American Horticulturist

A Publication of the American Horticultural Society
$1.50

Volume 70, Number 7 • July 1991
News Edition

JEAN JENKINS

In This Issue

Chemical Conundrum

Almost half of the home gardeners responding to a recent survey claimed they never use chemical pesticides. But anecdotal evidence indicates that most of us are struggling to develop our own Integrated Pest Management approach. At a meeting this spring of garden columnists and gardening show hosts from throughout the nation, most said their readers and listeners were using chemicals less, but not giving them up.

Carl Frankel of *Green Market Alert,* a newsletter that analyzes the impact on business of "green consumerism"—choosing products based on environmental concerns—estimates that only 10 to 15 percent of the population is composed of "visionary greens" who would never deign to use chemicals, and a quarter to a half of the adult population consists of "browns" who "don't give a hoot about the environment." That leaves anywhere from a third to two-thirds in the category he calls "mainstream greens."

Those in this category may spray their aphids with a "natural" mix of vegetable oil and soap, and pray for the ladybugs and lacewings to come along and deliver the final blow. But when a fungus strikes a favorite old rhododendron, they bring on the big guns and throw caution—and chemicals—to the wind.

How guilty should this make them feel? It's hard to get an unbiased answer. The industry speaks reassuringly of its testing; the environmentalists remind us that the industry is doing the testing and laws relating to those tests are full of loopholes. The industry counters that the threat of lawsuits keeps them honest . . . and so it goes. We can say that thorough testing of these chemicals and their impact on humans and other inhabitants of the planet is in its infancy, and great concern and caution would seem to be the order of the day.

In this issue, we'll tell you how the industry is responding to these concerns, summarize some new research on the relationship between food costs and pesticide use, and offer some alternative ways of dealing with insect pests.

AMERICAN HORTICULTURIST

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

Pest Blasts From the Past

Before the advent of synthetic pesticides in the 20th century, gardeners had to rely on their own wits and materials close at hand to battle insect pests. Although we might imagine our forebears hopelessly swatting locust swarms with brooms, it seems as if they had an easier time of it than we do.

Peter Henderson opened the chapter on insects in his popular *Gardening for Profit* (1902) with reassuring words: "We have but little trouble with insects in our highly cultivated grounds." It must have been true, for the practical gardening books before the 20th century devote little space to insect pests (and almost nothing beyond greenhouse, orchard, and cabbage pests). They undoubtedly had fewer pests to contend with, since most of our troublesome ones are relatively recent foreign introductions. But, as the following selections make clear, gardeners past also used their imaginations more.

Some of their solutions were remarkably simple:

"Best remedy for ants among pots, greenhouses or vicinity, is very hot boiling water." (*The Horticulturist,* May, 1874)

"Take fine dry dust from a common road, sift it through a fine riddle so as to remove all stones and lumps, and apply freely with the hand when the dew is on the plant. It was with me a perfect success last year. No bug was ever seen upon squash, melon, cucumber, or pumpkin." (*The Horticulturist,* February, 1873)

Soap suds, tobacco (water or smoke), and hellebore were used on many pests; whiskey was recommended for mealybugs, salt for cabbage lice, and common black pepper as a cure for green cabbageworms:

"About a quarter of a pound of pepper is used on a hundred heads of Cabbage, and is sifted on from a dredging box in the morning, when the dew is on. A thrifty German mechanic informs us that he mixes pepper and coal-ashes together and sprinkles on the mixture with perfect success in the destruction of the worms." (*Vick's Monthly Magazine,* September, 1879)

Gardeners must have been made of hardier stock then, for some of the cures seem worse than the diseases. The *Shaker Gardener's Manual* (1843) advocated pouring on fermented urine to prevent rootworms and cabbage lice. A Mr. Ducharte described to the French Horticultural Society in 1880 his method of destroying May beetle grubs "by digging holes and filling them with rank manure. The larvae speedily find out these congenial homes and are easily destroyed." *Vick's Monthly Magazine* recommended a none-so-appealing procedure for destroying ants: "Place meat, bones, or pieces of sponge with sugar in them in the way of the ants, and occasionally pick them up and drop them into hot water."

Other solutions were much more time consuming than our accustomed quick fixes, such as the following control for May beetles: "The best course is to shake all the trees in the morning and catch the insects and kill them with boiling water. It is a great deal of work, and must be engaged in by the whole community, and must be kept up year after year, until rid of the pests." One lady, as reported in *The Horticulturist* in August, 1874, destroyed rose slugs (a type of sawfly that skeletonizes leaves) by spending every morning picking them off her bushes and burning them. "She spent all the mornings in attending to them, and had that season burned bushels of leaves that were covered . . . by the growing slugs."

Many remedies seem downright suspect, like the widespread early 19th-century practice of pounding nails into fruit trees to prevent borers, or this control for orchard insects from *Vick's Monthly Magazine* in February, 1882:

"First, whitewashing the bodies and limbs of the trees as high as practicable, and, second, the latter part of spring and before insects become very active, plow furrows each way between the rows of trees, so as to leave a square piece of smooth ground under each tree; then scatter some straw lightly under the trees, keeping it away three or four feet from the stems, and many insects will harbor in it. After ten or twelve days that the straw has been thus spread under the trees, set fire to the straw, burning straw and insects together. Follow up the practice for two or three years and few insects will remain."

And some failed miserably. The correspondent for the *Ohio Farmer* tried salt and lime water to control insects on potted carnations and roses: "The salt injured the plants, and the lime-water improved the size and number of the worms."

To control curculio on his plum trees, poor H. Gregg of Downey, Iowa, "took strips of cotton cloth and wrapped around the trunk of the trees some 18 or 20 inches from the ground, and then saturated the cloth with kerosene, and repeated this application once in ten or fifteen days during the curculio season." He saved his crop of plums, but at the expense of the lives of the trees.

—Thomas M. Barrett

Pesticides From Powerful Plants

Anyone who has brushed up against poison ivy or stinging nettle knows that plants are not always friendly. Many plants have evolved protective poisons to ward off animals, and gardeners can harness some of these for their pest control arsenal.

The great advantage of botanical pesticides is that they break down into harmless substances more rapidly than synthetic pesticides. But this short life span makes them harder to use effectively since they must be applied precisely when and where susceptible insects are located.

Users should exercise caution with botanicals—just because they are "natural" does not mean they are harmless. Some are extremely toxic. Most botanical pesticides are nonselective and will kill beneficial insects, including honeybees. Spraying at dusk, when bees are least active, will help to minimize the loss. Also make sure to take the same precautions you would take with other pesticides—wash exposed skin after handling, avoid breathing the pesticide, and prevent contact with eyes and cuts.

Some of the more popular botanical pesticides are the following:

✦**Rotenone** is derived from the roots of several plants, including *Derris* spp., *Lonchocarpus* spp., and *Tephrosia* spp. (the latter two have also been used as fish poisons in South America and tropical Africa). It kills many types of pests, including squash bugs, cucumber beetles, Japanese beetles, mites, and thrips, but, since it is unstable in sunlight, air, and water, will remain effective for only three to seven days. It can be applied as a dust or in a water solution. It is very toxic to birds, fish, and pigs, and will kill beneficial insects. Rotenone is a stomach poison and a slow acting nerve poison that inhibits respiratory metabolism in cells.

✦**Sabadilla** dust is made from the seeds of *Schoenocaulon officinale,* a lily native to Central and South America. A contact poison, sabadilla controls a wide range of pests including harlequin bugs, squash bugs, webworms, cabbage loopers, and leafhoppers. It should be applied weekly until the target pests are under control. As it breaks down rapidly when exposed to sunlight, it is safer than rotenone and has little toxic effect on mammals. But sabadilla is toxic to bees and it can be an eye and mucous membrane irritant, so a mask should be worn when applying it.

✦**Ryania** is derived from the roots and stems of the ryania shrub (*Ryania speciosa*), a native of South America. It is effective against the European corn borer, coddling moths, thrips, leaf rollers, and corn earworms. Ryania works as a stomach and contact poison that kills by paralysis; it is slow acting and may take up to 24 hours to kill the pest. It is also more selective than many other botanical pesticides. It will not harm as many beneficial insects and is considered harmless to warm-blooded animals including humans.

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✦**Quassia** is perhaps the safest of the botanical pesticides. Sold in the form of wood chips, shavings, or bark of the quassia tree (*Quassia amara*, a tropical that can be grown in the warmest parts of the United States) quassia is effective against aphids, caterpillars, and most soft-bodied insects. It does not harm bees, ladybugs, or other beneficial insects. To be used as a spray, the material needs to be soaked in water for two to three days, then simmered over low heat for a couple of hours, strained, and mixed with soft soap. According to the Biological Urban Gardening Services (BUGS, a nonprofit organization working to reduce chemicals from urban landscapes) the tree-of-heaven (*Ailanthus altissima*), a close relative of the quassia tree, appears to have similar properties.

✦**Neem**, although used for centuries in southeast Asia, is a relatively new botanical pesticide to this country and is still not widely available. Made from the leaves and seeds of the East Indian neem tree (*Azadirachta indica*), neem extract is effective in controlling more than 80 insects, including leafminers, Colorado potato beetles, and Japanese beetles. According to BUGS, "Neem extract is systemic, acting from within the plant. When added to the soil neem compounds enter plant roots and are transported to the leaves making them toxic to insects." The pests either pass by the treated plants, or eat some of the leaves and then fail to develop properly and die before reaching adulthood so that they don't reproduce.

✦**Pyrethrin**, made from *Chrysanthemum cinerariaefolium* or *C. coccineum*, is probably the most widely used botanical pesticide. For information on this contact poison, see "Gardeners' Q&A" in the May 1991 *American Horticulturist* News Edition.

There are a bevy of other botanical concoctions reputed to control insects. You may experiment with them yourself. **Pepper** sprays have been used against ants, mites, and various caterpillars. **Wormwood** spray is recommended for controlling soft-bodied pests such as slugs and aphids, and **garlic** oil spray mixed with liquid soap has been used against a variety of insects. (For more homemade remedies, see "Companion Plants" on page 16.)

Suds Sanction

The law says you must follow label directions in using an insecticide. Liquid soap kills insects, but its label doesn't say a thing about killing bugs. So the Environmental Protection Agency was recently asked whether it can be used legally to kill the Africanized bees migrating into Texas from Mexico.

Fortunately, it appears that the EPA will not yet begin regulating the use of this home remedy, nor will an emergency exemption have to be issued. But the agency warned that the soap and water mix can't be sold as a pesticide and, because it hasn't been approved for such use, it cannot be applied on edible plants.

Healthier Food Without Higher Prices?

Conventional wisdom holds that if national legislation forced a drastic cut in agricultural pesticide use, food prices would skyrocket. But according to a recent study by Cornell University, food prices would rise less than 1 percent if alternative pest control practices replaced half of the chemical pesticides now used in United States agriculture. The study, summarized in a chapter, "Environmental and Economic Impacts of Reducing U.S. Agricultural Pesticide Use" in the recently published second edition of the *Handbook on Pest Management in Agriculture,* is based on a compilation of previously published research. Although not widely available, the study is beginning to generate some controversy because of the conclusions reached and the methodology used.

It concludes that substituting nonchemical alternatives for some pesticides used on 40 major crops would cost farmers an estimated $1 billion a year, this increasing total pest control costs some 25 percent and total food production costs only 0.6 percent. But these actions would save the economy more than $2 billion in health costs and environmental losses, it says.

"Some of these alternatives would be more costly, in part because they are more labor-intensive or because some crops in crop rotation"—one step the study recommends—"are less valuable, on a per-acre basis, to the farmer," says David Pimentel, the Cornell professor of entomology and agricultural sciences who led the study. "In other cases, reducing pesticide application and substituting alternative methods would cost no more or would actually save money and increase some yields."

