percent after six to nine days.

Adult lady beetles may be colored red, gray, or black, and the red or orange ones often have black dots on their wing covers. (The cucumber beetle, which is green with black dots, is not related.) The larvae are dark, elongated, flat, and soft bodied, and their first three pairs of legs are longer than the rest. Adults and larvae can be found dining at the same “table” of aphids or other prey.

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A seven-spotted lady beetle attacking an aphid.

But as extremely beneficial as the lady beetle is, there are some difficulties with its use as a biological control. The Vedalia beetle was a roaring success because it is very choosy about its diet and because it is strictly a parasite. It lays its eggs on the female cottony cushion scale

Vote for the Monarch

Organizations around the country, from the Garden Club of Ohio to the Southern Maryland Rock and Mineral Club, are joining the drive by the Entomological Society of America (ESA) to make the monarch butterfly the national insect. Humorist Dave Barry recently devoted two columns to the drive, offering a number of alternatives to the monarch—“Jiminy Cricket, the laughing mantis . . . the dead bugs in your light fixture”—and conducted a poll to determine readers' preferred insects. Barry received a number of imaginative nominations including the drive, the gadfly, the nervous tick, Johnny Mantis, and “a dead bug named Hector that was actually mailed to us,” but in the end the monarch won hands down. This type of publicity is exactly what the ESA hoped for when they began their campaign to raise national awareness of this beautiful, useful, and threatened insect.

The campaign, said Douglas Sutherland, chair of ESA's Special Committee for National Insects, “is one more way of sensitizing an increasingly urbanized population that there is life out there and if we don't take care of it, it's going to affect us.”

One of the greatest dangers facing the monarch butterfly is the destruction of overwintering sites in Mexico and California. U.S. monarchs east of the Rocky Mountains winter in an area of about 30 miles by 60 miles in Mexico. The sites are supposedly protected by the government, but residents continue to deforest the area.

adult or its egg mass, where the beetle can mature in one location.

Other species, however, tend to be very cosmopolitan in their tastes. Some will kill more prey than they can eat, but others will move on to greener pastures when prey densities begin to drop. The lady beetles' habit of overwintering in large congregations has made them easy to collect for later release as controls on farms or in gardens. But during this time, an insect such as the convergent lady beetle, the most popular product of commercial insectaries, according to the *IPM Practitioner*, will store body fat. It isn't hungry immediately after release, and will fly until it has worked up an appetite. Thus, while the beetle is effective in enclosed areas like greenhouses, many experts warn that when you release a batch of collected lady beetles in your own garden, it will be the neighbors who discover that their roses are aphid-free.

Even Pacific Grove, California—known as Butterfly Town, U.S.A., because of its winter monarch habitat for Western butterflies—is down to one monarch wintering site, and it was slated to be leveled by a developer before concerned citizens purchased the site.

Gardening organizations seem natural allies in the ESA campaign since butterfly gardening has recently become very popular, both for its beauty and because butterflies are important pollinators of plants. More than one-third of the 74 endorsing organizations for ESA's drive are garden-related, including the American Association of Nurserymen, the Men's Garden Club of America, and numerous state garden club associations.

But success is not assured. The bill, with 36 cosponsors, was introduced in the last session of Congress, but never brought to a vote. It will have to be reintroduced in the 102nd Congress before it can make it to the floor. Sutherland also noted that there is a rival bug vying for congressional support; several beekeeping organizations have been trying for years to make the honeybee—not even a U.S. native—the national insect. Since many people associate bees with stings, Sutherland and the ESA think the monarch would be a more positive symbol for the insect world.

For a free color brochure on the monarch butterfly, write to Douglas W. Sutherland, Special Committee for National Insects, Entomological Society of America, 9301 Annapolis Road, Lanham, Maryland 20707.

Some Good Guys with a Bad Name

Researchers have considered parasitic nematodes a promising pest control for 50 years. These wormy, microscopic creatures have proven their worth against both weeds and soil insects that feast on woody ornamentals and turf grasses. But they lack the appealing features of a lacewing or mantid and haven't been as easy to purchase.

"Nematodes" is not a word that usually evokes warm, fuzzy feelings in a gardener's heart, since the majority are prone to damage plants rather than save them, knotting up roots and deforming flowers, leaves, and stems.

Beneficial nematodes wipe out hosts essentially by making them sick. They enter the body cavity and within five days, release bacteria that kill the host by poisoning within a day or so. The nematodes continue to develop and breed, feeding on the bacteria and dead host tissue. Eventually the dead host's body bursts open and thousands of nematodes are released to decimate new hosts.

In the 1930s, scientists first began using *Neoplectana* species to combat Japanese beetles. *N. carpocapsae* is tiny



William J. Connick Jr. rolls out Pesta, a biological control made with nematodes.

enough to be mixed with water and sprayed onto plants or soil; one squirt from an oilcan would contain about 17,000. Because this species stores well—it will last for several weeks or even months when refrigerated—it is the most widely available commercially. The genus is effective against the larvae of sod webworms, cutworms, and crown borers; it will also attack moth and butterfly caterpillars. The Japanese beetle is the favored host of another genus, *Heterorhabditis*, which will also control chafers and billbugs.

A drawback to employing nematodes is that they're fussy about their environment. They're most effective when released into sandy or porous soil, but because they need water for mobility, high humidity is a must; dry conditions can kill them. *Neoplectana carpocapsae* will need to be reapplied after even a brief exposure to temperatures above 90 degrees; the activity of *Heterorhabditis*, on the other hand, will be slowed by low temperatures.

Of course, you can't expect to have beneficial nematodes in your garden if you use a nematicide to wipe out the harmful variety. And beneficial nematodes can be harmed by diatomaceous earth, a popular deterrent to slugs. However, nematodes are compatible with *Bacillus thuringiensis* and insecticidal soaps, and most will not harm beneficial insects such as lady beetles and lacewings.

Agricultural Research Service scientists are combining yet another nematode species, *Steinernema carpocapsae*, with semolina—a durum wheat flour used to make pasta—to control insects. The mixture, called Pesta, is relatively inexpensive and simple to make, according to William J. Connick Jr., a research chemist with ARS's composition and properties research unit in New Orleans. A water slurry of nematodes is mixed with the semolina, clay powder, and ingredients beneficial to the nematodes. The organisms are trapped in the dough when it is kneaded; then the dough is rolled into a thin sheet and left to dry at room temperature overnight. The dry dough is ground up the next day. When the granules become wet, each ounce of the dough releases over 35,000 nematodes into the soil.

Scientists found that Pesta made with *S. carpocapsae* nematodes was effective in controlling corn rootworm larvae. The mixture may also control white grubs, sod webworms, Colorado potato beetles, and other insect pests.

Insect Organizations

Want to learn more about insects? These organizations provide a variety of information and services for amateur and professional bug lovers.

♦**American Entomological Society**, 1900 Race Street, Philadelphia, Pennsylvania 19103, (215) 561-3978. Founded in 1859, AES is the oldest continuously operating entomological society in the Western Hemisphere. Dues are \$7 (\$4 for students) and include subscriptions to the quarterly *Transactions of the American Entomological Society* and *Entomological News*, published five times a year. The publications focus on taxonomic, morphological, and ecological studies.

♦**Entomological Society of America**, 9301 Annapolis Road, Lanham, Maryland 20706-3115, (301) 731-4535. For \$60 dues (\$20 for students) you receive the quarterly *American Entomologist* and may choose from a variety of other publications such as the *Journal of Economic Entomology*, *Environmental Entomology*, and *Journal of Medical Entomology*. *American Entomologist* contains a broad spectrum of both general and research articles.

♦**The Lepidopterists' Society**, Dr. William D. Winter, Secretary, 257 Common Street, Dedham, Massachusetts 02026-4020, (617) 326-2634. Members of the Lepidopterists' Society receive the biannual *News of the Lepidopterists' Society* and the quarterly *Journal of the Lepidopterists' Society*. Amateurs will be more interested in the *News* with its more general articles, book reviews, and a members' "Market Place" with classified ads for butterfly eggs and pupae, and moth eggs and cocoons. Dues are \$25, \$15 for students.

♦**The Xerces Society**, 10 Southwest Ash Street, Portland, Oregon 97204, (503) 222-2788. The Xerces Society is dedicated to the conservation of rare invertebrates and their habitats. Members receive the triannual *Wings*, the annual *Fourth of July Butterfly Counts*, and the irregular journal *Atala*. Gardeners should find *Wings* most appealing; recent issues have featured articles on the log pile as a shelter for butterflies, on Callaway Gardens' Day Butterfly Center, and on Florida's Butterfly World. Dues are \$25.

A Bestiary of Back-yard Bugs

PHOTOS COURTESY OF THE AGRICULTURAL RESEARCH SERVICE



The spurge hawkmoth was imported to help control leafy spurge, a Great Plains weed.

Besides the more famous beneficial insects, there is a host of other enjoyable creatures to invite to your budding wildlife habitat. Some will help control pests and others are simply fun to have around.

♦ **Moths** have a bad reputation among gardeners and the idea of luring them to anything but their deaths may sound heretical. True, the larvae of some moths do considerable damage to plants. Who would invite the cabbage looper, the corn earthworm, the cutworm, the European corn borer, the fall armyworm, or the dreaded gypsy moth to their garden? But there are many types of moths that are beautiful, relatively harmless, and a treat to observe.

Among these are hawkmoths, which, like butterflies, visit flowers for nectar. With their hover and dash about the flower bed, the rapid buzz of their wings, and their nectar-extracting long bills and tongues, they're sometimes mistaken for hummingbirds, and as much fun to watch. One species of hawkmoth (*Hemaris thysbe*) is in fact commonly known as the hummingbird moth—it visits garden flowers during the day and plays a useful role in pollination. It is attracted to many of the same nectar sources as butterflies, such as bee balm, butterfly bush, phlox, thistle, and zinnia.

