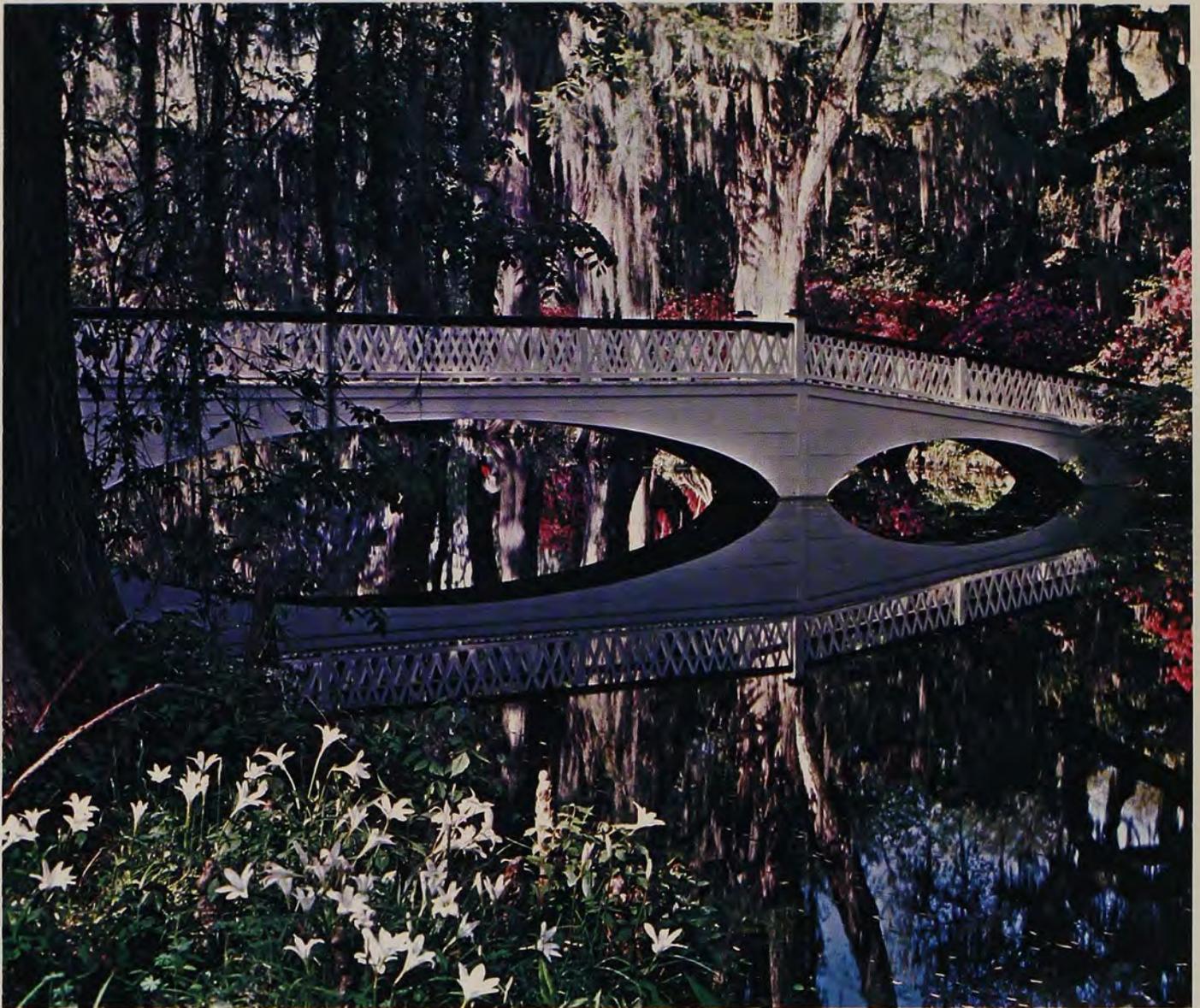


# AMERICAN HORTICULTURIST

FEBRUARY 1982





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# AMERICAN HORTICULTURIST

VOLUME 61 NUMBER 2

Wayside Gardens



*Potentilla* 'Gibson's Scarlet'. See page 15 for other 1982 Introductions.

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**On the Cover:** *Camellia japonica* 'Rev. John G. Drayton'. Named after the man who introduced evergreen Indica azaleas to America, this camellia and hundreds of others bloom every spring at Magnolia Gardens, which is featured on page 22. Photograph by Pamela Harper.

# FRIENDS OF RIVER FARM

The Society moved to its present headquarters at River Farm in 1973. The generous gift of Mrs. Enid Haupt, this 25-acre estate on the banks of the Potomac River was once a part of George Washington's plantation at Mount Vernon. The headquarters consists of a series of buildings, one of which dates from Washington's ownership of the property. The gentle, rolling land runs from the George Washington Parkway (the modern road from Mt. Vernon to Washington, D.C.) to the river and offers many unparalleled vistas. It is a wonderful location for the headquarters of the American Horticultural Society and a piece of land with outstanding opportunities for the development of gardens.

After many years of discussion and negotiation, I am pleased to report to you that the Society has now fulfilled all legal requirements of occupancy and has finally received a permanent occupancy permit for use of the property as our national headquarters. As a result we, as an organization devoted to horticulture and horticultural education, can now proceed with our intended use of River Farm both as the office from which we conduct the business of the Society and as an attractive and exemplary series of gardens appropriately surrounding the American Horticultural Society.

To accomplish this objective, the Society's Officers and Board of Directors have taken two steps. The first of these was the preparation of a detailed master plan for the development of gardens and landscaping on the property over the years ahead. Many features of this plan are already underway, and the construction last year of a new entrance driveway and the planting of a portion of that driveway as a demonstration fruit orchard has already transformed what was formerly a rather nondescript lawn into a functional and attractive feature of our headquarters.

The second step was the rejuvenation of an organization within the Society that was instrumental in helping us first get settled at River Farm. That group, The Friends of River Farm, is a special group of devoted friends within our general membership that operates as one of the committees ap-



Murray Keene

A view of the Ballroom Garden at River Farm, the Society's national headquarters in Mt. Vernon, Virginia.

pointed by the Board of Directors. I am personally delighted that Mrs. Malcolm Matheson, Jr. has accepted the chairmanship of this committee and is already hard at work organizing Society members throughout the country to help her with the many tasks taken on by her committee.

The Friends of River Farm is charged by the Board of Directors to accomplish three objectives:

First, the Friends sponsor projects and activities throughout the country to generate support and resources for the demonstration gardens, educational displays and horticultural education programs at River Farm.

Secondly, the committee organizes and sponsors horticultural events that use all the facilities of the house and gardens. We hope the Friends will be able to secure the support and participation of area garden clubs and friends of the Society in this endeavor.