DAVID LYNCH-BENJAMIN/CORNELL

David Pimentel of Cornell.

Among suggested alternatives to large-scale pesticide use:

✦Crop rotation, which discourages buildup of insects, weeds, and diseases.

✦Mowing weeds and using denser planting patterns to crowd out weeds.

✦Use of viruses, bacteria, fungi, and beneficial insects to control pests.

✦Insect vacuums and traps that lure insects with synthetic sex attractants.

✦Photodegradable plastic or mechanical cultivation to prevent growth of weeds between crop rows.

✦Genetically altered plant varieties with improved pest resistances and short-season crops that mature before pests do.

It also recommended procedures for more efficient pesticide use, such as substituting ground-application equipment for aerial spraying, the use of recirculating sprayers that catch pesticides that miss their target, "rope-wick" applicators that apply herbicides directly to targeted weeds, and scheduling pesticide application as necessary rather than on a routine calendar basis.

Farmers spend about $4.1 billion annually to apply one billion pounds of pesticides—69 percent in herbicides, 19 percent in insecticides, and 12 percent in fungicides. The study notes that the increased use of pesticides in the last half of the twentieth century has not resulted in a reduction in pests. Since 1945, the use of chemical pesticides in the United States has increased 33-fold in pounds; the toxicity to pests of some pesticides has increased at least 10-fold. However, today an estimated 37 percent of all crops are lost to pests versus a 31 percent crop loss in 1942; losses to insects nearly doubled, from 7.1 to 13 percent. The continued high level of crop losses is attributed to a number of factors, including the destruction of natural enemies of certain pests, an increase in pest resistance to pesticides, and changed agricultural practices that encourage pest damage, such as the use of less resistant varieties, the reduction in crop rotation, and a reduced crop diversity.

At the same time, the report says, annual environmental and social costs of pesticide use are $2.2 billion:

✦An estimated 20,000 humans per year are afflicted with pesticide-induced cancer. Another 3,000 persons develop pesticide poisoning symptoms serious enough to need hospital treatment.

✦Honey losses and reduced crop pollination from bees poisoned by pesticides cost the economy an estimated $150 million.

'Farmers Willing' to Cut Pesticides

According to a study published in May by the Natural Resources Defense Council (NRDC), alternative farming techniques, including crop rotation, intercropping, and the use of Integrated Pest Management, could reduce pesticide application by 25 to 80 percent on nine crops grown in California and Iowa. The NRDC report differs from the one issued by Cornell (see accompanying story) in focusing on fewer crops—chosen to represent the diversity of American agriculture—in two specific states and in incorporating the experiences of individual farmers. "The environmental community has long-maintained that significant reductions in pesticide use are possible," says Jennifer Curtis, NRDC research specialist and primary author of *Harvest of Hope.* "Our study quantifies these pesticide reductions and verifies they can be achieved without threatening productivity or profitability."

Despite the potential of alternative agriculture, the NRDC study cites several barriers that hinder farmers' ability to adopt less chemical-intensive practices. For example, the rules by which many farmers receive federal farm subsidies for major commodities such as feed grains, wheat, cotton, and rice penalize crop rotation. Also, federal and state marketing policies and grade standards place a premium on produce cosmetic qualities that are difficult to attain cost-effectively without high chemical use. The report also charges that the federal government has failed to adequately support research on alternative farming systems or to disseminate research results that are available. "Farmers are quite willing to embrace environmentally sound farming systems," says Tom Kuhnle, NRDC resource economist and co-author of the study, "but in many cases, policy barriers stand in their way."

To obtain a copy of* Harvest of Hope, *send $19.95 to NRDC Publications, Natural Resources Defense Council, 40 West 20th Street, New York, NY 10011.

✦Pesticides drifting into adjacent lands may destroy at least $75 million worth of crops and forest resources.

✦The reduction of beneficial natural enemies of plant pests and the build-up of increased pesticide resistance due to chemical pesticides is estimated to cost $300 million a year.

Susan Cooper, staff ecologist for the National Coalition Against the Misuse of Pesticides, claims the study did not go far enough, citing programs in Sweden and Indonesia where massive reductions in pesticides have been achieved. Leonard Gianessi, a fellow with Resources for the Future—a private, nonprofit natural resources research organization—calls it "a terribly misleading study and scientifically flawed" because the authors misrepresented the original research upon which their study is based. Says Pimentel, "Some felt we were too conservative and others felt we could not go as far as 50 percent [reduction in use]." The next step, he says, is to look at the costs and benefits of pesticide reduction on a regional basis.

To receive an abstract of the study, write to Cornell University, News Service, Village Green, 840 Hanshaw Road, Ithaca, NY 14850-1548.

Killer Carrots and Lethal Limas

Among the many reasons to consider cutting down our use of gardening chemicals, the most persuasive is probably that their use on our food is said to increase the risk of cancer, genetic damage, or birth defects.

On this score, say a number of scientists, the average American consumer could use a little perspective. Plants—tasty, healthful ones such as carrots, potatoes, tomatoes, and broccoli—contain their own natural protective substances. And of those tested so far, about half seem to be carcinogenic to rats and mice.

Of course, foods contain only small amounts of these substances and chemical pesticides are highly potent, right? Not according to Dr. Bruce Ames of the University of California-Berkeley, a cancer researcher who developed the Ames test for mutagens—substances that can cause inheritable genetic changes. Ames and his colleagues developed a scale that looks both at how toxic a substance is in rodents and the degree to which humans are exposed to it. The number assigned to each substance is what he calls the human exposure to rodent potency ratio, or HERP. The higher the HERP number, the greater the risk. Ames gives PCBs a 0.0002 and DDT a 0.0003. The aflatoxin in 32 grams of peanut butter on one sandwich give it a 0.03. One gram of dried basil and one raw mushroom each rate a 0.1, and 12 ounces of beer are given a 2.8.

Other foods are toxic in other ways. Broccoli contains a substance that can cause thyroid enlargement in humans. Potatoes contain arsenic and oxalic acid, a toxin that can form kidney stones. Lima beans, sweet potatoes, and apples contain cyanogenetic glycosides, a substance that when chewed or ingested can release cyanide. Tomatoes and potatoes contain substances that can interfere with nerve transmission.

Other carcinogens are formed during the cooking of food. When meat is charbroiled, smoked, or fried, mutagens are produced both by smoke deposited on the meat, and from the breakdown of the meat itself. Roasted coffee beans, bread crusts, toast, and fried potatoes also contain mutagens. Fermented foods—yogurt, soy sauce, wine—contain ethyl carbamate, a carcinogen in laboratory animals.

The good news is that for a toxic dose of these substances, we would need to ingest almost 100 cups of coffee, 100 pounds of potatoes, or 10 pounds of spinach at a sitting. The small amount of harmful chemicals we do take in are usually metabolized or excreted. In addition, the normal diet contains what appear to be anticarcinogens. Vitamins A, C, and E, and some other substances seem to offset the effect of carcinogens and mutagens in our diet.

How do we evaluate Ames's information in light of information from other authorities indicating that pesticides are highly toxic? A 1987 National Academy of Sciences (NAS) study, for instance, estimated that pesticides may cause 20,000 new cancers each year.

A spokesman for the National Cancer Institute said that Ames is well respected and his data is in line with their own. "The problem," she said, "is that there is just no human data. We have to extrapolate from animals." Ames is in a camp holding that tumors in animals are caused mainly by the huge doses used in studies; others believe that rodents are a good model for risk in humans, and that these megadoses are the only way to find the one-in-a-million risk that regulators watch for.

Surveys indicate that human beings are psychologically predisposed to being fearful of pesticides. Robert A. Logan, director of the Science Journalism Center at the University of Missouri-Columbia School of Journalism, says humans tend to underestimate familiar risks—motor vehicle accidents, for instance—and overestimate unfamiliar risks, and that they prefer risks over which they have control, to which they expose themselves voluntarily, and which are natural in origin.

Logan says members of the news media have been too uncritical of studies purporting to show pesticide risk. They fail to ask, for instance, if the findings have appeared in a refereed journal and to have independent experts who can offer a second opinion.

The American Society for Horticultural Science told Congress in testifying this year on the need for more funding for horticultural research: "There are no immediate or easy answers to the difficult and emotional questions raised by consumers."

Many chemicals remain untested for some or any of these dangers to humans, or for their interactions with other chemicals. And even if ingesting these chemicals posed no risk to humans, their careless application can cause subtle damage to the environment, killing bees, birds, running off in groundwater to kill fish, and killing beneficial organisms that might eliminate our having to use any pesticides at all.

The Industry: More Unity, More Diversity

The pesticide industry has seen the writing on the wall, and it doesn't say "DDT."

Those who manufacture, mix, sell, and get paid to apply garden chemicals are banding together to tell their side of the story to the public, and diversifying their product line to give gardeners the nature-based products that many of them are demanding.

Giants of the $1.3 billion industry—they usually refer to themselves as agricultural chemical manufacturers—are reluctant to give out hard figures on how much environmentalism is hurting them at the cash register. But even if sales remained level, the criticism has cost dearly in terms of increased regulation and liability concerns.

"We are constantly bombarded by federal, state, and local issues, regulations, legislation, and misinformation," says Bill Liles, director of Ciba-Geigy's turf and ornamental department. "This constant attack on our industry has cost us all valuable resources." Liles's statement was made last fall in announcing the formation of an umbrella organization, Responsible Industry for a Sound Environment (RISE), an autonomous committee of the National Agricultural Chemical Association.

RISE represents one end of the industry response spectrum. Executive Director Allen James explains that it was developed to support what the industry is doing now, and reassure federal and state policymakers and consumers that pesticide manufacturers can go about their jobs in a responsible manner without further regulation.

Last spring, three pesticide companies —DowElanco, Ortho, and Monsanto—joined forces to tell their story to about 40 members of the gardening media in San Francisco. DowElanco hosted a similar workshop in its home base of Indianapolis, Indiana.

Those at the Indianapolis meeting were given an exhaustive explanation of the thoroughness of the chemical testing process, which is said to take seven to 10 years and cost $30 to $50 million for each new product. Scientists compared the toxicity of their products to more familiar chemicals. Nicotine is two to five times more toxic taken orally than one of the DowElanco insecticides, according to Susan McCollister, Dow's group leader of Health and Environmental Sciences. Although you wouldn't want to get it in your eyes, it's no more dangerous in that regard than laundry soap or window washing liquid, she said. Others added that modern pesticides are designed to bind

Read the Label—If You Can

If there's any piece of advice that those on both sides of the pesticide issue agree on, it's this: READ THE LABEL. Don't just sneak a peek. Read all of the label, and follow its directions and warnings religiously. It's illegal *not* to follow label directions.

The pesticide industry claims that the greatest danger to gardeners, pets, and the environment is caused by misuse of these chemicals—not unlike alcoholic beverages or prescription drugs.

But at workshops this spring, industry hosts and garden writer guests agreed that even college graduates and those with 20-20 vision find reading the labels arduous. Once you read "Chlorpyrifos is a cholinesterase inhibitor. Atropine is antidotal," do you really want to keep going? And no one would guess by looking at the labels that many gardeners are middle aged and older. The print on many of the labels is in six-point type; what you're reading now is nine-point. Some is even smaller.

Federal regulators decree what information must be on a product label. One suggestion was that more simply worded instructions and warnings could be printed in bigger type on a separate flyer to be sold with potentially hazardous products. But they could be lost or overlooked, and who wants to add to the mountain of paper we're all trying so hard to recycle?

In lieu of a more permanent solution, manufacturers are trying education.