Underwing moths are a favorite nocturnal species to watch for. They are one of the most colorful members of the Noctuid family, with black hindwings banded with red, orange, or yellow. Attract them with a sugary bait—brown sugar and molasses mixed with mashed bananas, overripe peaches,

and stale beer. Ferment the mixture a few days and smear it onto the bark of trees or fence posts.

♦ **Beetles** are in your back yard too. The order Coleoptera represents one third of all known insects, and if you turn over a stone or a piece of wood, dig into the soil, or pry behind a rotting log, chances are you will find one. Or look in the night sky—fireflies are actually flying beetles and their

larvae, gardeners will be happy to learn, eat slugs, snails, and other insects.

Ground beetles (Carabidae family) also chew up a bounty of pests. The shiny gold, black, and copper fiery searcher eats caterpillars, and its close relative the fiery seeker preys on cutworms and armyworms. The eastern snail-eater eats slugs and snails. And purely for entertainment, watch for bombardier beetles. They defend themselves from enemies by discharging an explosive fluid, spraying a cloud of smoke, and sounding like a popgun.

One ground beetle genus, *Calosoma*, introduced into this country a decade ago, is proving to be "a glutton for larvae and pupae of the gypsy moth," according to Paul Schaefer, an Agricultural Research Service entomologist with the Beneficial Insects Research Laboratory at the University of Delaware.

♦ If you live close to water, watch for **dragonflies** and **damselflies**. Their larval stage is spent in water, but upon hatching they become airborne and eat a good quantity of flies, mosquitoes, and other small flying insects. The adult darner, a frequently encountered North American dragonfly, has a wingspan up to six inches and is colored brown, green, blue, and purple. Its flight pattern is just as entertaining as the hummingbird's as it hovers, darts, dives, and flies backwards in search of food. It's another reason to build a pond and take up water gardening.

♦ **Walkingsticks** feed on plants, but usually not enough to cause harm.

Their bizarre, stick-figure appearance makes them worth tolerating. You'll be lucky if you see them at all, for they are well camouflaged with their green or brown (depending on age) color, a long slender body, long legs, and tiny head. Walkingsticks are related to **praying mantises**, another fascinating insect to observe, but one that may be overrated for pest control. They eat plenty of bugs, snatching them with their front legs and then immobilizing them with a quick bite to the back of the head. The downside is they kill all types of bugs, good and bad, and occasionally a small toad, a salamander, or even a hummingbird.

♦ **Big-eyed bugs**. Allen Cohen, an Agricultural Research Service scientist in Tucson, Arizona, specializes in the study of these pop-eyed creatures. "A colleague of mine describes them as looking like Peter Lorre," he says. *Geocoris punctipes* consumes many pest species, including earworms, tobacco budworms, whiteflies, and aphids. Other species are partial to caterpillars of various types.

One hindrance to the wider introduction of some insect predators is the difficulty of finding a diet that will keep them happy and healthy until their release. Natural diets can be expensive; artificial food can slow reproduction or change behavior. After rearing his bugs in the laboratory for seven years, or 70 generations, Cohen feared that "junk food" would inhibit their ability to kill pests. But an examination of their gut contents after they were released in the wild showed that their predatory instincts were still intact.



Geocoris punctipes, commonly known as a big-eyed bug, consumes many species of pests including Lygus bugs, corn earworms, tobacco budworms, aphids, and whiteflies.

Gardeners' Q&A

Q: *Since the insecticidal spray pyrethrum is made from chrysanthemum plants, how can I make my own homemade pyrethrum spray?*

P. G., Perry, Ohio

A: Pyrethrum can be derived from the flower heads of the summer blooming perennial, *Chrysanthemum coccineum*, commonly called painted daisy or painted lady. Pyrethrum foliar spray rapidly paralyzes and kills thrips, aphids, beetles, leafhoppers, mealybugs, corn earworms, cabbage loopers, and other soft-bodied insects. It seems to work best on adult pests rather than on insect larvae.

Pyrethrum is usually classified as acceptable for organically grown produce. However, it is not necessarily without its harmful effects, and should be used only when insect pests reach unmanageable levels in the garden. Pyrethrum is among the least toxic of all insecticides to man, livestock, and pets, but it can wipe out beneficial insects such as adult ladybugs and bees. Avoid buying pyrethrum-based formulations since commercially made pyrethrum often contains other compounds and can be quite toxic.

To make the spray, crumble dry or fresh flower heads into a container of water, and mix by hand or use a blender to chop the flower heads completely. Let the mixture stand in an airtight container several hours, then pour it into a spray container and spray the infested plants directly from close range. You may need to experiment with the proportion of flower heads to water to get a level that is toxic to the pests. Concoct stronger concentrations of the mixture if insect pests are not killed, but recover after being knocked off the plant. A little soap added to the mixture can heighten its effectiveness. Spraying may need to be repeated, so it is a good idea to make a big batch. Store in airtight containers to maintain the potency.

The best time to spray is at dusk since pyrethrum begins to break down after a few hours of exposure to sunlight, and within six hours if the temperature is above 55 degrees. Dusk is also the time of day when bees are less active, so the chances of poisoning them are decreased. However, do not spray in the evening if a heavy dew may occur as the water will prevent pyrethrum from breaking down by the time bees begin active feeding in the morning.

C. coccineum grows to a height of one to two feet. It has fernlike foliage and three-inch pink, red, or white flower heads. Blooms appear in June and July. Plant it in a sunny location with well-drained soil and keep well weeded. It is hardy to USDA Zone 3.

—Maureen Heffernen
Horticultural Intern

Q: *I would like to plant a children's garden this year for my children ages five through eight. What kind of flowers and vegetables would be interesting and fairly easy to grow for children in that age group?*

R. K., Denver, Colorado

A: Find out what kind of plants interest your children—flowers, herbs, vegetables, or a combination of all three? I have found that most children like a variety. Choose plants with larger seeds, which are easier for children to handle and to plant in straight rows.

Older children might like to help design the garden. Take some graph paper and draw your garden plot on it. Decide if you want all the vegetables in one section or interspersed with the flowers and herbs. If you plan on having any climbing plants, such as pole beans or morning glories, a trellis made of chicken wire or strings tied between two poles would be a nice idea. The plants take up less room and the children can enjoy watching them climb the trellis.

After everything is written down, have the children make labels for each plant so you all know exactly what's growing where. I like to get the seed packet or a picture of the plant from a seed catalog, glue it to a piece of cardboard, write the name underneath it, and glue a wooden stake to the back of the cardboard. Then put clear contact paper over it to protect it from rain and other elements.

Buy a combination of plants and easy-to-germinate seeds of quick growing plants that can be sown directly in the garden. The first year should be as fun and uncomplicated as possible to maintain the children's interest.

Plants to try are cherry tomatoes, plum tomatoes, purple bell peppers, and eggplants. They are easy to grow and have attractive fruits.

Some of the seeds that children might enjoy planting directly in the garden are pumpkins (varieties big enough for carving in the fall) and mini-pumpkins that look pretty on the table or a teacher's

desk. Mini-pumpkins can grow on the trellis to save space. Others include cucumbers, different varieties of lettuce, different colored radishes, carrots, curly parsley, cinnamon basil, zinnias, marigolds, four-o'clocks, and sunflowers. You and your children can go through different catalogs and decide what looks interesting.

Many companies also sell special growing kits designed for children. These kits usually come with lively illustrations and very detailed instructions for planting each variety.

Carol Dowling
Horticultural Intern

To obtain a copy of the design for the popular children's garden trellis displayed on the grounds of River Farm, send 50 cents to the Gardeners' Information Service at the AHS address.

Leaf Blowers Are a Blast

When Hurricane Hugo hit the Mid-Atlantic coast, huge trees were toppled by its winds of more than 120 miles per hour. But leaf blowers are delivering regular doses of winds up to 180 miles per hour to landscapes throughout the United States, observes Biological Urban Gardening Services (BUGS) in its publication, *Professional Collaborator*. BUGS is an organization that helps urban homeowners and landscape managers reduce their use of pesticides.

The result is that leaves are burned and ripped from branches, new growth and flower buds are damaged, and topsoil is blown away. Disease spores that have been dormant in the soil or garden debris can be blown back onto leaves. Stressed plants may become dehydrated and shut their stomata—the natural openings in leaves that allow for the exchange of gases and water vapor.

BUGS concedes that the leaf blower has a place when trying to get autumn's surfeit of debris under control. But demanding a perfectly clean landscape year-round removes natural mulch with all of its benefits, uses nonrenewable fossil fuels, causes air pollution, and, most noticeably, creates noise pollution.

Re-employment of the rake, they suggest, would give many ears a break.

Members' Forum

Seed Packet Art

Your report on the subject of seed and flower catalogs in the January News Edition was excellent and a special delight to me. My father worked for many years at Stecher-Traung Lithographers in Rochester, and he faithfully supplied his little girl with samples of every colored seed packet the company produced. Fun, beautiful, exciting, and envied—that was what my packet collection was then. How I wish now that I had sense enough to treasure it properly!

Now I think we all have come to depend upon these gorgeous catalogs to force an end to endless cold winter, especially where I live. However, the Reverend Mr. Beecher's words 141 years ago could be well-applied today as an admonition against the ever more tantalizing catalogs bursting our mailboxes the year around (as well as to the whole of the advertising profession!).

Oh yes, complaints continue to be in order. But it seems we should learn to accept these missives with a certain sophistication: I know I would sorely miss being "entrapped" by any of them, when I wish to be!

Arabelle DuBois
Rochester, New York

Compost for 'Shrooms

In reading the recent letters regarding ways to camouflage a compost pile, I decided I would rather not hide it but use it to grow edibles such as mushrooms.