And third, one of its objectives is to promote membership in Friends among Society members and associates. The committee has established a contribution of

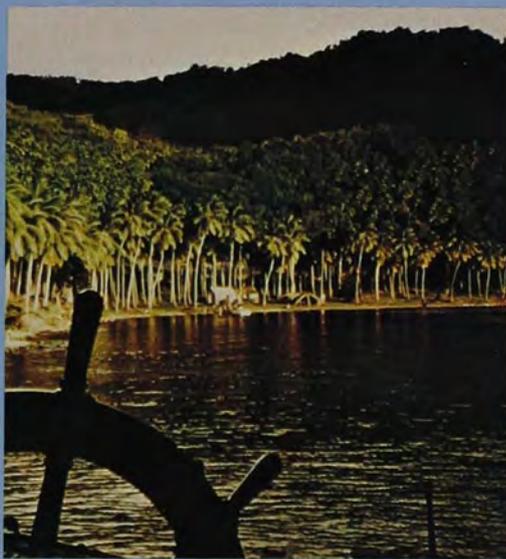
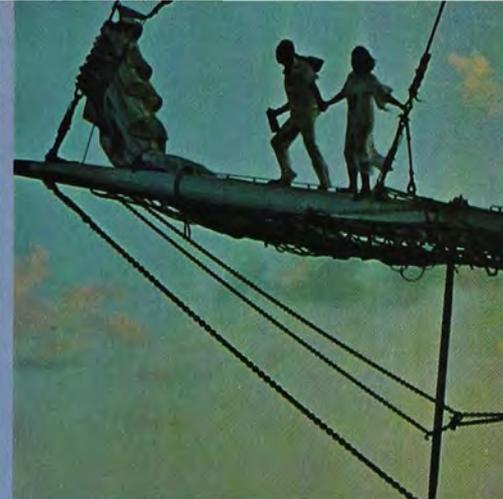
\$25.00 per year over the general membership fee as one that will qualify you for membership in Friends of River Farm. Proceeds from these fees will be devoted to implementing garden plans and making your headquarters a property of which all of us can be proud.

Additional activities sponsored by the Friends will have an appeal to our entire membership, even beyond those of you who are able to visit River Farm. Special lectures throughout the country, available only to Society members, with free invitations to members of Friends, is just one project being considered.

If you would like to support us in these activities, please consider becoming a Friend of River Farm. Your \$25.00 tax-deductible contribution can be most important in furthering our goal of creating a functional and attractive headquarters.

For your convenience the Society has bound in a tear-out application form in this issue. I hope you will fill it out and return it to our office at River Farm soon.

*Gilbert A. Daniel*



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# LETTERS

## Fellow or Member?

The gardening book I ordered just arrived (I'd rather leave it unnamed). Once again (the third time recently) I find the jacket blurb stating that the author is a Fellow of the Royal Horticultural Society, in a manner implying that this is an honor or a qualification.

The Royal Horticultural Society has no "members," everyone is a "Fellow." It used to be that one had to be proposed for membership but this has not been the case for a long time now. Thus a "Fellow" is merely a member, and anyone can become one on payment of the annual subscription, at present £14 a year. It is thus no different from being a member of the American Horticultural Society.

*Pamela Harper  
F.R.H.S.!*

## Gifts to the Paca House

It gave us great pleasure to read the article in the October *American Horticulturist* on the restoration of the William Paca Garden, and we are delighted that its author has provided your readers with such a comprehensive account of the research that went into the re-emergence of this elegant 18th-century garden.

It is difficult to include the fund sources for such an extensive garden restoration in a magazine article. However, some deserve special mention as they are of interest to gardeners and conservationists. Although the primary funding agencies were its owner, the State of Maryland, which also maintains the garden; Anne Arundel County's Project Open Space and Historic Annapolis, Inc., a private, non-profit preservation organization which manages the garden, your readers will be particularly interested to learn that in the beginning when a donation not only resulted in progress but, in addition, encouragement for our monumental task, the William Paca Garden received the Founders Award from the Garden Club of America and also a grant from the Land and Water Conservation Fund of the Department of the Interior, Bureau of Outdoor Recreation. These two grants were extremely influential as they led to the garden's present emphasis

on conservation of the flora of the mid-Atlantic region. Other garden oriented gifts came from the Middendorf Foundation, Federated Garden Clubs and Garden Clubs of America far and near. In particular, we are grateful to Zone VI of the Garden Club of America for the flower parterres and the Maryland House and Garden Pilgrimage whose donation provided the large magnolias along the garden walls. Additionally, thousands of private individuals have contributed to the garden. Among them are generous friends who were responsible for the reconstruction of original garden features, such as the elegant gazebo or pavillion, the spring house and Chippendale style bridge.

All in all, we have many people to thank for Governor Paca's once and present garden that now graces Maryland's Capital City as it must have done in 1765. We thank you and the author for the October article and hope to meet your members in the garden.

*Mrs. J.M.P. Wright, Chairman,  
The William Paca Garden Committee  
Historic Annapolis, Inc.*

## Errata

We regret that no credit was given to the photographer who took the picture featured on page 2 of our December, 1981 issue. That photograph of a display garden at the Chelsea Flower Show was taken by Frances Wright.

In our December, 1981 article on camellias in containers, the proportions for adding fertilizer to containerized plants were stated in error. On page 32 of that issue, the rate for fertilizer application *should* read: ¼ teaspoon per 6-inch pot, 1 rounded teaspoon per 8-inch pot, 2 rounded teaspoons per 10-inch pot.

Also in the December issue, two errors appeared in the article on the Gotelli Dwarf Conifer Collection. Mr. Gotelli's name is, in fact, William T. Gotelli, not Edward Gotelli as we stated. In addition, it was the Arboretum and not Mr. Gotelli who estimated the cost of assembling his collection to be \$500,000. We apologize to Mr. Gotelli for these errors.

*The Editors*

# CAPSICUMS

About 50 kinds of peppers (*Capsicum*) belong to the Solanaceae or nightshade family, but only two species, *Capsicum annuum* and *C. frutescens*, are grown in the United States. Some are sweet, some are hot. All originated in tropical America. *C. frutescens* was believed to be South American, but it now ranges as far north as the southern United States. *C. annuum* was probably Mexican at the time of the Spanish Conquest, but it also now ranges into the southern United States and into South America.

The name *Capsicum* originated from the Latin *capsa*, meaning box. *Frutescens* means shrubby and *annuum*, of course, means annual.

Garden peppers were in cultivation long before Columbus carried them back to Europe in 1493. Fragments dating back to about 7,000 B.C. have been found in Mexican caves, but because it is difficult to tell wild from cultivated *Capsicum* species, the area in which peppers were originally domesticated remains a mystery. The numerous kinds described by early writers indicate considerable variability, and such variability is accepted generally to indicate antiquity of cultivation. The Olmec and Aztec tribes are both known to have used these plants.

Ornamental peppers originated from the bird pepper, *Capsicum annuum* var. *glabriusculum*. *C. annuum* yields one of the best known spices, paprika or cayenne pepper, a powerful stimulant. It can promote a general warmth all over the body without any narcotic effect. The fruit is a very persistent heart stimulant.

West Indian natives soak the pods in water, add sugar and orange juice and drink the concoction for fevers. A liniment is made from it and it can be used as a gargle as well. The list of medicinal uses makes it sound almost like a cure-all. Cayenne pepper or the dried ripe fruit of *Capsicum* was an official U.S. drug from 1820 through 1965. It was listed as an irritant, for gas and colic, as a stimulant and condiment and much more. The active ingredient is an oleoresin called capsaicin, an aromatic phenol.

As a food, peppers excel most other vegetables in Vitamins A and C and also con-



Photos by Barbara W. Ellis

ABOVE: *Capsicum* 'Fiesta' and 'Midnight Special' add dramatic color to this annual border at the U.S. Botanic Garden in Washington, D.C. LEFT: Closeup of *Capsicum* 'Fiesta' photographed at Longwood Gardens.

tain calcium, phosphorus, iron, sodium, magnesium, thiamin, riboflavin and niacin. Green peppers are used in salads as well as in goulashes and stews. Hot peppers (they can be green, red or yellow) are pungent and can be dried. Chili peppers and pimentos come from the species.