Monsanto, makers of a popular grass and weed killer, have issued a press release on how to read a garden product label. Their product label warns, for instance, against mixing the product in a galvanized steel container, which could result in forming an explosive hydrogen gas mixture. It also warns that it is nonselective, and could kill vegetation that you value if you use it on a windy day.

A similar press release was issued by DowElanco, an organization formed by the 1989 merger of Eli Lilly's and Dow Chemical's plant science businesses and Dow's industrial pest control business. It advises:

- ✦ Follow label directions for mixing the pesticide, and do so carefully in a well-ventilated area.
- ✦ Use only the recommended amount. Don't assume that if a little is good, a lot is much better.
- ✦ If the label calls for safety equipment, use it.
- ✦ Don't apply pesticides on a windy day.
- ✦ Don't smoke, eat, or drink while mixing or using pesticides. Ingesting a substance is more dangerous than inhaling it.
- ✦ Wash your hands after using a pesticide.
- ✦ Store products in their original containers and out of reach of children or pets.
- ✦ Properly dispose of the leftovers and their containers. This is the hardest part. While communities may have collection points to which homeowners can bring regulated chemicals, they haven't yet reached the point at which they offer curbside pickup, as many now do with recyclable materials. The release suggests that local public works, sanitation, or recycling departments are the most likely places to get information on disposal options.

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Monsanto adds that you should use garden chemicals only in containers intended for them. (Horrors! Do gardeners really put their chemicals in soft drink bottles?)

But first on DowElanco's list of tips to consumers was this:

- ✦ Know what the pest problem is before you treat it. Identify the pest and its biology. Find out when it's best to treat it and if you need to treat it at all. Pesticides, whether natural or synthetic, are not the only way to treat certain pests. Monsanto suggests: "Don't expect a 'perfect' lawn or garden."

We can all learn to live with dandelions or a bug-chewed leaf or two.

Changing Times

How far have pesticides fallen from favor?

✦ In a nationwide survey last summer, members of the American Association of Nurserymen said that development of safer pesticides and more effective Integrated Pest Management were the top research needs of their industry.

✦ In an ongoing consumer survey being conducted by the United Fresh Fruit and Vegetable Association and *Produce Business Magazine,* 60 percent of respondents are saying that they are concerned about pesticides.

✦ The Agricultural Research Service has changed the name of a road at its Beltsville, Maryland, headquarters from Pesticide Road to Biocontrol Road.

to the soil so they won't contaminate groundwater, and to break down quickly on exposure to sunlight, others added.

Media representatives at the San Francisco meeting told their hosts they wanted more than the company line: they wanted to hear about what the companies are doing to help the environment, educate consumers, and revamp products.

Dow listed efforts it is making to reduce waste, recycle or reuse manufacturing byproducts, or find markets for recycled products. It's also involved in a four-year partnership with Ducks Unlimited, the Nature Conservancy, and the National Fish and Wildlife Foundation to restore more than 60,000 acres of wetlands.

Both Dow and Monsanto have established toll-free numbers where consumers can get information and express their concerns (see box). Ortho has a toll-free number, but prefers that it be used in emergencies only. Ortho Consumer Affairs Manager Brodrick Hill said they have developed and printed four million copies of a 14-page brochure, "Straight Talk," that's available wherever their products are sold.

But increasingly, rather than trying to convince gardeners that the old products are safe, companies are emphasizing current products that can be viewed as more "natural," or are developing new ones altogether.

Ortho has combined that approach in what is called its Orthoganics line of two fertilizers and three pesticides. Two of the products—blood meal and rotenone pesticide—were already in its product line. But in a marketing effort launched last September, it relabeled those products and added bone meal, insecticidal soap, and a botanically based rose and flower spray.

Micro Flo, a Lakeland, Florida, company that formulates and markets more than 100 generic-label pesticides, is phasing out many of its conventional products and putting its resources into others it sees as less environmentally hazardous. This includes five pheromones—sexual attractants that lure insects into a trap—a growth regulator called PGR IV, and an insecticide that is effective in minuscule amounts when mixed with an attractant and feeding stimulant.

Current products are being evaluated, and in many cases eliminated, rather than going through the long and costly process needed to reregister them with the Environmental Protection Agency, said Ardis Barnes, Micro Flo's director of market development. "It's an economic decision," he said. It's not easy or cheap to register these more biologically oriented products, but the demand is clearly there. "You're seeing a whole change in the industry," said Barnes. "The growers are concerned and the manufacturers are concerned."

Ciba-Geigy has obtained exclusive rights to market a beneficial nematode-based insecticide made by Biosys, a manufacturer of biological control products. Biosys benefits from Ciba-Geigy's marketing might, while the latter adds a "natural" product to its line-up. Liles said Ciba-Geigy now has a biotechnology center where scientists are using genetic manipulation to breed disease resistance into plants. They have recently bred a *Bt* gene into tobacco.

Those that already have biological-control products can take development a step further. Sandoz Crop Protection Corporation has received permission from the Environmental Protection Agency to field test a genetically engineered strain of *Bacillus thuringiensis* that the company claims will be two or three times more effective than *Bt* products now on the market. *Bt* is a microorganism that has been used for almost 20 years to control caterpillar-type pests.

—Kathleen Fisher

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Regional Notes

Cold Lessons in Berkeley

California's long drought may have had at least one silver lining: it may have protected some plants that otherwise would have frozen to death in an unprecedented cold snap last December.

Last winter, the San Francisco Bay area experienced night temperatures that dipped to record-breaking midteens for several nights before Christmas and again several days after. Many Bay area gardens, including the subtropical beds in the University of California Botanical Garden in Berkeley, were devastated.

The most severely hit areas of the botanical garden were its Mesoamerican and African plant sections.

But horticulturists are used to adversity, and the garden's staff is no exception. Education Coordinator Carol Baird, writing in the garden's newsletter, observed: "The U.C. Botanical Garden is, after all, a research garden, among other things; the freeze has afforded us an opportunity to learn much more about the hardiness of plants in this climatic region." Some of the Eastern North American trees, such as the *Taxodium distichum,* behaved normally for the first time in years, dropping their leaves as nature intended.

PHOTOS BY RICHARD ANDERSON

African Hill plants are expected to rebound from freeze.

The New World desert had extensive leaf damage but shows signs of renewed vigor.

While all of the *Pelargonium* species were killed and oleanders froze to the ground, many plants that are normally frost sensitive survived, and Baird believes that the five-year drought may be partly responsible.

Baird notes that plants protect themselves against freezing in three ways: they may rid themselves of sensitive tissue, as occurs when trees drop leaves; they may get rid of microscopic bits of matter, called ice nucleators, around which ice could form; or they may get rid of water in sensitive tissue. All of the botanical garden's plants were severely drought stressed, she observes.

The survivors included cacti in the New World desert display; *Magnolia dealba,* which, while it lost most of its foliage, is showing renewed vigor; *Asarina* and *Penstemon* species of the Mesoamerican beds; aloes, bamboos, and gingers; South American *Melastoma* species; and a large orange tree in the herb garden.

The African plants were clearly the hardest hit, Baird said this summer. But she is not removing any plants that might still contain living tissue. "It will be another year yet before we know for sure what survived and what didn't."

Guarding Idaho Shrubs

Members of the Idaho Army National Guard are replanting native shrubs that have been destroyed in an area southeast of Boise. The shrubs, primarily big sagebrush (*Artemisia tridentata*) and winterfat (*Ceratoides lanata*) are threatened primarily by range fires started by lightning, but also by National Guard training in the area. When the species are destroyed, exotic annuals take over. The area of approximately 135,000 acres encompasses the Snake River Birds of Prey Area, established as a refuge in 1979.

Seeds were collected in the fall of 1988 and 1989, and several thousand of the shrubs were started in a U.S. Forest Service nursery. Soldiers planted 16,000 shrubs in the spring and fall of 1990, and were to have planted several thousand more this spring.

According to *Sage Notes,* a publication of the Idaho Native Plant Society, the sites will be monitored to learn about the survival rates of the reintroduced shrubs and whether the planting has an impact on the shrubs' regrowing on their own or on other plants and small mammals.

Russian Olive: Nyet

In the May/June issue of *Wildflower,* the newsletter of the National Wildflower Research Center, Midwest Office Program Coordinator Bonnie Harper-Lore warns against planting Russian olive (*Elaeagnus angustifolia*) in the Plains or eastern Rocky Mountain states.

In addition to its attractive gray color, airy texture, and pleasing round shape, the Russian olive tolerates a wide range of soils, drought, and cold. But this hardiness is now making it a pest in pastures and river valleys in such states as Iowa, Nebraska, Colorado, and New Mexico. The spread is hastened by birds who find the Russian olive berries tasty, she says.

Florida County Adopts IPM Policy

Officials of Sarasota County, Florida, believe that theirs is the first county in the nation to adopt a policy of Integrated Pest Management (IPM). By using preventive measures and biological controls first, IPM reduces the amount of chemical pesticides that need to be used. A citizens' advisory committee with representatives from agricultural, environmental, landscape maintenance, legal, and pest control groups will oversee procedures, educate the public, and promote the use of IPM by the pest control industry and private citizens in the county.

Michael Holsinger, director of the Sarasota County Extension Service at the University of Florida's Institute of Food and Agricultural Sciences, said a few cities have an IPM policy, but this appears to be the only countywide program. He believes that increased concern about pesticide safety, the cost of developing new pesticides, and the liability associated with pesticide use make IPM "the wave of the future."

New in Atlanta

Those visiting the Atlanta Botanical Garden this summer will find several new garden areas: a demonstration garden of plants native to the coastal plain, including Cumberland rosemary, a perennial with purple flowers, and the titi, an evergreen shrub; a moon garden of white-flowering and silver-foliaged plants; a fern glade of native Southeastern ferns; and the Alston Overlook, where gazebos provide a place to sit and gaze down at a wildflower meadow and native shrubs and trees.

WADE SHERBROOK

Loss of habitat is threatening America's wild chiles.

Wild Chile Reserve Established

Native Seeds/SEARCH has set up the world's first reserve for wild chiles (chiltepins, *Capsicum annuum* var. *aviculare*) near Tumacacori, Arizona, in the Coronado National Forest. The Arizona-based nonprofit organization has constructed a fence around the five-acre site and is in the process of tagging, monitoring, and studying the chiltepins.

According to Kevin Dahl, assistant director of Native Seeds/SEARCH, the northern limit of the chiltepin is restricted to a few areas in southern Arizona, southern Texas, and New Mexico and loss of habitat is threatening these populations.

Chiltepins grow beneath "nurse" trees such as hackberries, mesquite, and palmetto, which provide protection from frost in the winter and from direct sunlight and heat in the summer. The trees also protect the plants from grazing by cattle and other animals. Such overgrazing, overharvesting of the chiles for use in cooking, and harvesting of the trees by wood cutters are all threatening chiltepin populations.

Native Seeds/SEARCH Research Associate Dr. Donald Norman, an ecologist from the University of Pennsylvania, plans to conduct a variety of environmental interaction studies in the chiltepin reserve. Since birds play a major role in the dispersal of chiltepin seeds, he will study bird-chile interaction to determine what attracts birds to the chiles, which bird species are the most attracted, and at what stage of chile growth. Dahl says that red-plumed birds like the cardinal often eat the red fruits of the chiltepins and that the color of the pepper may affect the color of the plumage.

Norman will also study why chiltepins are so hot. The chiltepin has fruits the size of a pea and is reputed to be among the hottest chiles in existence. Used for ages by Native Americans, and increasingly today in American restaurants to season cooked dishes, chiltepins are the second most expensive spice in the United States, after saffron.

The reserve is the first in the United States for the conservation of a wild relative of a food crop.