When I ordered morel mushroom spawn last year, I found upon its arrival that to grow them, I needed an area of compost much larger than the amount that would normally be in a bin. By the time I was able to develop such a space, my spawn had been about a month and a half in the refrigerator, and I have not had apparent success in developing this mushroom growing area.

However, I feel that if one were to know beforehand a way in which the composting area could be organized to handle growing mushrooms (in a somewhat moist, shady area), it could be prepared a few months ahead of time and used routinely for cycling kitchen scraps so that they could be useful immediately. During the six weeks in spring that the area should not be worked, an alternate smaller covered container could be developed to hold the scraps, for later retrieval and use in the mushroom compost area. I find a large pail from the local deli, in which dill pickles had been shipped, to

be ideal, with its tight cover, for holding over these materials.

Tommie F. Moody-Riewaldt
Irmo, South Carolina

Whether morel mushrooms could be successfully grown on a "cooking" compost seems open to question. Morels are more difficult to cultivate than most mushrooms. While they grow on a wider variety of substrates (shiitakes need hardwoods, preferably oak), they also require very precise conditions in terms of moisture and temperature. A spokesman for Northwest Mycological Consultants, Inc., a consulting service for mushroom growers, said they would be happy to advise you if you would telephone them at (503) 753-8198 and describe your growing conditions in greater detail. They have recently developed an information sheet on growing morels. Write them at 702 N.W. 4th Street, Corvallis, OR 97330.

As always, we would like to hear from members who have had success in this area.

Those who are dedicated recyclers as well as mushroom growers may be interested in growing oyster mushrooms, which have been grown on a number of waste materials. Elmer Schmidt, a forest products specialist at the University of Minnesota, is growing oyster mushrooms on bales of shredded paper. Schmidt describes oyster mushrooms as being "a little like morels and more delicate than shiitake."

In the wild, the mushrooms grow on dead trees, so it probably isn't surprising to find that they will grow on a wood product. Schmidt says he got the idea when he noticed mushrooms growing on newspapers left on an ironing board in a dark basement. However, like most mushrooms, oysters require exacting conditions, and Schmidt and undergraduate student Keith Tusa failed in their first effort, when they tried to grow the mushrooms on newsprint in closed, sterile jars. The bales, made by compressing unsterilized shredded newsprint mixed with a small amount of wood chips for aeration, sprouted mushrooms in three weeks when kept indoors under cool conditions. Analysis showed they did not contain any greater concentration of metals than fresh mushrooms in supermarkets.

Schmidt said he will need to do more research before the method is considered sound and mushroom bales become a consumer item.



Oyster mushrooms will grow on old newsprint.



Left: White inserts show shape of field-soil core. Right: Roots grew in both the soil core and the soilless mix.

Container Core

Every year I used to plant geraniums, periwinkles, coleus, and other ornamentals in a soilless mix in five- or seven-gallon containers on our deck. The soilless mix was essential for drainage in spring and early summer when rains were plentiful. However, when the rains ceased and temperatures increased, water management became a challenge that I generally lost. Using larger containers only delayed the problem, and every year during July and August I would have to water every day. If the plants once became drought stressed, they never flourished the rest of the season.

In recent years I have encouraged nurserymen to place balled-in-burlap trees and shrubs in containers in the spring for summer sales. The space between the soil ball and the inside of the container is filled with a typical soilless mix. Plants with a ball of soil around their roots always hold up better than those placed in containers bare rooted with only a soilless mix of pine bark, peat moss, and sand.

In the spring of 1989 it occurred to me that the reason plants with a ball of soil did better may not have been due to a better root system, but rather the presence of the soil. Per unit volume, good field soil can hold much more water and nutrients than components of a soilless mix.

The temptation was to use 100 percent field soil, but when a container is filled with field soil, the water table becomes very high and roots die from lack of oxygen. But a combination of a central core of good clay loam field soil surrounded by a soilless mix to control drainage seemed plausible. The technique worked. Instead of watering plants on our deck every day, I watered about once a week. Growth was

excellent and the geraniums flowered all summer, even in Oklahoma's heat. The core of soil holds a substantial quantity of water and nutrients, and the surrounding soilless container mix controls drainage and acts as an insulator.

During watering or rain, even if the field soil is not entirely wetted, it will adsorb water held at the base of the soilless mix by adhesion—the attraction of water to surfaces—and cohesion—the attraction of water to other water. This is because the field soil is much finer textured than the soilless mix; the finer the texture, the stronger the adhesive and cohesive forces.

I was afraid the plant roots would grow around the surface of the column of field soil and extract moisture, but not grow into the soil because of lack of oxygen. Near the end of the growing season, I took a five-gallon container of geraniums, removed the container, and cut a cross section to observe root growth. Roots were present in both the soilless mix and the field soil.

I created the column of field soil by using a narrow container two inches or more shorter than a larger container. The smaller container was filled with a good clay loam field soil that was moist but not wet and compacted moderately to eliminate large air spaces. The smaller container was then turned upside down in the larger one and removed to leave the column of field soil, and the surrounding space filled with a soilless mix.

The plants in this study were fertilized only once in the spring. This would not have been possible with just soilless mix, both because of its limited capacity to hold nutrients and because so much more water would have leached through the mix with the greater number of waterings it would require. Good field soil has an abundance of nutrients available, both

macronutrients (nitrogen, phosphorous, potassium, calcium, magnesium, and sulfur) and micronutrients (iron, manganese, copper, boron, zinc, and molybdenum) that the roots can extract.

Do not use soil from poorly drained areas, since it is likely to contain many pathogens. Most good garden soil should work well. Even though it contains weed seeds, most require light to germinate and would remain dormant. But do avoid soil that contains underground stems (rhizomes) of Bermuda grass, Johnson grass, or other perennial weeds.

Our deck is now much more enjoyable in summer!

Carl E. Whitcomb
Stillwater, Oklahoma

Go 'Way, Gophers

I am researching unique ways of getting rid of gophers from lawns and gardens, and would like your readers to send me their favorite methods.

Bruce Cook
Sylmar, California

The list of homegrown cures for gopher infestation seems endless—noisemakers, mothballs, daffodils, castor-oil plants, cats, dogs, snakes, and barn owls. Unfortunately, the heavy artillery—poison, traps, and bombs—is probably necessary for real gopher control. Kill traps work well, if they are sunk into freshly made burrows and completely covered so that no light penetrates into the ground. Poison baits, if fresh and dry, are also effective, but if spilled above ground, can also kill pets, birds, and other animals. Bombs that fumigate the gopher holes with poison gas are supposed to work, too, but it's hard to tell if they actually kill the gophers or just scare them away.

If readers have had good luck with more humane approaches, we will share them in this column and with Mr. Cook.

Making a Difference

The Rise of Wichita Falls

The north Texas town of Wichita Falls was a hot, dusty area long before a 1979 tornado destroyed many of the trees growing in yards and parks. Devastating as the storm was, it sparked the beginning of an ambitious project that turned a barren town into a green oasis.

Median strips are a common sight in Wichita Falls—in fact, nearly every street features a strip, adding up to 16 miles of empty landscape that regularly accumulated garbage. In 1981 the city council created the Wichita Falls Clean Country Commission and charged it with cleaning up the unsightly grass areas. But as Norma Crane, public information officer for the city and coordinator of the Clean Country Commission, observed: "You can clean up over and over, but it doesn't look any better." The trash, like a stubborn weed, always reappeared.

In an effort to beautify the flat landscape the commission created a type of adopt-a-tree program. For a \$75 donation local residents could "buy" a tree that would be planted in one of the median strips. The city council set aside funds for drip irrigation systems and the parks department was charged with planting and caring for the trees. The program was slow to start. "The first two blocks were really hard to sell," says Crane. "People were reluctant to participate because they didn't think we'd take care of the trees." But after citizens saw a genuine commitment from the city, the program was off and running. Secretaries bought trees for their bosses. Parents bought them for their children; children purchased them for their parents. Trees were given for Christmas gifts, anniversary presents, and memorials.

Citizens are given a choice of planting areas and trees: red oak, live oak, cedar elm, 'Bradford' pear, or, for \$25, ornamental crape myrtle. Each median is planted with a variety of trees.

After five years and 185 blocks, Wichita Falls is beginning to green. As civic pride grew, tree plantings, landscaping, and beautification projects expanded beyond the median strips to parks and yards. "Areas that used to gather litter and garbage don't anymore," says Crane. "The change has been tremendous!"

In 1988 the city received a Keep Texas Beautiful Award from the state of Texas. The prize was \$100,000 in landscaping for the city. "Naturally we took it all in trees!" Crane says.

This year the city of Wichita Falls received the Lady Bird Johnson Award from the National Arbor Day Foundation. The Foundation's Arbor Day awards recognize outstanding work in the areas of tree planting, care, and conservation.

Each year the National Arbor Day Foundation presents awards to individuals, schools, communities, and media organizations. For more information write the awards committee at the address below.

Yellowstone Team

Country Living magazine, the National Arbor Day Foundation, and the United States Department of Agriculture Forest Service have formed a partnership to reforest three sections of Yellowstone National Park. In 1988 raging fires destroyed nearly one-half million acres of national forest in the Yellowstone area. Wildlife food sources and shelters were reduced even more by the salvage logging after the fires. To aid in reforestation efforts *Country Living* established the Cooke City, Montana, Wildlife Enhancement Reforestation Project and invited its readers to contribute funds to purchase trees. Donations were sent to the National Arbor Day Foundation. The foundation purchased seedlings that will be planted by the forest service. Contributors received a membership in the foundation and seedlings to plant in their own yards and gardens.