Capsicums are perennial shrubs in most tropical countries. They are many branched with shiny, ovate, dark-green leaves. The fine petaled flowers are white or greenish and produce a podlike berry that can be red, orange or yellow at maturity. The berries vary greatly in size, shape and pungency. Only the two species mentioned earlier are grown in the United States, but

from them come numerous cultivars.

Peppers are a popular garden vegetable and as such need a long growing season. For temperate area outdoor planting, they should be started inside and set outside in June when the night temperatures are above 55° F. They like warm weather and rich soil and should be fertilized with a 5-10-5 gardening mixture.

These ornamental peppers are fun to raise. Not only are they attractive to look at, but they may also be eaten. Many different cultivars have been developed, but horticulturally, all can be treated alike. Seeds can be sown anytime and do best in loose soil: sand, peat, vermiculite or sphagnum. They germinate in about two weeks at a temperature of 70° to 80° F. They need a lot of water at this time, preferably from the bottom, so the soil does not compact. Once germinated, the plants like full sun and water only occasionally. Transplant them when they are about four or five inches tall into a light, sandy soil that has

plenty of humus added. Put them outdoors or in porch boxes or pots, one to a pot, for they are bushy. Pot outdoor plants for winter display. Peppers also do well under fluorescent lights.

Like most flowering or fruiting plants, peppers do not like too much nitrogen. When growing ornamentals of any kind, you should learn to use phosphorus feeding to promote flowering and, therefore, fruit production. You also can experiment with hormone sprays or gibberellins to improve fruit set. A slow release fertilizer in the soil works well, plus a water soluble fertilizer every week. Water when the soil is dry.

Knowing your plant's origins often tells you how to treat one that is new to you. *Capsicum* does well in a warm, moist climate with a long growing season. Plants will produce green fruit within six weeks after they are transplanted and will bear for three or four weeks. Once they drop their fruit, you may as well dispose of the plants.

Peppers are sometimes sensitive to chills and need water if subjected to dry air. Although they are susceptible to anthrac-

nose, this disease does not appear to be prevalent with house plants.

Insects are not usually a problem once the plants are established. If outside in the garden, cutworms sometimes attack, but this danger can be overcome by using cardboard discs at the base when transplanting. The plants are extremely susceptible to cold; even a mild frost will brown the leaves.

Probably the most popular forms are the sweet bell pepper and the hot cayenne or hot chili pepper. There are certainly a dozen popular sweet cultivars and a half dozen popular hot ones. Virtually all seed companies list a number of these in their catalogues.

Ornamental peppers are easy to dry. Cut and remove the seeds, place the peppers on racks or string them in an airy, shady place where a temperature of 100° to 140° F can be maintained. The oven, the attic, the area over the stove or a food dehydrator are all good locations. Too much sun can destroy the vitamins. You can use the whole pepper if you wish, but be aware that the use of the seeds and core intensifies the pungency and lessens the color. When brittle dry, grind the peppers and store the

spice in sealed glass jars.

A warning about working with peppers—you can burn yourself. Either wear rubber gloves or grease your hands with shortening when handling the peppers. If you do get burns, washing off your hands with water won't help, but milk usually works. To be safe, avoid the potential danger by taking precautions first. ☼

—Jeanne G. Hawkins

#### SOURCES FOR CAPSICUM SEED

AHS 1982 Seed Program. Look in seed program mailing sent to all members.  
Burpee Seed Company, Warminster, PA 18991

Herbst Seedsmen, Inc., 1000 North Main Street, Brewster, NY 10509

Geo. W. Park Seed Co., Inc., Greenwood, SC 29647

Stokes Seeds Inc., 737 Main Street, Box 548, Buffalo, NY 14240

Twilley Seed Company, Inc., P. O. Box 65, Trevoise, PA 19047

Jeanne G. Hawkins is a free lance writer who is on the Board of Directors for the Quail Botanical Gardens. She also edits the statewide bulletin for the California Native Plant Society.

## A Selected List of Capsicum Cultivars

Ornamental peppers come in many shapes and colors, and they all adapt well to container planting because they have a modest root system. A list of 16 popular cultivars follows. The first eight are primarily grown for their ornamental qualities. They may be listed as Christmas peppers, ornamental peppers, capsicums or simply peppers in seed catalogues. The last eight cultivars on the list will be found in the vegetable listings of most seed catalogues, since they are most often grown for eating or for flavoring foods.

Name	Shape	Color	Comments
'Aurora'	cone shaped	purple turning to red	may have five colors of fruit all at same time
'Black Prince'	candle shaped	black to bright red	nearly black foliage
'Christmas Pepper'	cone shaped	green, purple and red	
'Fiesta'	small, slender	white to red	white and red fruit at same time on bush
'Fips'	little, pointed	green to yellow to orange to red	
'Holiday Cheer'	globose	white and yellow ripening to red	
'Holiday Time'	cone shaped	yellow turning to red	AAS winner 1980
'Midnight Special'	long, slender	purple turning scarlet	foliage dark, almost black
'Anaheim TMR'	long, tapered	green to dark red	
'Dutch Treat'	long, tapered	yellow to orange then red	AAS winner, very ornamental
'Early Pimento'	heart shaped	dark green turning dark red	
'Hungarian Wax'	long, slender, pointed	canary yellow to bright red	
'Jalopeno'	oblong	green to red	
'Large Sweet Cherry'	flattened globe	deep green to cherry red	
'Long Red Cayenne'	curled and twisted	bright red	
'Sweet Banana'	long tapered	yellow	very ornamental

# THE SOLANACEAE FAMILY

**S**olanaceae, the nightshade family, ranks near the top of any list of plant families that serve mankind even though the grasses and legumes may surpass it in prominence.

Of interest to me in studying the Solanaceae were the different points of departure taken by the several authors I consulted. For instance, a horticultural reference states: "Besides having many ornamentals" (which were listed first), "the family abounds in plants with medicinal or poisonous properties, and the potato, tomato, eggplant, red pepper, tobacco and others are of great economic importance." Another begins, "It is easily one of the leading horticultural groups, for it includes vegetables of world-wide cultivation. . . . and many garden flowers." Still another, in citing its importance to man, begins by enumerating the "food plants."

This cosmopolitan family consists of about 90 genera and 2,000 species of herbs, shrubs, trees and vines of tropical and temperate regions, chiefly Central and South America. Nightshade flowers are borne singly or in clusters. The petals are fused so that the corolla is round and flat in some, tubular in others. The fruit is either a berry or a capsule, depending upon the genus. Leaves vary greatly in size and shape and are entire or variously dissected. They are usually alternate. Stems are sometimes prickly or hairy, as are some fruits.

'Tis true, vegetables dominate the group—and tobacco is second in importance among cultivated nightshades. Many species are poisonous. We are often reminded of this fact when using the common name of the family because of the frequent association of "deadly" with nightshade. However, among the strange relatives in Solanaceae there are numerous ornamental genera that are long familiar garden favorites and much used universally.

The genus *Solanum*, from which the family name is derived, includes about half of all the species in the nightshade family. So many, in fact, that classification is considered difficult. It includes the weedy *Solanum nigrum*, common nightshade, and toxic *S. dulcamara*, deadly nightshade, but also *S. tuberosum*, the potato. Many species of this genus have sedative properties,



***Solandra maxima* is a spectacular Mexican climber known as chalice vine or cup of gold.**

Alice R. Tangerini

and, indeed, the name comes from the Latin *solamen*, meaning comforting.