Chiltepin seeds and dried seeds for seasoning are available from Native Seeds/SEARCH, 2509 North Campbell Avenue #325, Tucson, AZ 85719.

Claremont Cultivars

The Rancho Santa Ana Botanic Garden in Claremont, California, this spring opened its California Cultivar Garden, the first project completed under a master plan of renovation. The garden is billed as the "largest collection of cultivated varieties of native California plants ever assembled," and includes perennials, shrubs, and trees.

At the opening of the new area, Thomas S. Elias, the garden director, announced that the garden had been awarded a $400,000 Academic Research Facilities Modernization grant from the National Science Foundation. It was the only botanical garden among 78 institutions receiving the award this year. The garden is a research and education institution that focuses on the flora of California.

Making a Difference

Beating the Bulldozers in Ohio

This spring the Toledo Botanical Garden's wildflower rescue project had volunteers and staff working alongside bulldozers to remove wildflowers and ferns from a construction site in the western suburbs of the city. This is the third year for the project, which started when Janice Tolson, the botanical garden's chief horticulturist, realized that an area about to be developed contained an abundance of wildflowers. "That first year we only had six staff people and two volunteers," Tolson recalls. "This year over 30 people participated."

Most of the volunteers are experienced gardeners. Beginners are shown what to look for at the site and receive basic instruction on how to remove plants. The latest rescue mission was accomplished over several weeks as workers dug up plants and replanted them at the botanical garden.

This year participants collected royal, cinnamon, and interrupted ferns along with columbines, trilliums, *Gaultheria* species, wood anemones, jack-in-the-pulpits, flax, and skunk cabbages. "Everything is pretty common in this area," Tolson says. "There were rumors that there were lady's-slippers growing in the area but we didn't find any."

The wildflowers are planted in the botanical garden's wildflower walk. The small area was started five years ago and is used in the garden's nature education program. As part of the program, elementary school students learn about local native plants and see what used to be growing where housing developments now stand.

Tolson and her staff scout development sites for wildflowers that might be rescued, then contact developers for permission to remove the plants. The developers have always agreed to the rescue mission right away. "No arm twisting was involved," Tolson says.

This year Bob Radachi, superintendent of the Stone Oak Development Corporation, contacted Tolson and asked if she was interested in the plants at a planned housing site. Radachi had worked with Tolson on a previous rescue project. "It's a real change for a developer to contact us," Tolson says. "From their point of view we could have been pains in the neck, but we were very careful to stay out of the way of the crew and machinery."

COURTESY OF THE TOLEDO BOTANICAL GARDEN

Toledo Botanical Garden volunteer Betty Zauner (left) and chief horticulturist Janice Tolson rescue wildflowers from a building site.

Radachi, an avid gardener and a horticulturist, wanted to save as many of the wildflowers as possible. "Everything went very well with no delays," Radachi says. "I look forward to working together on other projects."

For more information on the wildflower rescue write Janice Tolson, Toledo Botanical Garden, P.O. Box 7430, Toledo, OH 43615.

Pushing Poppies in California

"Any area that has been replaced with beautiful wildflowers becomes a less desirable place for littering," says R. David Herndon, a California business relations consultant and founder of California Poppies, Instead of Litter! The nonprofit group is dedicated to distributing seeds of the bright yellow-orange state flower to California residents who will plant them along local highways, trails, and paths.

Herndon organized the group two years ago hoping to eliminate roadside litter and bring the California poppy back to the state's highways. For $2 residents receive three packages of poppy seeds and planting instructions. Seeds are also available in bulk for groups interested in mass plantings. California Poppies, Instead of Litter! asks residents to broadcast the poppy seeds while hiking along roadsides and trails and to pick up aluminum cans and other litter at the same time. Herndon isn't aware of any restriction to planting seeds along the roadside. "Mother Nature has an army of birds that broadcast seeds all over the world," he says. "I don't see why anyone would object to people broadcasting a few seeds while walking on public land."

Since the program began Herndon has distributed more than 100 pounds of poppy seeds. It has been so successful in California that the group has expanded the program nationwide. For a $3 donation residents of the rest of the country can receive three packages of a mix of 12 different wildflower seeds. The mix is composed of wildflowers native to North America, including California poppies, scarlet flax, lupines, blanketflowers, gilias, and evening primroses.

California residents may receive poppy seeds by sending $2 and a self-addressed, stamped envelope to California Poppies, Instead of Litter!, P.O. Box 1718, Dept. 1991, Pleasanton, CA 94566. To receive the wildflower mix send $3 and a self-addressed, stamped envelope to the same address.

Research by and for the Amateur

The idea of starting an information exchange for home gardeners came to Ken Allan after a disappointing trip to the Rodale Research Center in Emmaus, Pennsylvania. "I went down there expecting to see all sorts of experiments on garden vegetables," remembers Allan. "I was quite disappointed to see that the amount of garden space devoted to vegetables was smaller than what I had at home.

"As I drove north from Pennsylvania, I reflected on the fact that government-funded institutions do little or no research that is directed at home vegetable gardens. Some of the research that is done on behalf of commercial growers is also of interest to the home gardener, but many areas of culture and breeding are ignored entirely by the professionals."

So in 1990 he formed the Garden Research Exchange to encourage and publish vegetable research by home gardeners. He calls it "a bulletin board for amateur experimenters."

Besides circulating useful research, there are other advantages to an informal, amateur research organization. Allan is not affected by the same type of commercial concerns as are home gardening magazines. He publishes all research, regardless of its timeliness or trendiness. Also, since the research annual carries no advertising, his contributors have total freedom to lambaste less-than-adequate products. Says Allan: "It used to be that when a gardening magazine ran an article on rototillers, I would turn to it first, expecting a consumer's report, rating the available tillers." Now, he says, "the descriptions of individual machines always read like advertising copy."

Five types of research reports were published in the Garden Research Exchange's first yearbook, *Vegetable Garden Research 1990:* variety trials (peas, bell peppers, potatoes, sweet potatoes, and tomatoes), cultural experiments, home plant breeding reports, garden observations (without controls or measurements), and reviews of research published in specialized journals. Most submissions detail cultural experiments, such as "Sweet Potato Cuttings Versus Sprouts" (plants from sprouts gave higher yields), "North-South Position and Jerusalem Artichoke Yields" (the south plants yielded twice as much), and "A Test of Root Knot Nematode Remedies From the Popular Press" (they were all ineffective). One contributor reported his success in combating young squash bugs with a homemade garlic-mineral oil insecticide.

COURTESY OF GARRETT PITTENGER

Garrett Pittenger, who gardens at Palgrave, Ontario, grew sweet potatoes under clear plastic mulch as part of a cross-Canada sweet potato trial organized by the Garden Research Exchange. Pittenger found that soil warmed by the sun's rays shining through the clear plastic enabled him to grow a bushel of medium to large tubers on eight plants; one of the tubers was 10 inches long and four inches in diameter.

Perhaps the most intriguing part of the Garden Research Exchange is Allan's attempt to stimulate an interest in amateur plant breeding. Convinced that home gardeners can make a contribution, especially with less commercial vegetables like parsnips, squash, and celeriac, Allan urges gardeners to experiment with selection and hybridization. In the 1990 yearbook there are reports on breeding for tall peas, red potatoes, orange cauliflower, seedless watermelon, and for a container-grown green stuffing pepper that will overwinter indoors for at least two years.

This sounds like complicated stuff, but Allan insists that his organization is for amateurs. He does hope he will help some gardeners become more precise. "A lot of people who garden go by feel. They trust their eyes. I have found that trusting your eyes is not a very wise thing to do."

For information on contributing to the Garden Research Exchange or for a copy of Vegetable Garden Research 1990 *(price, $12) write to Ken Allan, Garden Research Exchange, 536 MacDonnell Street, Kingston, ON K7K 4W7, Canada.*

Heirloom Veggies

AHS has added an heirloom vegetable garden to its displays at River Farm. Thanks to a donation of seeds from the Southern Exposure Seed Exchange in North Garden, Virginia, spring visitors saw rare and historic cultivars such as 'Tom Thumb' lettuce (a tiny butterhead introduced around 1855), 'Green Curled' endive (low spreading and dark green, introduced before 1855), and 'Greenpeace' kale, a Russian kale from the Greenpeace Experimental Farm in British Columbia.

Among the old cultivars growing in the summer garden are 'Yellow Pear' tomato (pear-shaped fruits up to three-fourths inches long, introduced around 1850), 'Cherry Sweet' pepper (shaped like bonbons, introduced before 1860), 'White Wonder' cucumber (a Southern heirloom with ivory white fruits), and 'Scarlet Runner' runner bean (introduced before 1750 and grown by early colonists who obtained seeds from Native Americans).

Members' Forum

Compost Workshop

The September 1990 issue of your News Edition contained information on composting that inspired the Sedgwick County Master Gardeners of Wichita, Kansas, to plan a public composting workshop last spring. More than 250 persons spent the day touring exhibits and listening to speakers.

Composting is unique in its appeal to two audiences: recyclers and gardeners. It differs from other recycling activities in that the composters themselves must process the raw material and distribute the finished product. Information on how to compost may be new to a dedicated recycler. On the other hand, generations of gardeners have produced compost in order to use the end product and may be unaware of the broader implications of this homely activity.

We chose speakers to appeal to both groups. Joe Pajor, Wichita's Department of Public Works natural resources director for solid waste management, explained the relationship of yard waste to waste management and landfill use and showed slides of a pilot community composting program he has spearheaded.

Following an explanation of the basics of composting by a Kansas State University extension horticulture agent, master gardeners explained nine composting systems constructed for this workshop. They ranged in complexity from a plastic bag with holes punched in it and mounted on a frame to an elaborate wood bin with removable slats. A local nursery owner explained bins and composting aids available commercially.

Exhibitors, who included garden shop owners and equipment suppliers, donated $400 in door prizes, and drawings were held throughout the day. Admission was free; master gardeners covered expenses by taking donations for coffee and rolls in the morning, serving a box lunch, and holding a plant sale.

The publicity was considerable. Master gardeners delivered dozens of brochures to area garden shops and nurseries. Six days before the event, the local newspaper's garden column featured the workshop, which was also plugged by a radio call-in program. Two television stations ran features on the workshop in progress.

We plan to repeat the workshop next year with some changes. We hope to appeal to a wider audience by holding it on Saturday rather than Friday and aiming more publicity at citizens concerned with reducing landfill use. A bill to prohibit yard waste in landfills died in the Kansas legislature last year but there are plans to reintroduce it at the 1992 session.

We would like to improve the speakers' visual aids and construct additional composting systems. Hands-on, three dimensional demonstrations were very popular and would be repeated.

Sedgwick County master gardeners would be very interested in hearing from others who are planning or have held such a workshop. Our community is very concerned about the environment and will need all the information available on composting. Even experienced gardeners will find they have things to learn.

Susan Hall
Wichita, Kansas

You have a lot of good ideas! Others who plan to organize composting workshops may want to ask for some of the resource materials being assembled by AHS Program Director Joe Keyser, who has been conducting composting classes at River Farm since last winter. He invites community groups planning compost workshops to contact him for the AHS workshop outline, a list of suppliers, and a number of other useful handouts.

Keyser stresses the need for composting educators to go beyond the basics to broader issues of compost ecology, addressing sometimes complex questions regarding pesticide-treated materials, local laws relating to the disposal of organic wastes, and how to provide ongoing support for beginning composters. He says gardeners should be urged to use recycled materials, such as wooden pallets and oak barrels, as compost bins, rather than focusing solely on commercial products.