About 125,000 pine and spruce seedlings are now growing in a nursery operated by the forest service; by this fall

they will be ready for planting in the Gallatin National Forest, Beartooth Scenic Highway, and the Absaroka-Beartooth Wilderness area. During the project's first phase 820 acres will be planted with white-bark pine, spruce, and Douglas fir trees. An interpretative display will explain fire recovery efforts to visitors. Foresters expect chipmunks, squirrels, and smaller wildlife to return to the area within a year after the planting, although it will take many more years for the trees to produce enough pine cones to feed grizzly bears and for the forest canopy to provide a dense cover for moose.

Other corporations are participating: Crest, Beatrice/Hunt-Wesson, Bristol-Myers, Moore Business Products, Wing Industries, New Antiques, Le Jardin Academy, and Fit for Life Foundation. The companies advertised the program in newspapers and placed contribution coupons in grocery stores. So far, more than 58,000 people have donated.

For more information write the National Arbor Day Foundation, 100 Arbor Avenue, Nebraska City, NE 68410.



The triangular Wichita Falls lot, far right above, was transformed, below, by the Clean Country Commission project.



COURTESY OF WICHITA FALLS CLEAN COUNTRY COMMISSION



1990-1991 Annual Appeal



Update Report May 1991

American Horticultural Society



Horticulture: Fundamental to our Survival

One of the joys of being employed at the headquarters of the American Horticultural Society is working amidst the gentle beauty of historic River Farm, on the banks of the Potomac River.

This joy is enhanced, now that spring is here. Daily, parents bring their children to run free across the meadow and lawn, to picnic beneath the shade of ancient trees, to stare in wonder at the goldfish in the pool, and delight in the colorful rainbow of spring flowers that grace our gardens.

Our children are our future, and when I envision the future of AHS, I wonder about the world that the children who play here will inherit. How fortunate they are to have parents who value the importance of exposing them at a young age to the wonders of nature and horticulture. Children and nature are naturals together; they seem to sense innately how important plants and green spaces are to surviving in this world.

Horticulture—the art and science of growing plants—is fundamental to our survival on planet earth. For the first time in our history, half of the United States population lives in urban areas; thus, exposure of children to the natural world and horticulture becomes even more vital to assuring our future. Our children are the future protectors of the social and environmental health of our country.


Tender young plants and children need nourishment to survive. So, too, the field of horticulture today is truly in need of nourishment. Horticulture's precious legacy to our nation—our public and private gardens, parks, arboreta and botanical gardens, and educational programs in organizations and institutions of higher learning—all need our support. The keys to securing the resources necessary to preserve and protect our horticultural legacy are steadfast, dedicated, personal commitments of time, energy, and funding.

We at AHS constantly hear of decreases in budgets for state horticultural programs; in extension programs; in enrollments in horticultural courses in colleges, universities and technical schools; and in funding for plant research and development. We are alarmed at the loss of these valuable programs.

It has been written that horticulture is in decline—if so, it may be that too few people understand and value its unique contributions. The field of horticulture could be threatened unless those of us who care about it begin to act.

The American Horticultural Society is actively networking with concerned gardeners and professional horticulturists across this great country of ours to rally support anew for the field. We are speaking clearly and publicly of the needs within the field. We want to raise the public's awareness of the importance of horticulture, reminding others that *plants* sustain all life on earth.

Won't you let us know that you support our efforts by contributing generously to this year's AHS Annual Appeal, so that we may continue our work on your behalf? Not only will horticulture benefit, so will you and your children and grandchildren. We thank you sincerely for your generosity.



Judith A. Borden
Judith A. Borden
Development Director

A Case for Support

Since its founding in 1922, the name of the American Horticultural Society has been synonymous with excellence—a respected organization with the ability to provide timely, accurate horticultural information.

Throughout the years, thousands of amateur gardeners and professional horticulturists have been attracted to the Society because of the quality of its publications and services, the caliber of professional horticulturists who served on its board, wrote articles and provided horticultural guidance, its newsworthy lectures and symposia, and its guided travel-study tour programs to unusual garden sites throughout the world.

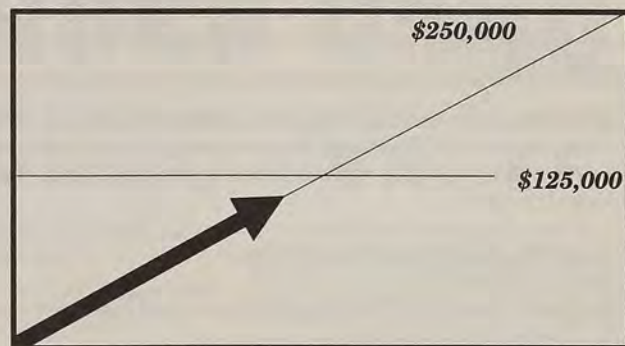
Now, as the American Horticultural Society enters the last decade of this century, it is challenged as perhaps never before in its history, and on numerous fronts. The Society faces critical challenges it must meet to secure its future:

- Raising Public Awareness of the Importance of Horticulture
- Uniting the Field of Horticulture
- Expanding its Educational Programs
- Maintaining and Preserving River Farm
- Increasing Membership in the Society
- Continuing to Improve its Organizational and Development Operations
- Debt Reduction and Endowment
- Attracting Ongoing Operating Support

Each of these challenges comes at a time of unprecedented economic uncertainty in our nation's recent history. Non-profits increasingly are witnessing a downturn in donations. Many face extinction unless those persons who care deeply, rally to provide funding for the institutions they support.

The American Horticultural Society **deserves** your support. ***Its mission is vital to the environmental and social health of our nation today, and to future generations.*** The contributions of horticulture throughout the decades and to the world's future deserve recognition and support. We invite you to join with us in our efforts to educate and inform Americans across our great country of the vast importance of horticulture.

Goal of the 1990-1991 Annual Appeal



Received to date:
(November 26, 1990 through March 15, 1991)

174 Member Gifts	\$56,749.47
Board Challenge	\$38,780.00
Total	\$95,529.47

If you want to help your Society grow:

- Encourage your friends or garden club members to become active members of the American Horticultural Society;
- Sponsor an AHS benefit tea, garden party, or dinner;
- Stage a plant sale to benefit AHS;
- Use your imagination to create a project to benefit AHS;
- Mail your personal gift today to the 1990-1991 Annual Appeal.

If every member of the Society contributed \$15 we would surpass our goal. Every gift is important. Thank you.

Return Response Card

☐ Yes, I want to continue the proud tradition. I will support the 1990-1991 Annual Appeal.

☐ Please record me as a supporter at the _____ gift level.

☐ My tax deductible gift in the amount of \$ _____ is enclosed.

☐ I pledge \$ _____ to be paid in _____ installments.

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Phone (evening): _____

The American Horticultural Society is a nonprofit educational 501(c)(3) organization, supported by membership dues and fees and voluntary contributions from the private sector.

Methods of Giving

Donors to the AHS 1990-91 Annual Appeal are encouraged to make pledges early in the year, and pay anytime before the Appeal ends in June. Payments may be made in a single check, or a series of payments, made payable to the **AHS Annual Appeal**.

Gifts of any amount are helpful and appreciated. The following higher Gift Levels of Support recognize individuals who have made valuable contributions to the American Horticultural Society:

George Washington Associates*

\$10,000 and above

To recognize America's first President, an avid gardener and original owner of River Farm.

George Washington Associates may arrange for a framed, matted 9" x 12" photograph of a favorite flower, photographed in your own garden at the height of bloom. Created for AHS by photographer Maryl Levine, whose rose photograph appeared on the cover of *American Horticulturist*, August 1990.

Liberty Hyde Bailey Associates*

\$5,000-\$9,999

To recognize "the father of American horticulture," professor of horticulture at Michigan State and Cornell Universities.

Liberty Hyde Bailey Associates will receive a one-of-a-kind, handcrafted stained glass piece with a horticultural theme, appropriate for a window. Created for AHS by stained glass artist Trish Hendershot.

Haupt Associates

\$2,500-\$4,999

To recognize Enid A. Haupt whose generosity provided us with River Farm.

Haupt Associates will receive a framed, matted, color photograph of a River Farm rose or iris. The evocative flower portrait is photographed by Maryl Levine.

Morrison Associates

\$1,000-\$2,499

To recognize Benjamin Yoe Morrison, first director of the U.S. National Arboretum and president of AHS from 1935-1940.

Morrison Associates will receive a copy of the *AHS Encyclopedia of Garden Plants*, a best seller, published in 1989.

1922 Founders Associates

\$500-\$999

To recognize the original group of dedicated horticulturists whose vision still lives today.

1922 Founders Associates will receive an autographed copy of *The Wildflower Meadow Book*, 2nd edition, by AHS friend Laura S. Martin. Published in 1990.

The Garden Classics Club

\$250-\$499

Garden Classics Club members will receive four "Masterpiece Gardens Series" seed kits, created by AHS and Northrup King Company.

The Garden Friends Club

\$100-\$249

Garden Friends Club members will receive two "Masterpiece Gardens Series" seed kits.

*formerly titled, "Society"

Other Types of Gifts

Your Development Office at AHS can provide information to you about alternatives to an outright gift. For example:

- life income gifts, bequests and memorials, real estate, artwork or objects, furnishings, office equipment and supplies, life insurance, or securities.

Please phone the Development Office at (703) 768-5700. We hope you will be as generous as possible when you consider your gift to the 1990-91 AHS Annual Appeal. **Every gift counts, every gift will be acknowledged.** We are committed to continuing to provide quality programs, activities, and services and to provide wise leadership and accountability in all we do. Your generous gift will enable AHS to continue its proud tradition. Won't you share in it? **We sincerely thank you for your support.**

Matching Gifts

Your support to AHS can be doubled or even tripled by asking your employer if the company participates in a "Matching Gift Program." Please obtain the Matching Gift form from your employer's personnel, public relations, or employee benefits office and forward it to AHS. **Please do not overlook this important aspect of your gift to the AHS 1990-91 Annual Appeal.**

Recycling Bill

Rep. George Hochbrueckner (D-New York) has introduced the Recyclable Materials Technology Markets Development Act (HR 300) to encourage composting and recycling. The bill would create an Office of Recycling Research and Information in the U.S. Department of Commerce and allow the commerce secretary to designate products as recyclable. No one may manufacture these products unless 25 percent of the product is recycled in 1992, 1993, and 1994; 50 percent is recycled in 1995, 1996, and 1997; and there is a good faith effort to recycle 75 percent of the product in 1998 and after.