Ornamental solanums of tropical origin are much used as pot plants in the greenhouse or conservatory. Well known to most gardeners, and to the plant-buying public, is Jerusalem cherry, *Solanum pseudocapsicum*, a tender plant of modest size favored for its persistent scarlet or orange fruits.

Two tender South American vining species are *S. jasminoides* from Brazil, a climber with sprays of pure white, star-like flowers tinged blue and *S. wendlandii*, Costa Rican nightshade, also called paradise flower. *S. wendlandii* climbs by means of hooked prickles and produces clusters of showy light-blue flowers. Paradise flower is popular in Florida and also can be grown for greenhouse ornament.

Kangaroo apple, *S. aviculare*, from Australia, is a shrub with mauve flowers and flashy orange berries.

From Ecuador comes naranjilla, *S. quitoense*, which produces orange fruit variously described as tangerine-size, tomato-shaped or "as large as tennis balls." The plant is a large, robust shrub with hairy leaves and fruit densely covered with easily removed white hairs. The freshly squeezed juice is used in Ecuador and Colombia to make sorbete, a drink with an appealing sweet-sour flavor. In some Central American countries the fresh juice is processed into frozen concentrate. The fruit is an

excellent dessert fruit and in addition is used to flavor confections, jams and jellies. Naranjilla, the "golden fruit of the Andes," is included among "Underexploited Tropical Plants with Promising Economic Value," a 1975 report of the National Academy of Sciences.

*S. macranthum*, potato tree, is one of the few trees in the nightshade family. This beautiful flowering tree from South America was first cultivated in 1916 in Trinidad using seed from botanic gardens in Egypt. It is fast growing but short lived. Not only do the multicolored three-inch flowers—violet, pink and white—make a striking display but the 10- to 15-inch dark-green leaves are handsome also. It blooms year round in the tropics and bears orange berries the size of golf balls.

The genus *Solandra* was named for Dr. Daniel Carl Solander, a Swedish pupil of Linnaeus and the botanist on Captain Cook's first voyage of exploration in 1768. *Solandra maxima* is a spectacular Mexican climber known as chalice vine or cup of gold. The flaring, funnel-shaped, creamy blossoms, nine inches in length, turn orange with purple streaks after opening. Another gold cup, *S. guttata*, is more or less shrubby but climbs to 20 feet. It is much used in the greenhouse, but is planted outdoors in Hawaii and southern Florida. Fragrant yellow flowers feathered with purple are followed by large red berries. Popular for outdoor culture in California is *S. grandiflora*, from the West Indies, a 30-foot vine with fragrant white flowers. The solandras are winter flowering.

From Colombia comes *Streptosolen jamesonii*, the only species in its genus. This six- to eight-foot climber is often used potted and twining on supports in the greenhouse or conservatory. It also is excellent for the outdoor border where it can be lifted and cared for in the greenhouse during winter. In the extreme south and in California it can be grown outdoors. Its tubular orange flowers grow among hairy evergreen leaves.

About 40 species of tropical shrubs and trees comprise the genus *Brunfelsia*. A half dozen of these are cultivated in America, the best known of which is probably *B. americana*, lady-of-the-night. This six- to

eight-foot shrub needs a warm greenhouse for best production of its fragrant flowers, but it can be grown outdoors in Zone 9. *B. pauciflora* is much planted outdoors in tropical countries for its neat foliage and large, handsome, salver-shaped flowers. It will flower in the greenhouse throughout the year. The several variants of this free-flowering species are familiarly known as yesterday-today-and-tomorrow or morning-noon-and-night due to the fading of the flowers from blue through lavender to white. Otto Brunfels, a Carthusian monk, is honored in this flower. He was an early German botanist who in 1530 published the first good drawings of plants.

*Cestrum* is another group of tender fragrant shrubs, a few of which are grown for their beautiful clusters of flowers. They make handsome greenhouse plants and are popular outdoors in Zones 9 and 10. *C. diurnum*, day jessamine, is commonly planted in Florida. Its greenish-white flowers are followed by glossy black berries. *C. nocturnum*, night jessamine, or queen-of-the-night, is an evergreen species with greenish flowers also from the West Indies.

In a transitional location stands *Datura*, an interesting genus with medicinal and narcotic properties as well as ornamental features and a historic spot in genetic studies.

*Datura* is a genus of contrasts—from smelly weeds to lovely ornamentals. Of the eight or more species, the one commonly known as jimsonweed in the United States, *D. stramonium*, is among the best known and most widespread. It also is the one most widely used in medicines today.

Aside from its value as a source of medicines, jimsonweed has been important in gaining an understanding of fundamental biological principles. At the beginning of the 20th century, after the rediscovery of Mendel's laws, *Datura* was being used to illustrate genetic principles in college classes. Various interesting discoveries came out of the early study of *Datura*. One plant was discovered in the course of these investigations that, instead of the normal two sets of chromosomes, had only one and was thus the kind of individual that geneticists call haploid. This was the first haploid plant ever reported in scientific literature.

*D. stramonium* is an Old World plant now widespread in many areas. Known for its disagreeable odor, it nevertheless has various medicinal applications because of the scopolamine and atropine found in



***Physalis alkekengi* is the Chinese-lantern plant whose fruit is a red berry enclosed in a large, inflated orange calyx.**

Alice R. Tangerini

the seeds, flowers and leaves. All parts of this naturalized weed are poisonous.

Needless to say *D. stramonium* is not among the species grown as ornamentals.

Only *D. metel* from India is of much garden interest. It resembles jimsonweed with white, violet or yellow flowers, but they are larger and sometimes double.

*Brugmansia* is a genus of shrubs or small trees found along roadsides in the tropics. Originally classified in *Datura*, all of the shrubby species make good tub plants in cool climates. Commonly, they are often called angel's-trumpet. Probably the best of these is the double-flowered *Brugmansia suaveolens* (formerly *Datura suaveolens*). It is suited for the warm greenhouse as a pot plant or it can be unpotted and set in the garden in the summer. It is hardy for outdoor use in U.S.D.A. Zone 10b, and its pendulous, musk-scented white flowers adorn a 10- or 15-foot shrub. Also widely cultivated in tropical America is *Brugmansia X candida* (formerly *D. X candida*), the floripondio of Peru. *B. sanguinea* of the high Andes has yellowish or reddish-orange flowers that are pollinated by hummingbirds.

A number of herbaceous ornamentals of this family are grown simply for their flowers—in contrast to the diverse uses of some of those already described. Nearly all of these genera come from the southern part of South America. Among them are *Petunia*, *Browallia*, *Nierembergia*, *Salpiglossis* and *Schizanthus*.

*Petunia* without doubt is the most important. In a perusal of almost any current seed catalog we recognize the significance of petunias among garden flowers, and we observe immediately the great diversity of sizes, shapes and colors that exist in the species *Petunia X hybrida*. New cultivars

are continually being produced from selection of mutants, hybridization and treatment with plant growth hormones. Luckily the delicious scent, especially in the evening, has survived the large scale breeding that has resulted in the multitude of forms.

Petunias have made their own scientific contribution, being used in research focused on the mechanisms of air pollution damage to ornamental plants. As test plants they revealed that even within a given species some forms have more resistance to air pollution than others. For example, purple, blue and red petunias are much more resistant to chemical smog than are common white petunias, and small-flowered ones show more resistance than those that are large-flowered.