Seed Program 1992

It's not too early to begin preparing for the 1992 AHS Seed Program. The Seed Program offers members a chance to share their favorite plants with others and develop their horticultural knowledge as well. Only a small percentage of our members takes advantage of the Seed Program; even fewer donate seeds. We would like to encourage more to get involved in this rewarding aspect of the Society. The variety of seeds we received last year was lower than in past years and we had almost no seed for grasses, herbs, or vegetables.

Seeds from all types of plants are acceptable. We would especially like to expand our offerings of annuals, grasses, herbs, vegetables, perennials, and wild plants. If you have any questions on when or how to collect the seeds from your plant, call the Gardeners' Information Service at (800) 777-7931 between 11 a.m. and 3 p.m. EST. Otherwise, just follow a few simple guidelines:

✦After collecting your seeds, clean them and let them dry on a paper towel or sheets of newspaper. If the seeds are sealed in an airtight bag and sent while still wet, they will mildew and become unusable. Be sure to seal the seeds well—little seeds have a way of finding holes and working their way free. Also, seeds lose viability more rapidly if not kept in an airtight container. Resealable plastic bags are good, but a plain mailing envelope will work if you tape all the openings.

✦Send enough seeds to fill at least 200 orders. We try to send about 50 small seeds per envelope; our envelopes hold only five larger seeds such as tree seeds. Place the seed packets in a padded mailing envelope, label it "Hand Cancel" and mail to: 1992 Seed Program, American Horticultural Society, 7931 East Boulevard Drive, Alexandria, VA 22308.

✦Send us as much identification and cultural information as possible, including the Latin and common names for the plant (and cultivar names if applicable), height when mature, growth habit, flower color, appropriate soil and exposure, hardiness zones, and germination requirements. Also send us your name so we can give you credit, and your phone number in case we have any questions about your seeds.

Gardeners' Q&A

Q: ***I am very intrigued by the process of tissue culture. Is there any way I can attempt this process at home?***

M. G., Portland, Maine

A: Tissue culture is a new and important method of propagating numerous identical plants from a small piece of plant material that is grown in a chemical mix under scrupulously sterile conditions. The chemical mix, using agar to give it a jellylike consistency, supplies the basic nutrients, salts, and sugars to the plant piece (also known as the explant) since it is unable to manufacture its own energy while developing in the mix.

The process of tissue culture is extremely exacting because it requires that the explants, mix, and tools be contaminant-free. But a pair of researchers at the University of Connecticut have devised the following, relatively simple do-it-yourself recipe:

To prepare the medium in which the explant will grow, you will need one-eighth cup of table sugar, one cup of tap water, one-half cup of stock (one-fourth teaspoon of all purpose 10-10-10 fertilizer in one gallon of water), one-half (250 mg.) of an inositol tablet (a B complex vitamin), one-quarter of a vitamin tablet containing thiamine, and two tablespoons of agar flakes.

This basic agar mix should be boiled, stirring constantly, until all ingredients melt. Pour one-quarter inch to one inch of the mix into clean jars, and place these jars in a pressure cooker along with a razor blade and tweezers. (These last two items will be used to cut and handle the explant.) Also add to the pressure cooker several pint glass jars filled with water that will be used to sterilize the explant itself. Cook all of this for 15 minutes at 15 pounds of pressure. Add bleach to the sterilized water—one part bleach to 10 parts water. Cut a clean new shoot from a selected plant with the razor and pick it up with the tweezers to rinse in distilled water for a few seconds. Dip the plant piece in the bleach solution for about 10 minutes and then rinse again with distilled water. Repeat this process three times, finishing with the distilled water. Now place one plant piece in each agar-filled jar, making sure it is firmly pressed on top of the agar. Cover the jar tightly with a clear plastic wrap and fasten with a rubber band. Set the jars in indirect sunlight where the room temperature is between 70 to 77 degrees. If a sustainable root structure develops, transplant into a soilless potting medium and grow under regular conditions.

Since you are experimenting in a non-sterile environment, you can expect some contamination, which will show in media discoloration or stunted or dead plant pieces. Some plants that have been successfully grown in this mixture include African violet leaf and petiole sections and wandering Jew shoots.

If you would like to read more about the principles and methods of tissue culture, one very good book is Lydiane Kyte's *Plants from a Test Tube: An Introduction to Micropropagation,* available from Timber Press.

Q: ***What are the substances on the market that absorb water and then release it to plants during dry periods? Do they work?***

S. E., Santa Fe, New Mexico

A: Absorbing water gels, also known as hydrogels or hydrophyllic gels, were developed to increase the availability of moisture to plants when water is low or unavailable to them. The gels are made from natural or synthetic cross-linked polymers that can absorb up to 300 to 1,500 times their weight in water. They slowly release stored moisture as microorganisms decompose them and through capillary action as heat, wind, and erosion evaporate ground moisture. Manufacturers claim they will last more than five years depending upon type of product (natural or synthetic polymer gel), soil pH, alkalinity, mineral content, soil microorganisms, and fertilizer used.

By keeping a steady amount of moisture available to plants, the gels are supposed to reduce water stress to both garden and house plants during drought or when growers can't or don't water them. Commercial growers may extend the shelf life of container plants, reduce desiccation during shipping, and save on watering costs.

In addition, manufacturers claim the gels decrease fertilizer leaching and soil compaction and improve soil media aeration and overall plant survival and quality.

The gels are tiny, clear grains that become a jellylike paste when they absorb water. They can be added to plants wet or dry. House plants or any container plant can be potted in soil mixed with the gels in the amounts suggested on the package. For outdoor flower beds, the gels can be incorporated evenly in the planting holes near the roots of the plants. If the gels are used wet, plants can be watered normally at first, and then half as often. If using dry, water normally for two weeks, and then half as often.

The gels decompose into carbon dioxide, nitrogen, and water so they should not harm the environment.

If these materials sound too good to be true, they may well be, according to several independent researchers who have tested these products under various conditions with different plants. Results are decidedly mixed on their performing as advertised. The gels appear to be more effective on some plant species than others, and do not seem to be effective for woody plants. All agree that more testing and research needs to be done on which plants would benefit the most and what environmental conditions warrant use of the gels.

Using these gels does not compensate for neglect of plants.

—Maureen Heffernan
Gardeners' Information Service

Report from Birmingham

Wild About Woodlands

A bad case of Solomon's-seal lust was an inevitable outcome of the AHS Annual Meeting for those with shady perennial beds. Almost every private garden we visited seemed to have the variegated form of this woodland plant, and many of us returned with it high on our "must have" list.

A majority of the gardens toured by AHS members had woodland areas of some size, and other native Southern plants—notably the oak-leaf hydrangea—made many repeat appearances. What was striking was how different each of these shady gardens was in its relation to the house, the terrain, and the landscaping.

In 1990 Louise "Weesie" Smith received an award from the American Horticultural Society for her efforts in rescuing wildflowers from being bulldozed by developers, so it was a treat a year later to see the result of those efforts. Her heavily wooded area is deceptive in its simplicity, looking absolutely natural and effortless with its collection of ferns and wildflowers including trilliums and lady's-slippers. Nearer the house are more cultivated plants including tree peonies and clematis on a bamboo lattice.

Louise Wrinkle provided guests with a map of her garden, the focal point of which is a creek, crossed by a rough-hewn bridge, that is being relandscaped as the result of tornado damage. Several of us were fascinated by an experimental compost bin that Wrinkle had built near her house. Made of wooden slats, its bottom is about two feet off the ground so that large particles should be automatically removed from the finished compost as it sifts through. It would make a great addition to AHS's National Compost Demonstration Park!

PHOTOS BY ARNOLD STEINER

Admiring the Ireland garden, from left are Pat Connaughton, Beverley Dunn, Jean Tomlinson, Everitt Miller, and Cass Miller.

Arnold Steiner created a garden sculpture from old tools.

The most dramatic natural setting had to be that of Ellen and Hank Weiland, where a former quarry for railroad gravel has left a bowl-shaped depression that the Weilands have terraced with rocks and timbers to create a multilevel garden of rhododendrons, azaleas, and shade-loving perennials and bulbs.

The gardens of Rose and Arnold Steiner and Fay and Bill Ireland were surrounded by woodland areas, but these were not the centers of attention.

In the Steiner garden is what could only be called a "formal" vegetable garden, planted with precisely positioned rows of vegetables, flanked with carefully tended roses, and highlighted with a huge urn of rosemary. On a wall of the garage facing the garden is a sculpture made of retired garden tools—a sure-fire conversation piece that gave visitors a new perspective on recycling. From the back patio, which features a lily pool, the view is of an expanse of lawn and a gazebo that serves as a "door" to the six acres of woodland garden that surround the property.

The Irelands' woods also surround the property which, near the house, is divided into a series of raised beds visible from the home's many windows. Some of the beds are a riot of color, but the most striking feature is a white garden off the all-white kitchen.

A complete change of pace was the townhouse garden of Virginia Bissell. This was no postage-stamp size plot, but a series of garden rooms planted with roses, perennials, other shrubs, and flowering vines.

Each of the gardens gave members some new ideas, but the tour had to be a real eye-opener to anyone who thought that gardening was synonymous with sunny borders.

American Horticulturist **Editor Kathleen Fisher traveled to Birmingham, Alabama, for the American Horticultural Society's 46th Annual Meeting in mid-April.**

Picking Up the Pieces

At first impression, it seemed that the reports of storm damage to the Birmingham Botanical Gardens had been greatly exaggerated. AHS members had been told that a tornado had ripped through the area on Good Friday, less than three weeks before, and that the wildflower and fern areas had been essentially obliterated.

None of this could be seen from the sunny courtyard, where a fountain of vertical columns splashes invitingly, and only a few downed trees were visible from the adjacent rose garden. The Japanese garden was untouched and serene.

But in the main building, members of the Birmingham Botanical Society had set up a display of native plants to compensate for the woodland plants we would not be able to see outdoors. The extent of the damage to the wooded area of the gardens was heart rending. "Quite a few tears were shed, by both volunteers and staff," said Gary Gerlach, garden director. A total of 1,100 trees were downed in the gardens and the zoo across the street by what meteorologists later said was a straight wind that cut a swath through the area.

The trees, in falling, took other plantings with them. Huge hardwoods toppled roots and all, leaving gigantic circles of earth perpendicular to the ground. Others crushed camellias and venerable old rhododendrons.

Gerlach said the heavy cleanup began May 6 and was completed by mid-June. Garden representatives had sought advice from their counterparts in South Carolina, who went through a similar cleanup following Hurricane Hugo in September 1989. They were told that in some instances, more damage was done by the heavy equipment removing trees than by the storm itself. "We had it written into our contract exactly how the work was to be done," said Gerlach. Before equipment moved into a given area, volunteers rescued the most valuable plants.

"There's only so much you can do, of course," said Gerlach. "You may think your paths are stable, but when a 10-ton forklift comes in and pulls out a stump, you end up having to excavate the pathways and put down gravel all over again."

In South Carolina, gardens once full of azaleas and camellias were left so bereft of trees by Hugo that they were turned into rose gardens. Gerlach doesn't foresee anything so drastic in Birmingham. As a result of the increased sun, he said, "some of the plants may have some foliage damage this summer. We'll try to avoid that next summer by rearranging plants and we might erect some temporary shelters for some of them."

The community has been extremely sympathetic, he said, and the Birmingham Botanical Society has been soliciting funds to repair the storm damage and restore the gardens and their plantings. The cost of tree removal alone was $146,000.

Donations to the storm repair fund can be sent to the Birmingham Botanical Garden at 2612 Lane Park Road, Birmingham, AL 35223.