HR 300 is one of the first pieces of federal legislation to encourage composting and is hailed as an important step in protecting the environment. The American Association of Nurserymen agrees with the bill's intent, but has some concerns.

"AAN is fully committed to encouraging recycling," said Ben Boluski, AAN's director of governmental affairs. "But we can't go into this willy-nilly. Two-thirds of the bill is wonderful and the intent is noble for one-third. But the bill doesn't describe the factors the secretary would use to determine what is recyclable and what is not. And we don't know where the recycling rates came from, and whether they are technically feasible. If a manufacturer doesn't meet the recycling rate requirement, the bill prohibits that firm from manufacturing that product. That's a rather stiff penalty without a rationale for the rates."

The bill, which has 59 co-sponsors, was referred to the Energy and Commerce and the Science and Space Technology Committees. At press time no action had been taken in either.

Ann Crammond, 1925-1991

AHS lost a prominent board member with the death February 20 of Ann Lyon Crammond, who was en route to a botanical exploration of Antarctica when her plane crashed in Chile. Crammond was director of the Atlanta Botanical Garden from 1979 to her retirement last October and a Garden Club of America member. She served on the AHS Board since 1988. Said AHS President George C. Ball Jr.: "This tragic accident took a significant leader from the American horticultural arena. She will be greatly missed among the AHS Board, in Atlanta, and by many other organizations that she served."

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TRAVEL/STUDY TRIPS FOR THE AHS GARDENER

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, in 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 Kemptville; and the delightful cottage garden of Allen and Penelope Paterson in Hamilton. This unique 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 the eastern world of Thailand, China, and Japan. Highlighted are excursions to the ruined city of Ayutthaya; hill-town villages near Chiang Mai; a jungle safari on elephantback to the Karen Village 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.

Leonard Haertler Travel Company, 7922 Bonhomme Avenue, Saint Louis, MO 63105, (800) 942-6666, (314) 721-6200 (in Missouri)

AHS TOURS

Regional Notes

Junipers Gone Amok

A tree monopoly is a dangerous thing. Residents of suburban streets once shaded by American elms have learned it the hard way, and now so are ranchers and environmentalists in Texas.

In this case, the trees are juniper, and they aren't sick, but too healthy. Three juniper species have taken over about 13 percent of the state, or roughly 22 million acres. This rampant growth, which began to get out of hand sometime in the 1960s, is encroaching on grazing land crucial to the economy of many Texas counties. But the trees serve as a habitat to two endangered bird species, which means they can't be destroyed without a careful plan. While ecologists seek an answer to the dilemma, they worry that the issue may be settled by wildfires, since junipers are resinous and "can go up like a torch," according to Dr. Fred Smeins, a researcher in the rangeland ecology and management department at Texas A&M University. Of particular concern is the Edwards Plateau in southwest central Texas.

Ironically, the monoculture of large junipers doesn't represent the best environment for either of the endangered birds. The golden-cheeked warbler prefers mature forests of juniper and oak, and the black-capped vireo likes more open ranges and junipers that aren't more than six feet tall, says Dr. Doug Slack, a Texas A&M wildlife professor.

"Anytime you have a single species of tree, it generally is not in the best interest of most kinds of wildlife," Slack says. In too many places now, the juniper is a single stand that is blocking out and lowering plant diversity, and as a result, animal diversity. There are only three small areas of Texas that do not have some degree of juniper infestation, according to Pat Shaver, a Soil Conservation Service state range conservationist.

The junipers, whose seeds are spread by birds, were once controlled by natural fires, which are no longer allowed to burn; goats, which few ranchers are now raising; and harvesting of their oil for perfumeries, most of which are out of business.

Smeins called for research that might shed light on the interrelationship of the plants, animals, and environment and suggest a strategy of regional management so that junipers, birds, and ranchers could live in harmony.



Next month, the Missouri Botanical Garden will open the William T. Kemper Center for Home Gardening, a 10,000-square foot pavilion that will house entertainment and educational facilities. Under the roof of the pavilion, designed like a large split-level home, will be a reference library, a combination classroom and demonstration kitchen, a "plant doctor" diagnostic service, a computer-assisted design system, and a greenhouse with a potting area for demonstrations of propagation. Through 1993, the garden will complete 20 demonstration gardens on 8½ adjacent acres—including a butterfly garden, rock garden, ground-cover garden, and a garden for persons with disabilities.

Flagstaff Adoptees

The Flagstaff, Arizona, area is not only very dry, but it has an extremely short growing season. Yet gardeners there aren't content with the reliable standbys. Like the rest of us, they want to push back the boundaries and try new plants.

To help them sort the hardy from the heartbreakers, the Arboretum at Flagstaff in 1988 established the Foster Gardener program. A dozen volunteers function much as the professional cooperators who test new plant introductions in various geographic locations. In this case, the plants are less likely to be hybrids or cultivars than species native to the Colorado Rockies or other areas with growing conditions similar to those of Flagstaff. "We choose plants that we feel have a high probability of success, but with which we don't have personal experience," said Joyce Maschinski, who began directing the program when she came to the arboretum as curator of plants a year ago. The foster gardeners grow the plants at their homes, keeping records on temperature, precipitation, and the plants' performance.

The selections include shrubs, trees, and perennials. Getting two thumbs up this year were Thurber's cinquefoil, Mount Lemmon sage, and pinks

(*Dianthus* spp.). Others met with mixed success: Saint-John's-wort wasn't very hardy in Flagstaff but became a pest in Sedona, 40 miles away; lupine from California doubled in size in one garden but fell victim to grasshoppers in another.

The best performers are displayed in the arboretum and, depending on availability, sold at its annual plant sale. Next season, said Maschinski, the trial ornamentals will include prairie gentian, beach evening primrose, Utah agave, and incense cedar.

The arboretum profits from the program by obtaining information about plant hardiness and microclimates. For instance, highs in the foster gardens the first year ranged from 82 to 112 degrees; lows ranged from 8 above to 10 below zero; the arboretum recorded a minus 26. The volunteers, said Maschinski, obviously enjoy exchanging the information with each other. "They're a delightful group and very serious about the program," she said. Although most are home gardeners, rather than horticultural professionals, "they want to beef up the program scientifically and begin taking more measurements of plant growth."

For more information contact Joyce Maschinski, The Arboretum at Flagstaff, P.O. Box 670, Flagstaff, AZ 86002, (602) 774-1441.

Pennsylvania's Award-winning Shrubs

Six shrubs have won this year's Gold Medal Plant Award from the Pennsylvania Horticultural Society. The awards program was initiated in 1978 by Dr. J. Franklin Styer to identify and promote underused woody ornamental plants of exceptional merit. Until this year, the award has been known as the Styer Award. The sponsors believe the new name will make clearer the purpose of the awards.

The winners are:

♦ *Hamamelis x intermedia* 'Diane'.

This witch hazel produces burnt orange blossoms in January and its autumn foliage is said to rival that of a sugar maple. Selected at the Kalmthout Arboretum in Belgium, it grows into a 15-foot vase shape. It is hardy in Zones 6 to 8.

♦ *Hibiscus syriacus* 'Diana'. A decided improvement on the old-fashioned rose-of-Sharon, this hibiscus produces large white flowers from July until frost and does not self-seed. The flowers stay open for more than a day so the plant is a striking addition to a moonlight garden. Left unpruned, it becomes an eight-foot, open shrub. Hardy in Zones 6 to 8, it was introduced in 1963 by the late Donald Egolf of the U.S. National Arboretum.

♦ *Ilex* 'Harvest Red'. This deciduous holly is a hybrid between the native *I. verticillata* and the Asian *I. serrata*. In fall, before the fine-textured leaves turn burgundy and drop, it begins producing its small but abundant cherry red berries. Introduced by Rutgers breeder Elwin Orton, it will tolerate heavy, wet soils. For berry production, it will need the company of a male holly, such as 'Raritan Chief', also from Rutgers. Hardy in Zones 3 to 9.

♦ *Sciadopitys verticillata*. The Japanese umbrella pine was difficult to propagate from cuttings until the development of a new rooting technique by Sidney Waxman of the University of Connecticut. This slow-growing tree has dense, dark green foliage with long, thick needles borne in lustrous whorls. According to Judy Zuk, president of the Brooklyn Botanic Garden and a member of the awards committee, many consider it the Rolls Royce of needled evergreens. It can reach a height of 60 feet or more, but is more commonly seen in middle age as a compact 15-foot wide pyramid 20 to 30 feet tall. Hardy in Zones 5 to 8.

♦ *Viburnum plicatum* f. *tomentosum* 'Shasta'. Another selection from Donald Egolf, this double-file viburnum is virtually smothered with white flower clusters in May and has a compact

horizontal habit, reaching six-feet tall and 12-feet wide. Its red July berries are quickly devoured by birds. Hardy in Zones 5 to 8.

♦ *Viburnum nudum* 'Winterthur'.

This selection of the native possum haw viburnum, from the late Hal Bruce of Winterthur, is a standout in the fall, when it produces a mix of pink and dusty blue berries against rich purple foliage. In June, it displays large flat clusters of creamy white flowers. Unlike 'Shasta', it will do well in locations that are both shady and wet. Hardy in Zones 7 to 9.

To obtain a list of sources for these shrubs, send a stamped, self-addressed business-size envelope to the Gold Medal Award, Pennsylvania Horticultural Society, 325 Walnut Street, Philadelphia, PA 19106.