*Browallia speciosa* 'Major', which is useful in the shady border, is the plant usually selected to grow in pots for the balcony or patio or in the greenhouse. Dwarf cultivars 'Blue Troll' and 'White Troll' are becoming increasingly popular because of their floriferous, compact growth. *Browallia* bears the name of another Swedish botanist, John Browallius, Bishop of Abo.

*Nierembergia*, the cupflower, is especially good for pots and window boxes and for bloom in summer in the flower border. The hardiest is *N. hippomanica* var. *violacea* with violet-blue flowers. *N. repens* var. *rivularis* has white blossoms. It makes a dense mat and is useful for bedding or planting between stepping stones.

*Salpiglossis*, painted tongue or velvet flower, is native to Chile. Known for the bright, rich colors of its satiny flowers with contrasting veins, it is available in many fine hybrids, both in mixtures or in separate colors.

*Schizanthus*, the butterfly flower or fringe flower, a Chilean half-hardy annual, is best used as a pot plant in the greenhouse. It can be used outdoors where temperatures are moderate, but it does not flourish in the hot summers characteristic of many parts of the United States. The leaves of the butterfly flower are much divided and lacy. The flowers are very different from others in the nightshade family for they are highly irregular with some of the lobes of the corolla being of different sizes or shapes from the others. *Schizanthus* blooms profusely in many-flowered clusters of delicate white, pink, rose, gold and violet flowers, usually with blotches of other colors.

Not to be overlooked in this recital of herbaceous flower garden genera are *Nicotiana* and *Physalis*, both of which have uses other than merely for flowers.

Delightfully fragrant flowering plants for the garden are *Nicotiana alata* and its cultivars whose flowers close in cloudy weather. Grown as an annual from seed, and often self-seeding in the garden or even living over the winter, it adds white, rose, mauve, cream or even greenish colors to the border. The tall annual or, in the South, perennial, *N. sylvestris*, is considered to have superior exotic perfume. Its flowers do not close in cloudy weather.

*Nicotiana tabacum* is the so-called "filthy weed" or tobacco whose history includes absorbing tales of its aboriginal uses and its introduction to European colonists and explorers. It is a crop plant of economic importance and for that reason it occupies a place in the modern scientific discovery of photoperiodism in plants. The response of plants to differing periods of day and night is known as photoperiodism. The principle was discovered by two government scientists who were working to determine why a certain variety of tobacco plant failed to produce seed in the vicinity of Washington, D. C. when it was successfully grown somewhat farther south. When they mechanically shortened the length of day for the plant, seed was produced, thus uncovering this new principle that is now incorporated in successful culture of many horticultural crops and also in the management of blooming plants in the home.

A novelty in the garden is *Physalis*, ground cherry or husk tomato. There are about 100 species of this genus, some annual, some perennial, originating in warm and temperate regions. They are mostly American. *P. alkekengi* is the Chinese-lantern plant whose fruit is a red berry enclosed in a large, inflated orange calyx. Winter bouquets of these colorful lanterns will last for weeks. Some other tropical species of *Physalis* produce edible fruit.

Speaking of edibles, as set forth at the start of this column, some favorite vegetables belong to the nightshade family. In April's "Strange Relatives," with the coming of spring and the home gardening season, we will give attention to the tomatoes, peppers and others of the Solanaceae. ♀

—Jane Steffey

Jane Steffey is the horticultural advisor to the American Horticultural Society.

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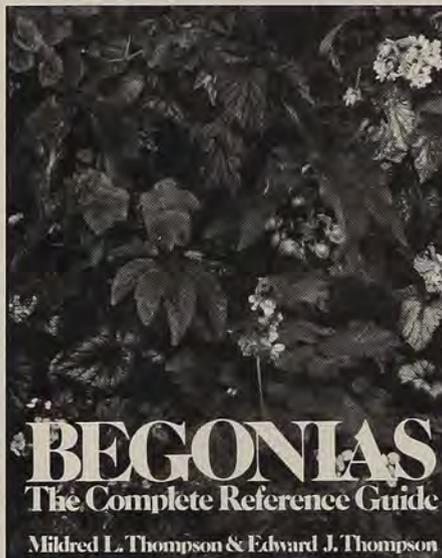
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# BOOK REVIEWS



## BEGONIAS—THE COMPLETE REFERENCE GUIDE.

Mildred L. Thompson and Edward J. Thompson. Times Books. New York, New York. 1981. 356 pages; hardbound, \$35.00. AHS discount price, \$30.50 including shipping and handling.

The begonia is one of the most popular of horticultural plants, but there has long been no authoritative publication on this genus for the amateur grower. This gap has now been filled. *Begonias*, produced as a labor of love by the Thompsons, finally provides a cultural and descriptive guide to the many different forms of the species and hybrids of the genus *Begonia*. This beautifully produced, large format book is loaded with illustrations and lists of cultivated species and cultivars. Although organized by the horticultural classification of begonias, which groups plants of similar growth habit, careful attention has been paid to the correct botanical classification of all species, and an introductory chapter gives an excellent background to the taxonomic history of these plants. Cultural instructions are given throughout the text, and separate chapters are devoted to propagation and growing in the garden and the greenhouse. If you grow begonias, you must have this book.

*PLANT HUNTING IN NEPAL.*  
Roy Lancaster. Croom Helm. London. 1981. 194 pages; hardbound, \$22.00.

AHS discount price, \$17.75 including postage and handling.

This is the sort of book you expect to find on an antiquarian book dealer's list — a horticultural adventure in some remote part of the world long ago as narrated by a knowledgeable and literate plantsman. All of that is true, but this adventure took place in the autumn of 1971 and Roy Lancaster, the former curator of the Hillier Arboretum in England, is telling us about it today. Well written and illustrated, this is a book to read on a winter's evening when the snow is blowing and the garden is invisible. Reading it will make you want to retrace the author's steps and you'll come away with a long list of new plants you'll want to introduce into your own garden.

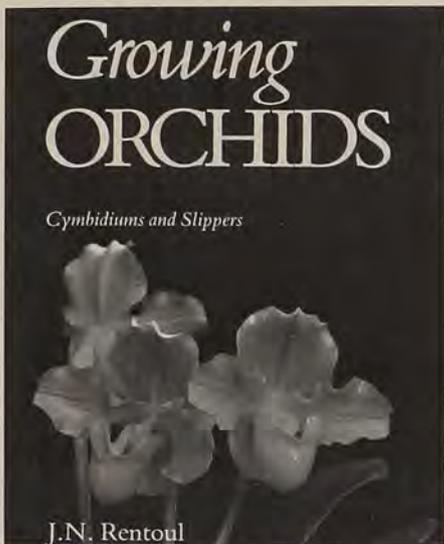
## ORCHIDS AGAIN!

*ALL ABOUT ORCHIDS.*  
Charles Marden Fitch. Doubleday and Co. Garden City, New York. 1981. 276 pages; hardbound, \$15.95. AHS discount price, \$14.80 including postage.

*GROWING ORCHIDS-CYMBIDIUMS AND SLIPPERS.*  
J. N. Rentoul. University of Washington Press. Seattle, Washington. 1980 (actual publication date, November 1981). 172 pages; hardbound, \$29.95. AHS discount price, \$28.20 including postage.

*THE MANUAL OF CULTIVATED ORCHID SPECIES.*  
Helmut Bechtel. Phillip Cribb and Edmund Launert. The MIT Press. Cambridge, Massachusetts. 1981. 444 pages; hardbound, \$75.00. AHS discount price, \$61.25 including postage.