The Survivors of the Sipsey Slide

The rain was coming in torrents, the sky was the color of mud, and the short lag between the lightning and thunder showed that there was some pretty violent action not too far distant. And here we were at the spot we had heard about all through this two-hour hike: the dreaded "rock-root slide," which we would have to descend by hanging on to ropes, getting a purchase on a few badly spaced toe-holds, mincing along a ledge, and then scooting down the rocks for several yards in a sitting position.

All 20 or so of us lived to tell about it. "There's nothing like survival," exulted Bob Monk, who at 72 was the oldest member of our party.

Our guide, Louise "Weesie" Smith, had told us as we began this trek through the Sipsey Wilderness that anyone over 65 should not attempt to hike the entire route. But of course it was Smith, just under her own limit at age 64, who clambered down the rock slide to help secure the ropes that let the rest of us make the grade.

Sipsey was a two-hour bus ride from Birmingham, but Smith made it go fast by filling us in on the area's geology, local political gossip, and of course, botany. She passed around a plastic packet that contained what appeared to be moss, but was in reality North America's smallest fern, *Trichomanes petersii,* which has fronds only one cell thick.

We were primed to see the native plants she described, in spite of the fact that the light drizzle that had fallen during the bus ride picked up momentum as we alighted. Some of our party had the foresight to bring ponchos; my borrowed trench coat was quickly soaked by the deluge. The wetness overhead was soon matched by puddles underfoot, and we had been warned that at one point we would have to ford a stream.

Those who chose not to trek the Sipsey Wilderness were entertained by lectures at the Birmingham Botanical Gardens. Lula Rose Blackwell, above, demonstrated flower arranging and produced examples for the meeting's dinners and receptions.

The continuing downpour convinced Smith to propose that all of us turn around and head back the way we came, but about 20 of us, roughly half the group, pressed on.

We were rewarded by the sight of towering cliffs, some with waterfalls that would have beckoned hotter and drier hikers to the grottoes at their feet.

There were many wonderful natives to see: Solomon's-seal, many trilliums (although few were still blooming), ferns, ground pine, partridgeberry, violets, *Coreopsis* species, and rhododendrons bearing fascinating bright yellow galls.

Fording the stream we had heard about was relatively simple: one foot in the water, then step on a rock. It was the next step that was the doozey—onto a bank as slippery as glass. The mutual mud-wallowing, and the relief of feeling some helping hands as one slid back in for the fourth or fifth time, made this a truly bonding moment. And certainly, once we had conquered the rock-root slide, we felt we had overcome great peril together.

"You told us it was rugged, Weesie," said AHS President George Ball, who was the last to descend. "You should have said 'scary.'"

Report from Williamsburg

Companion Plants, 'Natural' Sprays, Deter Pests

"You and Me Against the World," a song recorded by Helen Reddy in the '70s, didn't make music history, but it could be the theme song for companion plants in the garden. Companion plants, by repelling or serving as an alternate food source for predators, can be stalwart friends of both vegetables and ornamentals.

Colonial Williamsburg landscape supervisor Laura Viancour has had success with a variety of companions at Williamsburg and in her own garden. When chives or garlic are planted with roses there are few problems with Japanese beetles. Clary sage (*Salvia sclarea*) smells like human sweat to a raccoon; planted around bluebird houses it will keep the birds safe from these masked attackers. Tansy repels flies and attracts lady beetles. Nasturtiums and calendula attract aphids; fennel attracts the surfit fly that feeds on aphid larvae. Plant lavender cotton (*Santolina chamaecyparissus*) or southernwood (*Artemisia abrotanum*) to keep mosquitoes at bay. Have a problem with rats? A border of catnip or peppermint will keep them away from garden plants.

When companion plants need reinforcements, Bonnie Wright, a gardener at Colonial Williamsburg, suggests these recipes for homemade organic sprays, taken from *The Natural Formula Book for Home and Yard* published by Rodale Press:

General all-purpose insect spray: Chop or grind one garlic bulb, one small onion, and one tablespoon cayenne pepper and mix with water. Steep the mixture for one hour, then add one tablespoon liquid soap. The mix can be stored in a tightly covered jar in the refrigerator up to one week.

Alcohol spray for mealybugs: Mix together one half cup isopropyl alcohol (70 percent), two tablespoons soap flakes, and one quart of warm water. Make a fresh batch each time you spray.

Nicotine spray for aphid and caterpillar larvae: Mix a handful of tobacco leaves with one gallon of water and let stand for 24 hours. Dilute the solution to the color of weak tea. Caution: Nicotine can kill Solanaceae plants so don't use it on tomatoes and peppers. It is highly toxic to all warm blooded animals, including humans. It is easily absorbed through the skin and should be used with great caution.

Dr. Gouin's deer and mice repellent spray: Mix one tablespoon Tabasco sauce, one tablespoon commercial adhesive (like Vapo-Guard) **or** one-half cup of nondetergent soap powder and one gallon of water. Spray on the tops and undersides of leaves.

Charles E. Hess, the assistant secretary of agriculture who delivered the meeting's keynote address, swears by a formula developed by the Agricultural Research Institute:

Cooking oil spray for scale, mealybugs, and aphids: Mix one teaspoon of liquid dishwashing soap (like Ivory) with one cup of cooking oil. To prepare the spray, mix two teaspoons of the soap/oil mixture with one cup of water. This mixture will store well in a tightly covered jar.

Viancour advises that what works well for one gardener—whether it be companion plants or organic insect sprays—may not work for other gardeners. She suggests trying different plants and methods in order to find the right garden companions.

'The Prairie Is Our Rain Forest'

Attitude plays a large part in determining what's a weed and what's a wildflower. When Neil Diboll, an ecologist by training and owner of Prairie Nursery in Westfield, Wisconsin, first became interested in prairie natives, friends thought he was crazy to be growing "a bunch of weeds." No one will want these, was their prophesy. "Now these weeds have been upgraded to wildflowers," Diboll says.

The tall-grass prairie of the Midwest may once have extended all the way to the East Coast. There was an ongoing war between the forest and the prairie. During cooler times the forest prevailed; during hot periods the prairie would take over. But because the prairie soil was so fertile it was regularly turned into cropland. "The prairie is our rain forest," Diboll said. "And it's already gone."

Prairie plants support a wide variety of wildlife. The common milkweed (*Asclepias syriaca*) is dreaded and hated by farmers because nothing kills it, but it's an excellent plant for a large meadow garden and it's a life saver to the monarch butterfly. Nectar from blossoms of the lavender milkweed allows the monarch to produce toxins that make it poisonous to birds. The New Jersey tea, which was once used for firewood, is pollinated by flies, and flies are an important food source for hummingbirds. "Heathen gardeners" think goldenrod causes hay fever, Diboll says, but it's really just an innocent bystander, and its seeds are a primary food source for songbirds. It also provides bees and butterflies with a late season nectar source. The white turtlehead (*Chelone glabra*) supports a rare butterfly, the Baltimore checkerspot.

A prairie is a low-maintenance, dynamic landscape where nature calls most of the shots. Nothing stays the same in a prairie; there is continuous floral change. "It's a war in the wild community," Diboll says. "The plants are vicious, vicious fighters. The garden is a hospital and everyone is in the infirmary." He feels that many natives—like cream false indigo (*Baptisia leucophaea*), shooting-star, queen-of-the-prairie, turk's-cap lily (*Lilium superbum*), yellow coneflower (*Ratibida pinnata*), and prairie blazing-star (*Liatris pycnostachya*)—are just as beautiful as garden cultivars.

Prairie Nursery sells plants and seeds of native wildflowers and grasses. The catalog also contains a wealth of information about starting and maintaining a prairie. For more information contact Prairie Nursery, P.O. Box 306, Westfield, WI 53964, (608) 296-3679. Catalog $3.

Assistant Editor Mary Beth Wiesner was on hand for the 45th Annual Williamsburg Garden Symposium in Williamsburg, Virginia, April 7 through 10. The theme for this year's symposium, cosponsored by the American Horticultural Society, was "Garden Earth."

Your Yard Can Be a Real Zoo

Roger Swain opened his talk on "Bugs, Birds, and Beasties: Getting a Grip on Wildlife in the Garden" by explaining his lack of slides: "When I find a woodchuck in the pea patch, a camera is not the first thing I reach for."

Swain, a host of PBS's "The Victory Garden" and science editor of *Horticulture* magazine, doesn't have much faith in the usual methods for keeping wildlife out of the garden. Some people say to plant extra vegetables so there's enough for you and the deer. Swain says: "Plant a whole lot if you want to feed a whole lot of animals." He doesn't put much stock in repellents because they wash off or wear off. And on the subject of "have-a-heart traps" he says: "What do you do with a woodchuck once you have it in the trap? It's not the right kind of sharing to let it go in your worst enemy's back yard!"

Swain is an advocate of barriers, which he calls "tough love" for animals. Fence netting, which looks like a "Boston lady's church hair net," protects ripening blueberries from birds. When the blueberries are ripe, the net can be removed and used again the next year. Chicken wire made into a waist-high fence should be put up before there is a problem with mammals. The fence should be tied to posts at soil level, at one foot, and at two feet, but not at the top, so that it will bend over and dump a woodchuck that climbs to the top. These barriers will also deter deer where their population is small.

This setup won't deter raccoons, which are fantastic climbers. Here Swain resorts to electricity. When most people hear the words "electric fence" they envision "a long string of dead corpses," Swain says. Not so. An electric fence works with high voltage and low current pulses. It doesn't kill animals, and "you can sleep at night because your fence charger is awake."

Get to know your enemy, he says. Some of the greatest inventions for combating pests have been discovered by amateurs. For example: croquet balls, painted with bright red paint, coated with sticky bait, and hung head-high in an apple tree, will attract coddling moths, plum curculios, and apple moths. Swain advises hanging one croquet ball for every hundred apples.

Tolerance is the real key, according to Swain. He asked participants to think of their back yards as modern zoological parks. Your back yard is a place "where bats swoop and fireflies flash," he says, and it has the same uses as a zoo: recreation, conservation, and education, with the added bonuses of no crowds and no closing times.

Roger Swain recommends these sources:

A. M. Leonard, Inc., 6665 Spiker Road, Piqua, OH 45356. Bird netting.

American Livestock Supply, P.O. Box 8441, Madison, WI 53708. Electric fence chargers.

Kencove Farm Fence, 111 Kendall Lane, Blairsville, PA 15717. Electric fence supplies.

Pest Management Supply Company, P.O. Box 938, Amherst, MA 01004. Red sticky balls.

New Database on Plant Sources

The American Horticultural Society's Gardeners' Information Service (GIS) has begun to create a computer database of mail-order nurseries and seed companies. Once completed, the database will enable GIS staff to provide more information on plant and seed sources. Nurseries and seed companies are urged to send their current catalogs to GIS at the AHS address.

Gardeners' Bookshelf

The Weekend Garden Guide

Susan A. Roth. Rodale Press, Emmaus, Pennsylvania, 1991. 358 pages. Color photographs and black-and-white drawings. Publisher's price: hardcover, $23.95. AHS member price: $20.35.

After enduring the stop and start of rush hour or an afternoon dashing from scout meetings and piano lessons to soccer practice, the idea of weeding the vegetables or dividing the perennials may seem like endless chores rather than pleasant pursuits. If your weekday schedule finds you catching only brief glimpses of your garden moments after sunrise and seconds before sunset, *The Weekend Garden Guide* should have a prominent place on your bookshelf. Susan A. Roth's book is also for lazy gardeners like myself—those who yearn for a yard filled with flowers or fruits or vegetables (or possibly all three), but still want to have time to lie in the hammock with a tall glass of iced tea and a good mystery.

Roth says you can have everything your gardening heart desires—a charming cottage garden, a wildflower meadow, a bountiful vegetable plot, and summer-long fruit harvests—using low-maintenance techniques. Roth has almost 20 years of weekend gardening experience at six different homes, in three different hardiness zones.