Cultivar Detectives

Rose rustling and peach tree pilfering may soon be all but impossible, thanks to molecular science. Two researchers at the South Carolina Agricultural Experiment Station at Clemson University are using genetic fingerprinting to distinguish among plants that appear identical.

By using a molecular probe to study isolated DNA samples from a rose, biologist Bert Abbott and horticulturist John Kelly can determine if two plants merely look alike, or if one is a cutting that is being marketed under a different name. Each rose variety has a different pattern of DNA, which carries genetic information from generation to generation.

The work should prove valuable in court cases where a plant patent is in dispute.

Abbott plans to use this process to create genetic mapping systems for roses and peaches so that specific, valuable genes can be tracked in a breeding program. Without this technology, such genetic maps take generations to develop. Peach tree breeders could use the technique to determine if a particular trait had been passed on without waiting until the tree bears fruit.

Abbott hopes that this work will stimulate additional studies, both more basic research at the molecular and cellular level, and studies on other plants.

When the process is perfected, plants could be "fingerprinted" by Clemson researchers at an estimated cost of \$30 per sample.



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AHS Bulletin Board

Compost Park Starts to Cook

River Farm's planned compost demonstration site, announced in our special section on composting in the September News Edition, is well under way.

Originally envisioned as a modest testing and hands-on program to teach gardeners and homeowners the basics of effective composting, it is now called the National Backyard Compost Demonstration Park. It will eventually show more than 50 different bins and methods, making it the most comprehensive compost demonstration site in North America.

Commercial bins as well as a number of bins that can be made at home from recycled materials are being put together by staff, Master Gardeners, and other volunteers.

In conjunction with the park, AHS Program Director Joe Keyser is conducting compost workshops the first Saturday of each month. Keyser said that about half of the 30 to 40 who attend each month are novices and the other half are experienced composters. "The experienced people are interested in learning new and different methods," he said. "Or they may have tried it for the first time last season but had a problem with the way their compost smelled."

The biggest misconception about composting seems to be that it requires



Volunteers Ed Raduazo and Dee Stowell load a bin in the compost park.

the addition of inorganic fertilizers, activators, or lime. In fact, green plant matter such as grass clippings or fresh weeds contains all the required nitrogen when added in the proper proportion, as do organic fertilizers like blood meal or bone meal. As for activators, Keyser said that a few spadefuls of healthy garden soil or active compost contains tens of billions of micro-organisms, "more than enough to do the job." Residents of the Washington, D.C., area are afraid that because their composts contain a large proportion of oak leaves, this will make the finished product acidic. But the pH will be neutralized

by bacteria and fungi during the decomposition process, Keyser said.

The addition of kitchen scraps also seems to generate a lot of questions and confusion, although the rule is a fairly simple one. Raw or cooked vegetables unadorned with oils or sauces are good additions. Other materials mixed with or coating the vegetables may draw animals, cause unpleasant odors, or be slow to break down. The same is true of adding meat scraps, fatty bones, or similar "greasy" material. And he warns would-be composters to check local health regulations, because some jurisdictions have strict laws about disposing food wastes of any kind.

Keyser and his volunteers are also conducting special programs for garden clubs, homeowner associations, natural science and ecology classes, master gardening classes, flower shows, and other groups.

Suppliers who have donated commercially available bins, tumblers, and related materials such as aerating tools and mats, activators, and cover crops are: Gardener's Supply of Burlington, Vermont; BioBin of Bainbridge Island, Washington; Eco Atlantic of Baltimore, Maryland; Necessary Trading Company of New Castle, Virginia; Natursoil Company of Saint Cloud, Minnesota; Plow and Hearth of Orange, Virginia; Wilmarc, Inc., of Indianapolis, Indiana; Crary Company of West Fargo, North Dakota; Outdoor Power Equipment of Glen Allen, Virginia; and Davidson Designs of Seattle, Washington.

At left is the Afternoon Garden at Naumkeag in Stockbridge, Massachusetts, as it looked in 1926. The restoration of Naumkeag's gardens—designed by Fletcher Steele—will be discussed by Steve McMahon at the "Landscapes of the Country Place Era: Issues of Preservation and Restoration" symposium on July 12 at the Berkshire Museum in Pittsfield, Massachusetts. The AHS-sponsored event also includes lectures by Thomas Buchter on Winterthur Museum; Jonathan Miller on Stan Hywet Hall; Susan Maney O'Leary on George Eastman House; and Pamela Seager on Rancho Los Alamitos. In conjunction with the symposium the Berkshire Museum will present a photographic exhibit, "The Gardens of Fletcher Steele," from June 28 through September 15. For more information on the symposium call AHS at (800) 777-7931. To learn more about the photo exhibit call the Berkshire Museum at (413) 443-7171.



PAUL WEBER, FLETCHER STEELE COLLECTION SUNY/CESE, SYRACUSE, NEW YORK

Spring, at Last!

AHS will welcome the season with its annual spring fair at River Farm on Sunday, May 5 from 11 a.m. to 4 p.m. Members of plant societies will sell plants and answer questions. We'll also have displays and talks on composting and heirloom gardening; culinary demonstrations; and wares from businesses and craftspersons who feature natural products. Or join us at River Farm for one of these other activities:

♦ **May 1-June 24.** "The Artist Friends of River Farm" exhibit, Monday through Friday, 8:30 a.m. to 5 p.m. Free.

♦ **May 4.** Back-yard composting lecture, 10 a.m. Free. Call for reservations.

♦ **May 14 and 15.** "The Mother of Gardens," a flower arranging class sponsored by International Design Symposium and AHS. Kenn Stephens of IDS will present "The Flower Art of Ancient China" on May 14; and "Naturalistic and Gardenesque Arrangements" on May 15. Each 10 a.m. to 4 p.m. session is \$75 and includes supplies and lunch. Call for reservations.

♦ **June 1.** Back-yard composting lecture, 10 a.m. Free. Call for reservations.

♦ **June 1.** "Water Gardening" lecture by Charles Thomas of Lilypons Water Gardens in Lilypons, Maryland. 2 p.m. \$5. Call for reservations.

♦ **June 5-8.** Floral workshop by Danni Dawson. Call for more information.

♦ **June 11 and 12.** "The Influence of Ikebana," a class sponsored by IDS and AHS. Kenn Stephens will present "Line Arrangements in the West" on June 11 and "Modern Massed Line Designs" on June 12. Each 10 a.m. to 4 p.m. session is \$75 and includes supplies and lunch. Call for reservations.

♦ **June 22.** Annual Daylily/Lily Day. Members of the National Capital Daylily Club and the Potomac Lily Society and AHS staff members will be available to answer questions. 11 a.m. to 4 p.m. Free.

Contact the American Horticultural Society, 7931 East Boulevard Drive, Alexandria, VA 22308, (703) 768-5700 or (800) 777-7931.

New GIS Pamphlet

The Gardeners' Information Service has published a new resource bulletin, *Heirloom Seed Sources, Exchanges, and Resources*, which lists 32 sources of heirloom flower and vegetable seeds, 10 seed exchanges, and four books for heirloom gardeners. Send 50 cents to GIS at the AHS address.



NEW beauty, gorgeous new colors, exotic fragrance and fascinating new interest are given to your garden by the addition of a Water Lily Pool. And, fortunately, every garden, large or small, provides ample room for a Water Lily Pool, or at least a simple sunken tub-garden.

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Gardeners' Bookshelf

The Gardener's Companion

Roberta M. Coughlin. *HarperPerennial*, New York, 1991. 496 pages. Black-and-white woodcuts and illustrations. Publisher's price: softcover, \$14.95. AHS member price: \$12.70.

This is the gardener's book of lists. If you're the type that buys a world almanac each year (and saves the old ones), if you read classified ad pages for fun, and if you store a wrinkled copy of *The Guinness Book of World Records* in your privy, then let me sketch out a few reasons why you should buy this book: it is (a) fun, (b) imaginative, (c) wide-ranging, and (d) a little bit wacky.

Let's randomly open it up and see what we find: where to visit lilacs, companion plants for roses, antiquarian and out-of-print booksellers specializing in gardening books, flowers for songbirds, house plants that need infrequent watering, All-America Selections winners back to 1983, basil varieties, annuals that reseed easily, plants named for persons, old strewing herbs, and Arbor Day dates for all 50 states.

Taken in the right frame of mind, this book is a joy and useful indeed. Our copy, now a reference for the



Over 350 lists of practical gardening information: • flowers, vegetables, trees, shrubs and soils • what to plant, where to plant it and when • what's old, what's new • what's compatible and what's not PLUS: • tips on growing, common blights and pests • snippets of plant and gardening lore

Gardeners' Information Service, will become well-worn in no time. These are exactly the kinds of questions we get: "Can you recommend some fragrant climbing roses?" "What perennials do well in damp ground?" However, I can imagine that garden curmudgeons, surly after a bad case of thrips, might

not appreciate the limitations of such a book. "Why the heck isn't my 'Night Music' on the list of good miniature roses?" "Whaddaya mean avoid sycamore in back-yard plantings? I love mine!" "Parsley never worked for me as a baldness remedy!" I would have liked more information in the different lists of gardens to visit, like addresses and hours of opening. But lists will be lists, and invariably some are too short or too long.

Don't get me wrong, *The Gardener's Companion* is not just a series of series. Coughlin does a reasonably good job of introducing the lists and explaining why things are included where they are, and has stuffed in a lot of additional information beyond the lists—paragraphs on plant lore, cultural information, and plenty of tips and quotes. But this is not the place to go to learn how to plant your petunias; some of the practical suggestions can be confusing in their brevity. Why, for example, does she recommend shade-loving astilbe and hosta as companion plants for roses? To plant behind the roses perhaps? No explanation, all we get is a list. A garden-side gardener's companion it is not.