*All About Orchids* is a complete beginner's guide to growing these ever popular plants. Whether you have a greenhouse, a light room or only a bright windowsill, these clear cultural instructions should guide you to success with growing orchids. Almost half of the book is devoted to descriptions of the more popular genera and species and many hybrids. The rest of the book tells you how and where to grow them and where to get plants and supplies. Lots of illustrations add to the utility of this book, which is recommended as one of the better orchid books for beginners.



*Growing Orchids* deals primarily with two genera, *Cymbidium* and *Paphiopedilum*. The treatment is historical as well as horticultural, which makes for interesting reading. This book is more for the specialized collector, since the cultural instructions all relate to Australia and would be extremely confusing (and six months out of phase) for a beginning grower. Forty-two pages of color plates provide good illustrations of many of the species and some of the more popular hybrids.

*The Manual of Cultivated Orchid Species* is an expensive book, but well worth the price. It is a basic reference to the cultivated orchid species that belongs in every serious orchid grower's library. Two hundred and seventeen genera and more than 1,200 species are critically described. Discussions of their history and taxonomy and brief cultural notes are also included. Excellent line drawings throughout the text are a further aid to identification. Colored photographs of 720 species include all of

the described genera. This is the most complete and up-to-date treatment of orchid species currently available.

**THE COMPLETE BOOK OF ROSES**  
*Gerd Krüssmann. Timber Press.*  
 Portland, Oregon. 1981. 436 pages;  
 hardbound, \$50.00. AHS discount price,  
 \$43.75 including postage and handling.  
 Paleontology, mythology, philology, ancient history, art and the history of the rose in horticulture are merely the introduction to this book. Commercial rose production, propagation and plant breeding are still further studies covered before the main subject of rose species and cultivars begins. For once the title does not lie —this is the COMPLETE book of roses. Writing with typical Teutonic attention to detail, Gerd Krüssmann has brought the entire study of all possible aspects of the rose between the covers of one book. This new English edition has been updated and translated by the author from the original German edition of 1974. A monumental and authoritative work, the English edition is the definitive study of the rose from prehistoric times to 1981. Whether you are interested in rose species, old garden roses or modern hybrids, each variety is described with information on the originator, date of introduction and parentage of the hybrids. For more important cultivars, a lengthier pedigree is given. Wherever possible, the American Rose Society rating as well as the horticultural class (hybrid tea, climber, shrub, etc.) is provided. This is not a picture book, but it is sure to become a standard reference work. ♣

—Gilbert S. Daniels

Gilbert S. Daniels is the President of the American Horticultural Society.

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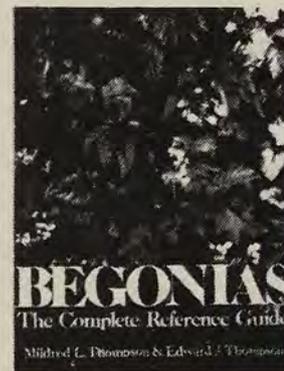
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# TOPWORKING FRUIT TREES

All too often gardeners are faced with the problem of what to do with an existing fruit tree that bears unpalatable fruit or that of wanting to grow several kinds of fruit in a limited amount of space. Topworking a tree can solve both of these problems, but unfortunately, few gardeners realize the potential it affords them. Fewer still are willing to try topworking because it seems to be such an awesome task.

Owners of commercial orchards topwork entire blocks of their trees to obtain fruit from newer cultivars. By grafting or budding (in that case the technique is called top-budding) new cultivars on to their existing trees they can obtain fruit with the best form, color and texture, optimum harvest dates, better storage qualities and increased disease resistance without having to plant entirely new trees. Backyard gardeners with only one tree can topwork it to obtain the same benefits.

Using the know-how of professional grafter Walter W. Turner, even the rankst beginner can successfully change an undesirable apple seedling to one bearing good eating apples. In fact, there is no reason why two, three, four or more choice cultivars can't be grafted onto the same plant to create a tree that produces several different types of apples from July to November. The best cooking apple is usually not best for fresh eating, but there's no problem deciding which to plant—by topworking, a family can have both on the same tree. For example, Turner has a young apple tree in his own yard already bearing 'Red Delicious', 'Winter Banana' and 'Rome Beauty'. He also has grafted on two other cultivars he particularly enjoys, and for fun he plans to add a crab apple he likes, which is red all the way through.

As a general rule, the more closely related two plants are botanically, the more likely they are to graft or bud successfully. Several cultivars of the same species are, in most cases, easy to graft or bud onto a single plant. In a few cases it also is possible to graft several species in the same genus onto a single plant. For example, it would be possible to have limes, lemons, oranges, grapefruits and Mandarin oranges, all members of the genus *Citrus*, on the same



ABOVE LEFT: When removing a branch to be grafted, Walter W. Turner first saws it off ahead of the place he plans to graft in case the wood cracks. He then re-cuts and grafts.

ABOVE RIGHT: A beginner using a heavy hammer or mallet could cause too much splitting.

The length of the split isn't important, but it is vital that enough tension remains in the split limb to hold the scions firmly in place. BELOW LEFT: Use a screwdriver to hold the crack in the limb apart while the scions are inserted, and trim the scions to a taper that matches the crack as closely as possible. A chisel can be used to spread the limb if a screwdriver won't hold it far enough apart. BELOW RIGHT: Be sure to wax all freshly cut surfaces, including the tips of the scions. If the wax cracks or a bubble escapes, rewrap, or air may reach the wound and dry out the scion.

citrus rootstock. Members of the genus *Prunus*, such as plum, almond, apricot, peach, nectarine and cherry, also could be grafted onto the same plant. According to Turner, apricots, cherries and peaches all

have brittle wood that splits easily, and for this reason, as well as the fact that the percentage of take is so low, soft fruits are generally top-budded rather than top-grafted (topworked). "Even when we bud

them,” Turner says, “we consider ourselves lucky if we get a 50 percent take. We have to re-bud the failures.”

In addition to changing the type of fruit a tree bears, topworking also can be used to induce a crop from a non-bearing tree. Many apple cultivars, for example, are self-sterile, that is, they require pollen from a different cultivar to bear fruit. If there is no other pollen source in the vicinity, then it is unlikely that such a tree will bear fruit since bees will not transfer compatible pollen to the flowers.

Mr. Turner considers apple wood easy to topwork. “The softer apple woods, like ‘Delicious’ and ‘Jonathan’, are the easier ones to graft,” he says. ‘Winesap’ and ‘Lodi’ have harder wood that also is more brittle. Therefore, they are a bit more difficult to graft. Turner counts on 90 percent take or better on his apple grafts.

Topworking old trees is best done gradually. It can harm a tree if too many branches are grafted in one year. A good rule to follow is to graft an old tree over a three-year period, treating one-third of the branches each year.

The first step in the process is to collect the scions that are to be grafted onto the old tree. The time of year to collect scions is when the trees are dormant—after the leaves fall off in the autumn, in winter or before spring growth starts. According to Turner, “When the buds start swelling, it’s too late to get scions, and before the leaves fall, it’s too early to get scions.”

Besides a friend’s apple tree, preferably one recently purchased as “disease free,” a good source for scions is a commercial orchard that is being pruned. Simply cut last year’s new growth off the prunings. Another possible source is a fruit tree nursery. Not every nursery offers scions for sale. Those that do have a broad program to reduce the hazard of transmitting invisible viruses that remain latent until exposed to certain conditions. Ronald B. Tukey, Extension Horticulturist from Washington State University, states, “[Our] scion wood is only taken from trees that have been indexed as virus free. These trees are continually tested by grafting buds onto susceptible test plants. It is an expensive program but reduces the hazards of transmitting virus.” Nurseries that offer scions for sale will probably offer several non-patented cultivars.