Low maintenance starts with the right plant in the right place—plants suited to the soil, moisture, and climate can almost take care of themselves. Replacing all or part of the lawn with ground covers will reduce time mowing and trimming. And while orchards may be out of reach for the weekend gardener, low-maintenance blueberries, strawberries, and raspberries can step in and take the place of hard-to-grow fruits like cherries, apples, and plums.

The Weekend Garden Guide combines detailed information with an easy-to-read style, making it a book you'll return to often as you plan your garden. Sidebars scattered throughout the text explain with words and graphics how to double-dig a garden, prune naturally, propagate ground covers, and remove lawn grass. Other boxes include a wide variety of plant lists—well-behaved meadow plants, native plants for woodland gardens, easy-care bulbs, and shrubs, vines, and ground covers for mixed borders.

But perhaps the three most helpful sections are a 68-page encyclopedia of nearly 300 easy-care plants with descriptions and culture, maintenance, and landscape-use information; the definitions of tools and techniques; and a weekend gardening activities calendar—geared to Zone 7—which provides a quick checklist of what to do in the garden every weekend of the year. The calendar breaks down gardening activities into manageable chunks perfect for harried or lazy gardeners who will especially appreciate the fourth weekend in December: "Relax."

—Mary Beth Wiesner

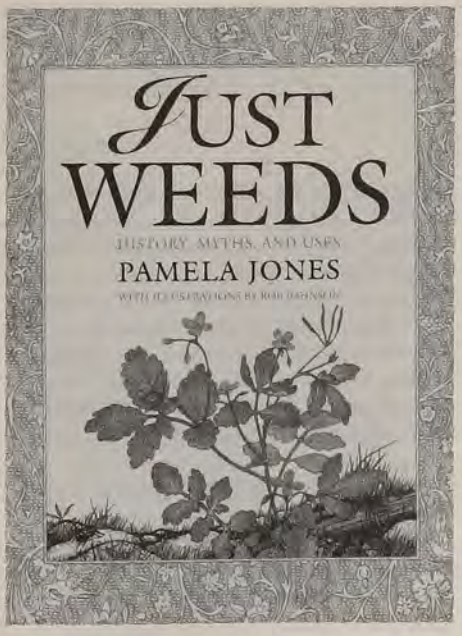
The Small Garden Planner

Graham Rose. Simon & Schuster, Inc., New York, 1991. 168 pages. Color photographs and color and black-and-white drawings. Publisher's price: softcover, $14.95. AHS member price: $12.70.

Landscape plans for small gardens are the focus of *The Small Garden Planner.* After a brief introduction to the basics of planning and carrying out the garden design, Graham Rose quickly moves to the more than 60 small garden plans that make up the bulk of the book. There are designs for gardens that make good use of hard surfaces: stone, brick, timber, or concrete; gardens that create a country environment in the city; Japanese gardens; gardens with water; gardens with different levels; and rooftop gardens and verandas. Each garden includes inspiring photographs and a landscape plan, a brief description, and a plant list. Gardeners with lots of space may find themselves yearning for a cramped corner lot after a look through these pages.

The Small Garden Planner was originally published in England; the American edition has been edited by Fayal Greene and contains a short list of American publications (including *American Horticulturist* would have made it an even better list) and lists of plant, seed, bulb, furniture, and ornament suppliers. The usual problem with English gardening books—concerning plant hardiness—isn't a problem here since the garden designs emphasize shape and form rather than specific plants.

—M. B. W.



Just Weeds

Pamela Jones. Prentice Hall, New York, 1991. 303 pages. Color illustrations. Publisher's price: hardcover, $29.95. AHS member price: $25.45.

In the typical gardener's mind, the boundaries between "vegetables," "fruits," "herbs," "ornamentals," "wildflowers," and "weeds" are impervious, despite the fact that these words have no botanical standing. The distinction, as Pamela Jones makes clear, has more to do with us than with the plants: "If we personally buy a plant at a nursery and set it in a garden bed, we recognize it as a garden plant; if it's in a field or along a roadside, we call it a wild flower or a wild plant; if we shake it, dried, out of a jar and into our stewpot, we call it an 'erb or herb; and if it messes up the perfection of our lawn or the vegetable garden, then it's a weed. And weeds must be pursued, dismembered, trampled, and destroyed without mercy."

Before you begin your next back-yard Inquisition, pause to read *Just Weeds*; perhaps you will become more tolerant, or even a fan of these survivors of the plant world. Jones charts out the botany, history, lore, and utility of 30 weeds (she has no better word) including many old favorites (common plantain, shepherd's purse, ground ivy, dandelion) and a few surprises (barberry, greater celandine, meliot).

No plant better illustrates the ambiguity of our "weeds" than poke (*Phytolacca americana*). Is it a vegetable? After all, the young shoots and leaves of this American spinach (another common name) are delicious. For centuries poke has been gathered as an early spring vegetable, primarily in the South. The plant was cultivated in late 18th-century Europe, and poke seeds are available today from a number of mail-order vegetable seed companies.

Is it an herb? Native Americans used pokeberry tea to treat rheumatism, arthritis, and dysentery; the Iroquois applied the root externally for skin disorders. It has been used by modern herbalists as a laxative, and to remedy laryngitis, tonsillitis, mumps, and diseases of the respiratory tract.

An ornamental? We have Mrs. William Starr Dana's testimony in her classic *How to Know the Wild Flowers:* "When in September the tall purple stems rear themselves above their neighbors in the roadside thicket, the leaves look as though stained with wine, and the long clusters of rich dark berries hang heavily from the branches, we cannot but admire its independent beauty." It is also a native plant—rare for a weed—a category many feel sympathy towards these days. Alas, it also crops up in the USDA's Agriculture Handbook No. 366, *Selected Weeds of the United States.*

A fault of such "weeds resplendent" books is a tendency to overcompensate for the years of contempt by listing every wonder ever ascribed to the plants. I would have preferred the inclusion of some research-based information at the expense of a few supposed remedies.

—Thomas M. Barrett

Grow It!

Erika Markmann. Illustrations by Gisela Konemund. Random House, New York, 1991. 47 pages. Color drawings. Publisher's price, softcover: $6.95. AHS member price: $5.90.

Editor's note: Most children's gardening books don't seem to be written for kids. So for an opinion on this one, we sought out an expert.

This book tells you to do a lot of things that will make plants taller than you. It has interesting words like "terrace," "minifarm," and "transform." But it names plants I don't really know and it doesn't say some of the Latin names. I think more pictures would help. The pictures it has are very detailed and fun.

It was very funny when the author talked about it being illegal sometimes to put your plant on the outside windowsill, and then I found out she was from Germany. It also says if your plant gets too big, to cut off the top with scissors. That sounds pretty dumb. But the book has lots of experiments and choices of things to try. I think other children would like this book because of the interesting words and the neat pictures.

—Hart Ebersole

Hart Ebersole will be a fourth grader next year in Fairfax County, Virginia.

Gardeners' Dateline

Mid-Atlantic

✦ **Through Aug. 31. Summer Terrace Show.** U.S. Botanic Garden, Washington, D.C. Display of a series of theme gardens surrounding the Botanic Garden Conservatory. Information: (202) 226-4082.

✦ **July 18. Gardening for the Environment.** Washington, D.C. Lecture/Demonstration by Pam Marshall and Erik Neumann, U.S. National Arboretum, Washington, D.C. Information: Janel Greene, (202) 475-4857.

✦ **Sept. 7. Sale of exotics and other plants.** Baltimore, Maryland. Information: Cylburn Arboretum Association, Inc., 4915 Greenspring Avenue, Baltimore, MD 21209.

✦ **Sept. 12-15. National Convention of the American Begonia Society.** Old Colony Inn, Alexandria, Virginia. Information: Barbara Nunes, 6025 Greeley Boulevard, Springfield, VA 22152, (703) 451-7238.

North Central

✦ **Through July 21. Early Summer Show: Pomp and Circumstance.** Foellinger-Freimann Botanical Conservatory, Fort Wayne, Indiana. Information: Foellinger-Freimann Botanical Conservatory, 1100 South Calhoun Street, Fort Wayne, IN 46802, (219) 427-1267.

✦ **July 13-17. International Floriculture Industry Short Course.** Cincinnati Convention Center, Cincinnati, Ohio. Sponsored by Ohio State University and Ohio Florists' Association. Information: Ohio Florists' Association, 2130 Stella Court, Suite 200, Columbus, OH 43215-1033, (614) 487-1117, Fax (614) 487-1216.

✦ **July 19-22. Annual Conference of the International Herb Growers and Marketers Association.** Hyatt-Regency Hotel, Minneapolis, Minnesota. Information: IHGMA, 1202 Allanson Road, Mundelein, IL 60060, (708) 566-4566.

✦ **July 20-Sept. 7. Tour of 12 organic farm and garden operations.** Ohio and southwest Michigan. Information: OEFFA Farm Tours, 65 Plymouth Street, Plymouth, OH 44865, (419) 687-7665.

✦ **July 27-Sept. 29. Late Summer Show: A Scented Garden.** Foellinger-Freimann Botanical Conservatory, Fort Wayne, Indiana. Information: Foellinger-Freimann Botanical Conservatory, 1100 South Calhoun Street, Fort Wayne, IN 46802, (219) 427-1267.

✦ **Aug. 18-21. Second Conference on Agroforestry in North America.** Holiday Inn University Plaza, Springfield, Missouri. Information: University of Missouri-Columbia, University Extension Conference Office, 344 Hearnes Center, Columbia, MO 65211.

✦ **Sept. 11-14. International Volunteer Conference.** Glencoe, Illinois. Sponsored by the Chicago Botanic Garden. Information: Linda Doede, (708) 835-8281.

✦ **Sept. 14-15. The 25th National Show and the 58th Midwest Conference of the American Dahlia Society.** Northtown Mall, University Avenue N.E. and Highway 10, Fridley, Minnesota. Information: Phyllis and Harold Gulde, 5917 Chowen Avenue South, Edina, MN 55410, (612) 922-1302.

✦ **Through Sept. 30. Exhibition of photographs by Steve Agard.** Olbrich Botanical Gardens, 3330 Atwood Avenue, Madison, Wisconsin. Information: (608) 246-4551.

Northeast

✦ **July 7-10. Agricultural History Conference.** Cooperstown, New York. Information: Seminars on American Culture, New York State Historical Association, P.O. Box 800, Cooperstown, NY 13226, (607) 547-2534.

✦ **July 9. The Medieval Garden in Word and Image.** Lecture by Tania Bayard, writer specializing in nature, horticulture, and gardens. Sponsored by the New York Botanical Garden and the National Academy of Design. Information: New York Botanical Garden, Bronx, NY 10458, (212) 220-8747.

✦ **July 15-19. Longwood Gardens annuals and biennials course.** Kennett Square, Pennsylvania. Taught by Dr. William H. Carlson, professor of horticulture and extension specialist in horticulture at Michigan State University and Patricia Christopher of the education staff at Longwood. Information: Continuing Education Office, Longwood Gardens, P.O. Box 501, Kennett Square, PA 19348-0501, (215) 388-6741, ext. 516.

✦ **July 18. The 44th Annual Open House and Garden Day.** Saint Thomas Church, Chestnut Street, Camden, Maine. Sponsored by the Camden Garden Club. Information: (207) 236-4725.

✦ **July 19-24. The 88th Annual Meeting of the American Society for Horticultural Science.** Pennsylvania State University, University Park, Pennsylvania. Information: Stephen J. Wallner, Department of Horticulture, Pennsylvania State University, University Park, PA 16802, (814) 865-2571.