—Thomas M. Barrett

Seed to Civilization: The Story of Food

Charles B. Heiser Jr. *Harvard University Press*, Cambridge, Massachusetts, 1990. Third edition. 228 pages. Black-and-white photographs, line drawings, tables. Publisher's price: \$12.95. AHS member price: \$11.00.

Of the 200,000 or more species of known flowering plants, only about 3,000 have ever been used by humans for food, and of these, only 200 have ever been domesticated. Today the seeds, fruits, and tubers of a mere handful of plants "stand between us and starvation."

Charles Heiser has set out to tell their story: where, when, and how food plants were domesticated and how they are used today. Heiser, a former professor of botany at Indiana University, brings to his task a lively style, honed by a career-long dedication to making plants interesting to the general reader. (He has written previous works on sunflowers, gourds, and Solanaceae.) No detached academic he—Heiser writes

with an increasing sense of urgency in this updated third edition, and is not afraid to pepper his prose with opinion, decrying nutritional illiteracy in the United States and those who "rely on the ridiculous propaganda of advertisements, diet books, and health-food 'authorities,'" and attacking the American attachment to white bread. "It is a sad note on modern civilization," he writes, "that we must remove some of the nutrients and then supply additives to the product that goes on the table."

But the bulk of this book is a series of fascinating vignettes of the plants themselves such as the story of the potato. The wild potato originated in South America where it came under cultivation some 4,000 years ago. Introduced to Europe in 1570, the potato was anything but a hit, perhaps because it was a member of the nightshade family (that Europeans knew through the poisonous mandrake, henbane, and belladonna). Several writers condemned it for its flatulent or "windie" property. After it was promoted by royalty in some countries, the potato gradually gained acceptance.

Americans will be drawn to the history of the sunflower, the only important crop to have been domesticated in what is now the United States. First cultivated in the Central United States sometime before 1000 B.C. and introduced to Europe in the 16th century, the sunflower was not a major food crop until it reached Russia where it became the primary source of food oil.

Even though humans have been remarkably successful with plant domestication and cultivation, "The Story of Food" does not have a happy ending. Heiser warns of the loss of genetic diversity in our food crops and of the effect of impending climatic change on food production. It is likely, he claims, that global warming will make it impossible to grow many of the major crops where they are grown today and that the United States will cease to be an exporter of food. "How rapidly the global climatic change will take place is still uncertain," Heiser writes, "but there can be little doubt that it will have severe effects on food production."

—T. M. B.

GRANDMA'S GARDEN



A Celebration of Old-fashioned Gardening

Grandma's Garden

Laura Martin. Longstreet Press, Atlanta, Georgia, 1990. 153 pages. Black-and-white photographs and drawings. Publisher's price: softcover, \$12.95. AHS member price: \$11.00.

Perennials: Toward Continuous Bloom

Edited by Ann Lovejoy. Capability's Books, Deer Park, Wisconsin, 1991. 287 pages. Publisher's price, softcover: \$15.95. AHS member price: \$13.60.

Ann Lovejoy, considered by many to be America's most exciting new garden writer, has in this book gathered more than 30 other "new voices in American garden writing" to share their love of and wisdom about perennials.

Lovejoy is an advocate of "gardening where we live," urging Americans not to slavishly imitate the British or even gardens elsewhere in the nation, and she envisions this collection as a patchwork quilt of truly American garden styles and interests. The results are indeed a patchwork not only of regions and tastes, but of writing styles, including free verse from Ryan Gainey and a satirical rhyme from Allan Armitage.

There are sections on color, plant specialists, unusual perennials, and "regionalists." Lovejoy lives in the Seattle area, and there is an overabundance of Northwesterners here, but her new voices also include residents of New York, Massachusetts, Florida, Oklahoma, Missouri, Ohio, Illinois, California, Texas, and North Carolina. Despite the differences between gardening in Texas and

Many of us have treasured memories of grandparents' gardens—magical places filled with snapdragons, zinnias, cornflowers, marigolds, and roses or bountiful vegetable plots that produced bushels of peppers, tomatoes, corn, and beans. For some, helping grandma plant flower seeds and pull weeds may have been the first introduction to the pleasures of working in the soil. In *Grandma's Garden*, Laura Martin uses her own memories of gardening with her grandmother to create a series of essays on heirloom gardening.

Within each seasonal section her reminiscences intertwine with old-fashioned gardening information: natural fertilizers and pest controls, the history of roses, waxing flowers (a popular preservation method of the mid-1800s), "putting food by," home remedies from the garden, and rural food celebrations and food festivals (the Okra Strut held in Irmo, South Carolina, sounds like quite the event—it features an okra eating contest called the Shoot-out at the Okra Corral). For each season she lists old-fashioned flowers with not only

Washington State, it's fun to observe that some perennials, such as *Aquilegia canadensis*, *Coreopsis* 'Moonbeam', and *Helleborus niger* are hailed and hardy almost everywhere.

There is good practical information here. Lovejoy ends the book with tips for bringing plants home from foreign travel, and an index tells the reader not only where to find references to each plant, but its height and hardiness zone. There are more than four pages of sources and resources.

What this book is not is an enjoyable one to sit down and read straight through, as a reviewer often must. Many of the writers are outstanding. A favorite was Mark Houser on blue plants: "The bugloss is a baseball player that hits .375 in the spring but finishes the season with a .225 average on a last place team. When it's over, it's over." But not all are that engaging, and hour after hour of what amounts to lists of "my favorite perennials" can be numbing.

Keep Lovejoy and company handy for a quick pick-me-up on a day when the hail rolls in or the Japanese beetles begin swarming. Open the book almost anywhere and you will find a shared experience, a delicious phrase, re-inspiration, or at the very least, names of new perennials to match wits with next season.

—Kathleen Fisher

botanical and common names, but also a history with the date of introduction into the trade, description, advice on how to grow, and ideas for companion plants.

Martin's book is filled with useful garden advice and addresses for heirloom gardening groups, seed sources, and living history museums. And her memories of gardening with her grandmother are wonderful and will inspire readers to remember their own garden histories. But I wish she hadn't tried to be both sentimental and informative in one book. Delightful anecdotes are interrupted by practical tips, and, without a table of contents or index, this information is hard to find later. Martin has included a few stories of other people's grandparents—more would have been welcome.

Grandma's Garden contains some interesting old photographs along with historical woodcuts and illustrations. Unfortunately it also includes some recent illustrations of plants and photographs from Plimoth Plantation which I found a bit distracting.

—Mary Beth Wiesner

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Gardeners' Dateline

Mid-Atlantic

♦ **May 5. Third Annual Gardeners in Their Gardens Tour.** Norfolk, Virginia. Sponsored by the Norfolk Botanical Garden Society to support improvements at the botanical garden. Information: Millie Clinkscals, (804) 363-0843 or Martha Beale, (804) 855-7177.

♦ **May 15. Flower Show Celebrating the Bicentennial of Mathews County.** Sponsored by the Garden Club of Mathews. Piankitank Ruritan Club, Route 198, Hugins, Virginia. Information: M. Tucker Preston, (804) 725-9362.

♦ **May 19. Tour of Private Gardens in Historic Annapolis.** Annapolis, Maryland. Sponsored by the Historic Annapolis Foundation for the benefit of the William Paca Garden. Information: William Paca Garden, 1 Martin Street, Annapolis, MD 21401, (301) 267-6656 or (301) 269-0601.

♦ **June 3-5. Searching for Success: National Environmental Leadership Conference and Award Programs.** Washington, D.C. Information: Renew America, 1400 16th Street N.W., Suite 710, Washington, DC 20036, (202) 232-2252.

♦ **June 8-9. Garden Tour and Art Mart.** Red Barn and Art Mart, Waterford, Virginia. Information: Waterford Foundation, Waterford, VA 22190, (703) 882-3018 or DC metro 478-8454.

♦ **July 3-6. Annual Convention of the American Gloxinia and Gesneriad Society.** Omni Hotel, Baltimore, Maryland. Information: Please send a S.A.S.E. to Jim Roberts, Local Convention Chairman, 5656 Calyn Road, Baltimore, MD 21228.

North Central

♦ **May 11-12. SpringFest '91.** Fellows Riverside Gardens, Millcreek Metro Park, 816 Glenwood Avenue, Youngstown, OH 44502. Information: (216) 740-7116.

♦ **May 16, 18, 19. Wildflower and Landscape Photography Lecture and Workshop.** Holden Arboretum, Mentor, Ohio. Sponsored by the National Wildflower Research Center.

Taught by John D. Smithers. Information: Education Department, (216) 256-1110 or (216) 946-4400.

♦ **June 15-23. Sixth Annual Rose Festival.** Boerner Botanical Gardens, Whitnall Park, Hales Corners, Wisconsin. Information: Friends of Boerner Botanical Gardens, 5879 South 92nd Street, Hales Corners, WI 53130, (414) 529-1870.

♦ **June 22-23. The 10th Annual Bonsai Show.** Morton Arboretum, Lisle, Illinois. Sponsored by the Morton Arboretum Bonsai Society. Information: Audrey Shallcross, (708) 305-8909.

Northeast

♦ **May 8. Annuals for the Garden.** Edgewater Farm, Plainfield, New Hampshire. Information: Judy Hayward, (802) 674-6752 or Wendy Regier, (802) 674-6729.

♦ **May 9. Annual Herb Sale.** Bryce Douglas Farm, Pughtown Road, Kim-

bertown, Pennsylvania. Sponsored by the Philadelphia Unit of the Herb Society of America. Information: Mrs. Edward S. Madara Jr., (215) 664-2738.

♦ **May 9-11. Green Festival.** Landis Valley Museum, Lancaster, Pennsylvania. Information: Landis Valley Museum, 2451 Kissel Hill Road, Lancaster, PA 17601, (717) 569-0401.