It is important to use disease-free scions since disease organisms can be transferred into a healthy tree through a graft union.

“The selection of good scion wood tends to eliminate any serious problems with fungal or bacterial diseases,” says Turner. He agrees with Tukey that “most diseases can be recognized as atypical growth, off-

***The best cooking apple is usually not best for fresh eating, but there’s no problem deciding which to plant—by topworking, a family can have both on the same tree.***

color wood or leaves, faulty leaf shape or bark disorders.”

Turner selects one-year-old growth that is at least one foot long. “The bigger it is the better,” he says. He then twice-ties each bundle of scions, labels them and puts them in cold storage. He also recommends the following procedure: “Bury them on the shady side of the building. The object is not to let them dry out. Also, you don’t want them to mold. If you place scions in a plastic bag and bury them a few months, they’ll undoubtedly mold. It’s best to put them in a burlap bag or in nothing at all. Bury them. Be sure they are completely covered with earth, and cover the plot with plastic. They will still be moist when you dig them out. When the ground starts heating up, that’s when you get the mold, from the rising temperature in daytime and lowering at night, creating condensation. To avoid mold, use the scions as early in the spring as you can.”

Turner believes his optimum time for grafting is when maples bloom. At that time crocuses and snowdrops are flowering and forsythia is in bud. Most grafting is done from the time the sap starts rising and buds start swelling until blooms fall. Certain grafting can be performed all summer provided juicy scion wood can be found.

Because it is vitally important that scions retain moisture right up to the time the grafts unite, Turner takes from storage only as many scions as he will use in a few hours’ time. He recommends carrying scions in wet burlap and setting them down in the shade or under a sprinkler.

With nippers, he cuts off the bottom of each scion so the wood is fresh, and cuts each scion straight across into three-bud

or four-bud sticks. It is important to remember which end of each scion is the proximal end (the end nearest the stem-root junction of the plant), because if a scion is grafted onto the plant “upside down,” a successful union will not be formed and the scion will eventually die. Each scion must be checked to be sure the buds are uninjured by mold, by a shovel digging them out or by freezing. Says Turner, “As you’re cutting them you check to see how moist they are. If they cut kind of dry—that is, hard to cut and sound dry—then you check the cambium layer. If it’s good, it’ll be a clear green color. If the scion is bad, it’ll be a brown color. A good way to check is to cut off a live twig and compare. Also, you check for shrivel wrinkles.” Although Turner chooses to cut his scions ahead of time and store them, some grafters cut the scion wood from nearby trees as they graft.

Faced with the stock trees, how does a grafter determine which limbs to graft? “I ask the orchard owner how many leaders he wants per tree and what shape—central leader, open vase, what?,” says Turner. “Most people want four to six leaders in a tree. Generally, I pick out six good leaders so if one happens to die, he’ll still have five good ones.

“Some orchardists like their limbs really low on the tree, almost down at its base. Some like them high; others, in-between. Ordinarily, they don’t prune the trees they want grafted. The tree structure is there. I just pick from the limbs. I try to space them evenly around the tree so that looking down from the top it looks like a star with five points.”

On older trees he grafts limbs about a foot from the trunk. When the grafter selects limbs to graft, spacing is much more important than limb diameter, providing the limb is under four inches, because limbs over four inches are difficult to split for the cleft graft. On the same tree, Turner frequently uses whip grafts for the branches under an inch and cleft grafts for sawed limbs.

Proper tools make grafting easier and more effective. A pair of hand shears or nippers or loppers is sufficient for small limbs. A pruning saw or chain saw is best for removing limbs larger than one inch in diameter. A small, sharp hatchet or cleaver and a hammer to drive it are necessary tools for clefting. Carry a screwdriver or chisel (Turner carries both) to spread the split apart to insert sticks. A

sharp knife—razor sharp or better—is absolutely essential to make smooth, straight cuts in the scions. Making a jagged cut reduces the chances of a successful graft considerably. Don't forget tape for wrapping whip grafts. Last on the list are wax and a paintbrush (one-inch is fine) to apply it.

Each cut is made straight across the limb. As insurance against cracking, Turner always severs the limb a few inches above the spot where he intends to make the cut for the graft. This way, he is more likely to be able to make a smooth cut on the spot he has chosen. The weight of the falling branch can often cause the limb to crack or the bark to tear along the underside of the branch as it falls.

When he cleft grafts the larger limbs, he places the clefting tool in the center of the limb perpendicular to the branch. That way both scions will be centered on the limb.

Turner suggests striking the clefting tool with just enough force so that the limb will spring back with enough pressure to hold the sticks firmly. "Use the chisel or screwdriver to open the split and hold it open. On each side is a tapered crack. You try to match that taper when you cut the sticks.

The sticks go in flush at the top and slanted in slightly so that the cambium layers have to cross. When you pull out the chisel, the sticks should be held solidly so that they won't move even when you wax them."

Branches under one inch are whip grafted. Turner recommends that whip grafts never be exactly matched. "There's more of a chance the cambium layers will match if they're just a little bit offset. Make tapered cuts on a long slant, slit them in the middle, push them together. Overlap at least at the bottom. Tape the graft tightly so that no fresh wood shows. Wax."

Waxing is important to maintain moisture in the newly cut surfaces while a graft union is forming. Wax seals out air that would dry out the scion. Turner waxes over and around all the tape of the whip graft and the tip of the scion. On cleft grafts, he waxes all fresh wood—where the cuts are, the splits caused by the clefting tool and the tips of the scions. Grafts must be sealed with wax within five minutes. A fast grafter can graft and wax an entire tree in that time limit if necessary. New grafters would be wise to wax one cut at a time. Should it rain before the wax dries, the grafts must be re-waxed within a day.

Turner obtains his best results from a wax that dries like plastic and stretches as the graft grows. Its one drawback is that it will crack if applied below 40° F.

Within a month's time the grafter can see which grafts have taken. The grafts are successful if the buds on the scions swell. They will leaf out if growing conditions are favorable.

During the grafting process a large portion of the tree is cut back. Consequently, lush growth will shoot out all over the tree. If a graft does not take, select one or two suckers below it that point in the correct direction. These may be budded later in the year or grafted the following year. Trim out all other growth from around the suckers you select.

When the grafts take Turner advocates temporarily leaving growth around them. "You've got to leave this stuff in the spring because you've cut off all those buds that were pulling the sap up. You've got to have buds there pulling sap up in the cambium layer to get that graft off to a good start. This is the reason why trees to be grafted are not pruned. The extra limbs—those you don't prune off—induce the sap to the graft."

Come summer, the limbs that helped bring nutrients to the grafts become competition for those same nutrients. Turner cuts away all growth from the limb stubs on which grafts were made until only the grafts remain. He also removes any branches that could be wind-whipped against the grafts and cuts out upper limbs that fruit weight might lower to brush against the grafts.

Only one of the two scions in each cleft graft will be permitted to grow. Pruners will remove the weaker one by cutting it away when the tree goes dormant. In later years the original tree can sprout profusely. Pruning is easier if the grafts are marked somehow so that the pruner won't accidentally cut away branches coming from the graft while leaving branches originating on the old tree.