✦ **July 23. Victorian Flower Show.** Park-McCullough House, North Bennington, Vermont. Sponsored by the Bennington Garden Club. Information: (802) 442-5441.

✦ **July 27-28. Adirondack Wildflower Festival.** Adirondack Park Visitor Interpretive Center, Paul Smiths, New York. Festival focus will be on endangered plants. Information: (518) 327-3000.

✦ **July 28-30. The 19th Annual Conference of the American Horticultural Therapy Association.** Holiday Inn, Center City, 1800 Market Street, Philadelphia, Pennsylvania. Information: Steven Davis, AHTA, 9200 Wightman Road, Suite 400, Gaithersburg, MD 20879, (301) 948-3010.

✦ **Aug. 9-11. The 17th Annual Conference and Celebration of Rural Life.** Hampshire College, Amherst, Massachusetts. Sponsored by the Natural Organic Farmers Association. Information: Julie Rawson, RFD #2, Barre, MA 01005, (508) 355-2853.

✦ **Aug. 15-17. Conference on Native Plants in the Landscape.** Millersville University, Millersville,

Pennsylvania. Information: Grace Evans, Continuing Education, 104 Dilworth Hall, Millersville University, Millersville, PA 17551, (717) 872-3030.

Northwest

✦ **July 31-Aug. 2. Sod Producers' Summer Convention and Field Day.** Portland, Oregon. Information: American Sod Producers Association, 1855-A Hicks Road, Rolling Meadows, IL 60008, (708) 705-9898, Fax (708) 705-8347.

✦ **Aug. 3-14. Exhibit: Northwest Natives.** Federal Way, Washington. Trees native to the Pacific Northwest designed as bonsai by local artists. The Pacific Rim Bonsai Collection is adjacent to the Rhododendron Species Foundation gardens. Information: Stephanie Rowland, (206) 924-3153.

✦ **Aug. 17. Iris Sale.** Crossroad Shopping Center, N.E. 8th and 156th Avenue N.E., Bellevue, Washington. Sponsored by the King County Iris Society. Information: Pamela Gallagher, 9421 130th Avenue N.E., Kirkland, WA 98033, (206) 822-3875.

Southeast

✦ **Through July 31. Kids in the Garden.** City Park, New Orleans, Louisiana. A weekly series of tours and workshops in the Botanical Garden for children ages 6 to 11. Information: Jerome Lebo, City Park, 1 Dreyfous Avenue, New Orleans, LA 70124, (504) 483-9386.

✦ **July 11-15. American Association of Nurserymen's 116th Annual Convention and Nursery Industry Exposition.** Walt Disney World, Orlando, Florida. Information: American Association of Nurserymen, 1250 I Street N.W., Suite 500, Washington, DC 20005, (202) 789-2900, Fax (202) 789-1893.

✦ **July 27. Summer Plant Fair.** Sarasota, Florida. Benefits Selby's education and research programs. Information: Marie Selby Botanical Gardens, 811 South Palm Avenue, Sarasota, FL 34236, (813) 366-5731.

✦ **July 28-30. International Lawn, Garden, and Power Equipment Expo.** Louisville, Kentucky. Information: (502) 473-1992, Fax (502) 473-1999.

✦ **Aug. 31-Sept. 8. American Pond and Garden Exposition.** Atlanta, Georgia. Information: American Pond and Garden Exposition, P.O. Box 449, Acworth, GA 30101, (404) 975-0277.

Southwest

✦ **Aug. 4, 11, 18. Workshop on floral design.** Garden Center, 10120 Lomas N.E., Albuquerque, New Mexico. Sponsored by the Council of Albuquerque Garden Clubs. Information: (505) 296-6020.

West Coast

✦ **July 20-Aug. 10. Tour: Rethinking Gardening in California.** Pier 39, San Francisco, California. Water-conscious gardening tours conducted by Denise Dirickson, Pier 39 landscape director, and her staff. Information: (415) 391-0850.

✦ **July 27-28. Begonia Show.** Los Angeles State and County Arboretum, Arcadia, California. Sponsored by the San Gabriel Branch of the American Begonia Society. Information: (818) 821-3222.

✦ **Aug. 17-25. Southern California Home and Garden Show.** Anaheim Convention Center, Anaheim, California. Information: (714) 978-8888.

✦ **Aug. 17-25. Annual Meeting of the Marigold Society.** Anaheim, California. Held in conjunction with the Southern California Home and Garden Show. Information: Bill Morris, (916) 756-8099.

✦ **Aug. 31-Sept. 2. Fern Show.** Los Angeles State and County Arboretum, Arcadia, California. Sponsored by the Los Angeles International Fern Society. Information: (818) 446-8251.

RICHARD INGALLS/COURTESY OF THE SONOMA COUNTY FAIR

Above is a detail from the pyramid featured at the 1990 Sonoma County Fair Flower Show in Santa Rosa, California. The 1991 show, "Secrets of the Silk Road," features oriental floral exhibits and is open July 20-August 4. Information: Sonoma County Fair, P.O. Box 1536, 1350 Bennett Valley Road, Santa Rosa, CA 95402, (707) 545-4200.

AHS Events

AHS will sponsor a symposium, "Landscapes of the Country Place Era: Issues of Preservation and Restoration," on July 12 at the Berkshire Museum in Pittsfield, Massachusetts. Cost of the symposium is $150. Please call AHS for more information and reservations.

If you'll be traveling to the Washington, D.C., area this summer plan to attend the back-yard composting lecture on July 6 at 10 a.m. at River Farm. The lecture is free but reservations are required.

Ohio native Carol Happ will display her oil paintings of endangered wildflowers at River Farm through August 24. The exhibit is open Monday through Friday from 8:30 a.m. to 5 p.m. Posters will be available for sale in the Cottage Shop.

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

International

✦ **July 16-21. Ninth World Rose Convention.** Belfast, Ireland. Hosted by the Rose Society of Northern Ireland. Information: Project Planning, 31 Spa Road, Ballynahinch, Co. Down, Northern Ireland BT24 8PT. Phone (0238) 561993, Fax (0238) 565073.

✦ **July 21-25. World Congress of Landscape.** Ottawa, Canada. Sponsored by the International Association for Landscape Ecology. Information: Gray Merriam, Department of Biology, Caleton University, (613) 788-3859.

✦ **Sept. 22-27. Sixth Biennial Conference of the International Protea Association.** Parmelia Hilton Hotel, Perth, Western Australia. Information: Promaco Conventions Pty Ltd, 9A Canning Bridge Commerical Centre, 890-892 Canning Highway, Applecross 6153, Western Australia. Phone (09) 364 8311, Fax (09) 316 1453.

✦ **Sept. 24-29. Conference: Tropical Orchid Splendor.** Durban, South Africa. Sponsored by the South African Orchid Council. Information: Colin Silver, P.O. Box 3404, Durban 4000, South Africa. Phone 011-27-31/705-1431, Fax 011-27-31/705-1458.

Classifieds

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AHS now carries a full line of unique compost bins, tumblers, and accessories—all on display in our National Compost Demonstration Park—and all significantly discounted (for members only). Call for a free price sheet: American Horticultural Society, (800) 777-7931.

HELP WANTED

Assistant/Associate Professor, Ornamental Horticulture, Plant Science Department. PhD in ornamental horticulture or related field with special knowledge of plant systematics required. For assistant professor: demonstrated research ability and oral communication skills required, teaching experience preferred. For associate professor: five or more years of productive research experience with publications and proven teaching ability required. Applicant evaluation will begin July 15, 1991, and continue until the position is filled. Send curriculum vitae, list of publications, official transcripts, and the names of three references to: Dr. Larry Englander, Search Committee Chair, Assistant/Associate Professor, Ornamental Horticulture (191050) Position, P.O. Box G, THE UNIVERSITY OF RHODE ISLAND, Kingston, RI 02881. (POSITION PENDING BUDGET APPROVAL).

We at the American Horticultural Society are often asked to refer individuals for significant horticultural positions around the country. We are not in a position to offer full placement services to candidates or employers. However, as a service to our members, both jobseekers and employers alike, we would be very glad to receive résumés and cover letters of individuals seeking job changes and employers seeking candidates. All responsibility for checking references and determining the appropriateness of both position and candidate rests with the individuals. AHS's participation in this activity is only to serve as a connecting point for members of the Society. Inquiries and informational materials should be sent to: Horticultural Employment, American Horticultural Society, 7931 East Boulevard Dr., Alexandria, VA 22308.

HOUSE PLANTS

ORCHIDS, GESNERIADS, BEGONIAS, CACTI & SUCCULENTS. Visitors welcome. 1990-1991 catalog $2. LAURAY OF SALISBURY, 432 Undermountain Rd., Salisbury, CT 06068. (203) 435-2263.

MINIATURE ROSES

Award-winning varieties from America's top miniature rose breeder and grower. Over 75 varieties for garden or container growing. Send for FREE color catalog: NOR'EAST MINIATURE ROSES, INC., Box 307AC, Rowley, MA 01969. Miniature roses are our only business and we do it right!

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Hooray for Heuchera!

The Perennial Plant Association has named *Heuchera* 'Palace Purple' the 1991 perennial plant of the year. Taxonomists are divided as to which species of *Heuchera* produced 'Palace Purple'—some say it is from *H. micrantha,* others are certain it is *H. villosa* or *H. americana.* All three species are North American natives; the seed that produced 'Palace Purple' was exported by a botanical garden in the United States to England, where the first plants of 'Palace Purple' were grown on the grounds of the Queen's palace at Kew Gardens. This cultivar was first sold in the United States in 1983.

'Palace Purple' was given the perennial plant of the year honors because it is easy to produce, is adaptable to most areas of the country, and has a long garden season. The most outstanding feature of 'Palace Purple' is its stunning reddish bronze foliage. The plant grows to only about 12 inches high but produces small white flowers that rise about six inches above the leaves. *H.* 'Palace Purple' can be used as a focal point in the garden or in the front of the border. The Perennial Plant Association suggests combining it with *Artemisia* 'Powis Castle' or *A.* 'Valerie Finnis', *Oenothera missourensis, Liatris spicata, Geranium* 'Johnson's Blue', *Solidago* 'Golden Fleece',

COURTESY OF THE PERENNIAL PLANT ASSOCIATION

Lamium 'White Nancy', or *Sedum* 'Vera Jameson'.

In Northern gardens this *Heuchera* will thrive in full sun; in areas with very long, hot summers the plant needs partial shade. It will grow in most soil types except heavy clay; it needs good drainage. Generous amounts of organic matter should be added to the soil to grow high-quality plants.

Bare root plants should be planted in the spring. Potted plants can be planted anytime between late spring to about a month before the first hard, killing frost.

Mosquitoes Feast, Zappers Get Zip

According to the Ohio Cooperative Extension Service, electronic bug zappers are an ineffectual means of mosquito control. "Most homeowners hear the zap and breathe the smell of fried bug and think they're killing harmful insects," says Dave Shetlar, an extension landscape entomologist. "But most of the bugs killed, such as ladybugs and lacewings, are beneficial because they eat insect pests or pollinate flowers." One study, published in June 1983 in *Mosquito News,* found that only 3.3 percent of the insects killed by bug zappers on an average night were female mosquitoes (only adult females feed on human blood).

Mosquitoes are attracted to the ultraviolet light of bug zappers, but only come within 10 feet of it. The mosquitoes are then drawn to humans or other mammals nearby, usually by searching for carbon dioxide. "So if you're on the other side of the porch, the zapper draws mosquitoes right to you, and you get bitten more often," says Shetlar.

The best way for homeowners to control mosquitoes is to keep them from breeding by removing or cleaning objects that hold water, such as old tires and rain gutters, where they may lay their eggs.

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