♦ **May 12. Scott Associates Annual Garden Day.** Swarthmore, Pennsylvania. Tour of six gardens in the Swarthmore-Media area. Information: (215) 328-8025.

♦ **May 18. The 30th Annual May Gardener's Market.** Greenwich Garden Center, Bible Street, Cos Cob, Connecticut. Information: (203) 869-9242.

♦ **May 19. Garden Show and Sale.** Corning Glass Center, Corning, New York. Sponsored by the Corning Philharmonic Society. Information: Corning Glass Center, Corning, NY 14831, (607) 974-8271.

♦ **June 1-2. Open Gardens Days.** Park-McCullough House, North Pennington, Vermont. Information: (802) 442-5441.

♦ **June 8. The 17th Annual Plant Sale.** Garden in the Woods, Hemenway Road, Framingham, Massachusetts. Sponsored by the New England Wild Flower Society. Information: (508) 877-6574, (508) 877-7630, or (617) 237-4924.

♦ **June 13. Horticultural Lecture and Luncheon.** Lecture by Pamela Schwerdt, former head gardener at Sissinghurst. Wave Hill Grounds, Bronx, New York. Information: (212) 549-3200.

♦ **June 15-16. Secret Garden Tour and English Garden Tea.** Newport, Rhode Island. Information: Benefactors of the Arts, 33 Washington Street, Newport, RI 02840, (401) 847-0514.

♦ **June 21-22. Historic Salem 1991 House and Garden Tour.** Salem, Massachusetts. Information: (508) 745-0799.

♦ **June 22. Garden Tour, Strawberry Festival, Plant Sale.** Orleans, Massachusetts. Sponsored by the Orleans Improvement Association. Information: (508) 255-1856 or (508) 255-9585.



This aerial view of the roof garden of the Safra Bank in São Paulo, Brazil, designed by landscape architect Roberto Burle Marx, is part of the "Roberto Burle Marx: The Unnatural Art of the Garden" exhibit on display at the Museum of Modern Art in New York City from May 23 to August 13. Marx has designed and built gardens and parks in South America since the 1940s. His designs range from bold geometrics to patterns inspired by exotic native plants. The exhibit includes drawings, models, and photographs. For more information contact the Museum of Modern Art, 11 West 53 Street, New York, NY 10019-5498, (212) 708-9400.

♦ **June 28-September 15. Photo Exhibit: The Gardens of Fletcher Steele.** Berkshire Museum, Pittsfield, Massachusetts. Organized by the American Horticultural Society. Co-sponsored by the Berkshire Museum and the Trustees of Reservations. Information: Berkshire Museum, 39 South Street, Pittsfield, MA 01201, (413) 443-7171.

Northwest

♦ **May 11-12. Early Iris Show.** Crossroads Shopping Center, Bellevue, Washington. Sponsored by the King County Iris Society. Information: Pam Gallagher, (206) 822-3875.

♦ **Through May 31. Spring Visitor Blooming Season.** The Rhododendron Species Foundation, Weyerhaeuser Corporate Headquarters, Federal Way, Washington. Information: The Rhododendron Species Foundation, P.O. Box 3798, Federal Way, WA 98063, (206) 661-9377.

♦ **June 1-2. Peak Season Iris Show.** Seattle, Washington. Sponsored by the King County Iris Society. Information: Pam Gallagher (206) 822-3875.

♦ **June 18. Seminar: Restoring, Enhancing, and Creating Wetlands.** Center for Urban Horticulture, University of Washington, Seattle, Washington. Information: (206) 685-8033.

Southeast

♦ **May 4-7. The 12th Menninger Sunbelt Tree Conference.** West Palm Beach, Florida. Information: Menninger Sunbelt Tree Conference, P.O. Box 6524, Clearwater, FL 34618.

♦ **May 5-8. Symposium: The Biology and Conservation of Epiphytes.** Marie Selby Botanical Gardens, Sarasota, Florida. Information: (813) 366-5730.

Texas Wildflower Hotline

The National Wildflower Research Center in Austin, Texas, will operate a wildflower hotline until May 31. To hear a recorded message on the best locations to view roadside wildflowers throughout Texas call (512) 370-0000, then dial four-digit code 9595. Callers must have a touch-tone phone. The message will be updated weekly.

♦ **May 11-12. Gardens for Connoisseurs Tour.** Atlanta, Georgia. Proceeds benefit the Atlanta Botanical Garden. Information: (404) 876-5859.

♦ **May 12. The 45th Annual Memphis Rose Show.** Oak Court Mall, East Memphis, Tennessee. Sponsored by the Memphis Rose Society. Information: Jim Browne, (901) 685-1566.

Southwest

♦ **May 18. Garden Tour.** Albuquerque, New Mexico. Sponsored by the Council of Albuquerque Garden Clubs. Information: Charlotte, (505) 296-6020.

♦ **May 25-26. Orchid Enchantment: Spring Show and Sale.** Albuquerque Garden Center, Albuquerque, New Mexico. Sponsored by the New Mexico Orchid Society and Escalante Orchid Society. Information: Diann O'Neill, (505) 292-1563.

West Coast

♦ **May 4-5. The 13th Annual Rose Show.** Fountain Square, 7115 Greenback Lane, Citrus Heights, California. Information: (916) 969-6666.

♦ **May 11-12. Geranium Festival.** Descanso Gardens, 1418 Descanso Drive, LaCanada-Flintridge, California. Information: (213) 681-2201 or (213) 829-0818.

♦ **May 18. High Desert Xeriscape '91.** Kerr-McGee Center, 100 West California Avenue, Ridgecrest, California. Information: (619) 939-2864.

♦ **May 18-19. Rhododendrons and Science.** Open House at the U.S. Geological Survey, 345 Middlefield Road, Menlo Park, California. Information: (415) 329-4000.

♦ **May 18-19. Rose Show.** Descanso Gardens, La Canada Flintridge, California. Sponsored by the Los Angeles Rose Society. Information: (818) 952-4400.

♦ **May 19. The 17th Annual Benefit Plant Sale.** Huntington Botanical Gardens, San Marino, California. Information: (818) 405-2282.

♦ **May 25-27. Bonsai Show.** Los Angeles State and County Arboretum, Arcadia, California. Sponsored by the Santa Anita Bonsai Society. Information: (818) 821-3222.

♦ **May 26. Backyard Pest Management Strategy.** South Coast Botanic Garden. Demonstration of a computer program to assist gardeners



These koala bears are just two of the many life-size topiary creatures visiting the San Diego Zoo in May for the San Diego Topiary Conference co-sponsored by the zoo and the American Ivy Society. The conference will be held May 23 through 27 and includes lectures and workshops on the art of topiary and a visit to the "Animals in the Garden" exhibit. For more information write: Animals in the Garden, Zoological Society of San Diego, P.O. Box 551, San Diego, CA 92112-0551 or call (619) 459-1235.

in insect identification. Information: (213) 544-6815.

♦ **June 6. Daylilies for Summer Days.** Huntington Botanical Gardens, San Marino, California. Lecture by James Folsom, director of the gardens. Information: (818) 405-2282.

♦ **June 11. Symposium on Urban Ecology.** Rancho Santa Ana Botanic Garden, Claremont, California. Information: Walter H. Lewis, President, Society for Economic Botany, Department of Biology, Washington University, Saint Louis, MO 63130, (314) 889-6841.

♦ **June 29-30. Symposium on Contemporary Designs for California Gardens.** Santa Barbara Botanic Garden, Santa Barbara, California. Information: Garden Registrar, (805) 563-2521.

International

♦ **May 23-24. Chelsea Flower Show.** London, England. Information: (800) 669-7469.

♦ **June 7-9. The 88th Annual Meeting and 86th National Exhibition.** Royal Botanical Gardens, Hamilton, Ontario. Information: Royal Botanical Gardens, P.O. Box 399, Hamilton, ON L8N 3H5, (416) 527-1158.

RON GARRISON © 1990 ZOOLOGICAL SOCIETY OF SAN DIEGO

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'Brigadoon'.



'Pride 'n' Joy'.



'All That Jazz'.

AARS '92 Winners: A Rose is a Tea, is a Mini, is a Shrub

Roses of three very different shapes have won the All-America Rose Selections Award for 1992. They include a hybrid tea, a miniature, and a shrub rose.

The hybrid tea, 'Brigadoon', will grow as tall as six feet and has large coral pink flowers that fade to a softer color at the base. The back of the petal is cream colored, and the foliage is deep green. Each lightly fragrant bloom bears 25 to 30 petals. It was introduced by Jackson & Perkins Company of Medford, Oregon, and was bred by their hybridizer William A. Warriner. Warriner has had many AARS winners, his most recent being the grandiflora 'Shining Hour' in 1991.

Also from Jackson & Perkins and Warriner is 'Pride 'n' Joy', a miniature that can nevertheless reach three feet tall on maturity. Its blooms are described as fiery orange with yellow reverse and the foliage as matte green. The form is round and compact and the flowers are about an inch and a half across with 20 to 25 petals.

The shrub rose, 'All That Jazz', has a "moderate damask" fragrance and dark, glossy foliage. Its flowers are coral and salmon, five to six inches across with 12 to 13 petals. It was introduced by DeVor Nurseries, Inc., of Watsonville, California, and bred by Jerry Twomey of Leucadia, California,

who won the AARS award last year with 'Sheer Elegance'.

AARS award winners are chosen from newly developed roses planted in test gardens throughout the nation and judged for two years on vigor, growth habit, disease resistance, foliage, flower production, bud and flower form, opening and finishing color, fragrance, stem, and overall value. The number of winners varies from year to year, depending on judges' perception of the quality of the entrants.

'Brigadoon', 'Pride 'n' Joy', and 'All That Jazz' should be widely available from garden centers and catalogs by the spring of 1992.



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