For the grafter, topworking is akin to creation. The satisfaction of harvesting fruit from a limb you have grafted is very much like the pleasure of plucking tomatoes from plants you have raised from seeds. ●

—Joy D. Foraker

Joy D. Foraker is an orchardist and a freelance writer who has contributed to such publications as *Western Fruit Grower*, *Plants Alive*, *Organic Gardening* and *House Beautiful*.

## Sources for Supplies and Additional Information

Gardeners wishing to topwork their own trees will want to read more extensively about grafting and budding techniques before making their first cut. Read Robert F. Carlson's article, "Grafting Techniques: A How-to-Guide," *American Horticulturist*, Volume 58, Number 2, April, 1979. Two books that will provide extensive, in-depth information about the subject are *Plant Propagation, Principles and Practices* by Hudson T. Hartmann and Dale E. Kester, Prentice-Hall, Inc., 1975 and *The Grafters' Handbook* by R. J. Garner, Oxford University Press, 1979. Both books are well illustrated with photographs and line drawings and contain discussions of the theoretical and practical aspects of grafting, budding and topworking. Since the books are written for professional horticulturists and students, the discussions can be rather technical, but they aren't beyond the scope of the serious gardener.

Grafting supplies such as wax, knives and tape are available from:  
Barrington Industries, P. O. Box 133,

Barrington, IL 60010, Catalogue 2.00.

Mellinger's, 2310 West South Range, North Lima, OH 44452. Mellinger's offers amateur grafting kits complete with knives, wax, tape and a cleft grafting tool.

Scions should be available from a local orchard or a neighbor who is willing to prune his tree. They also can be ordered from:

New York State Fruit Testing Cooperative Association, Geneva, NY 14456. Orders for dormant scions and cuttings should be placed before January 15th; this will be a good source of scions for those wishing to topwork their trees next winter.

Van Well Nursery, P. O. Box 1339, Wenatchee, WA 98801.

Pre-grafted trees with three, four and five cultivars on the same plant are available from several sources:

Gurney Seed and Nursery Company, Yankton, SD 57079 offers five-in-one pear trees and apple trees.

Kelly Brothers Nurseries, Inc., Dansville, NY 14437 offers three-, four- and five-in-one apple trees.

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# New Plants for '82



**E**ach year in January, February, March and April, gardeners across the country eagerly await the flush of new catalogues and plant lists that arrive in the mail to tempt them. In her book, *Onward and Upward in the Garden*, Katherine White said, "For gardeners this is the season of lists and callow hopefulness; hundreds of thousands of bewitched readers are poring over their catalogues, making lists for their seed and plant orders, and dreaming dreams."

The word new can mean many things.

In the following list, representing our choices of the introductions to look for in 1982, we considered only cultivars that will be available commercially in this country for the first time this year.

Our selections were made on the basis of information collected from various nurseries introducing plants. We solicited information on as many introductions as we could, looked at photographs, compared descriptions and made blatantly subjective choices. How nice it would have been to preview more new perennials, and perhaps

some more exotic species, but because of the way these plants enter the market, they aren't introduced with the flourish given to annuals and vegetables.

Here is our list of new plants to look for in 1982. Once again it's time to start poring over catalogues, comparing the old, and the new, making lists and dreaming dreams.

Sources for the plants we have selected are mentioned in the descriptions that follow. Addresses of these suppliers can be found at the end of the article.



**1 *Potentilla* 'Gibson's Scarlet'**: (pictured on previous page) A cultivar featured by Alan Bloom in his *Perennials for Your Garden*, 'Gibson's Scarlet' is a herbaceous potentilla frequently seen in European gardens but seldom found in America. It is now available from Wayside Gardens. It bears its scarlet flowers all summer, more continuously than other red cultivars such as 'Congo' and 'Flamingo'. A sun lover that thrives in any fertile, well-drained soil, 'Gibson's Scarlet' has soft-green foliage. U.S.D.A. Zones 5-9.

**2 *Spiraea japonica* 'Shirobana'**: Another Wayside introduction that has graced European landscapes for years, 'Shirobana' produces masses of lovely white, pink and red flowers from late spring through September. Unlike other members of its species, 'Shirobana' has a compact growth habit and only reaches a

height of from three to four feet. U.S.D.A. Zones 4-9.

**3 *Rosa* 'Gold Badge'**: In addition to the four All-America Rose Selections winners for this year, 'Brandy', 'French Lace', 'Mon Cheri' and 'Shreveport' (see the July, 1981 issue of *American Horticulturist* news for more information about these new cultivars), rose fanciers should look for other new roses. 'Gold Badge' was hybridized by the French hybridizer M. Meilland and was one of the new cultivars featured at the Conard Pyle Company's Annual Red Rose Rent Day. It is a beautiful yellow floribunda that blooms from May through November. 'Gold Badge' bears four-inch, lemon-yellow flowers and strong, dark-green foliage. Bred for vigor and disease resistance, 'Gold Badge' can be used in the garden or as a low hedge. It is available from

Wayside Gardens and at local nurseries and garden centers. U.S.D.A. Zones 4-10.

**4 *Gazania* 'Sundance'**: Large russet, red, orange and yellow blooms borne on sturdy stems high above the foliage are the trademark of this new F<sub>1</sub> tetraploid *Gazania* cultivar. The extra two sets of chromosomes lead to more vigorous growth, uniform habit and increased bloom. Plants should be available in garden centers and nurseries this spring. Seed is available from Herbst.

**5 Pepper 'Zippy'**: A new, mildly-hot hybrid pepper from W. Atlee Burpee Company, 'Zippy' has a flavor sharp enough to stimulate the taste buds without being too biting. The fruit looks very much like 'Long Red Cayenne', about six inches long and five-eighths of an inch wide, but it does not have



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the fiery taste. Prolifically borne fruit is ready to pick at the green-mature stage about 57 days after the plants are set into the garden. Fruit also can be left on the plant to ripen to a bright, shiny red. 'Zippy' fruit is delicious when eaten raw or cooked.

**6 Rosa 'Windjammer':** A miniature rose introduced by Nor'East Miniature Roses, Inc., 'Windjammer' bears orchid-pink blooms that have cardinal-red edges. As the flowers age they slowly turn completely red. A vigorously growing plant, 'Windjammer' averages 18 to 22 inches in height.

**7 Verbena 'Showtime':** 'Showtime' is a new mixture of early flowering types with an excellent color range. The attractive flowers are borne on plants that reach a height of 10 inches and spread to about 18 inches.

**8 Squash 'Jersey Golden Acorn':** This All-America Selections Bronze Medal winner bridges the gap between summer and winter squash. It can be eaten fresh in the summer like zucchini or stored for winter use like any other winter squash. Each bush-type plant will support from two to four mature fruits and will produce many more fruits that can be harvested and eaten when small. The fruit has a distinctive, nutty flavor. Harvest immature fruit when it is smaller than a tennis ball. It has a distinctive, nutty flavor. Mature, golden-orange fruit weighs between two and four pounds and has three times the vitamin A sources (beta carotene) as standard green acorn squashes. Available from Gurney Seed and Nursery Company and Geo. W. Park Seed Company.

**9 Zinnia 'Fantastic Light Pink':** The first of

two zinnias receiving All-America Selections Bronze Medal awards in 1982, this new cultivar bears large (4½ inch) flowers on compact, symmetrical plants. As the flowers slowly open the outer layer of petals ages to a light-pink color while the inner petals remain a deeper hue. The petals tuck under at the tips giving the flowers a ruffled appearance. Available from Twilley Seeds and Herbst.

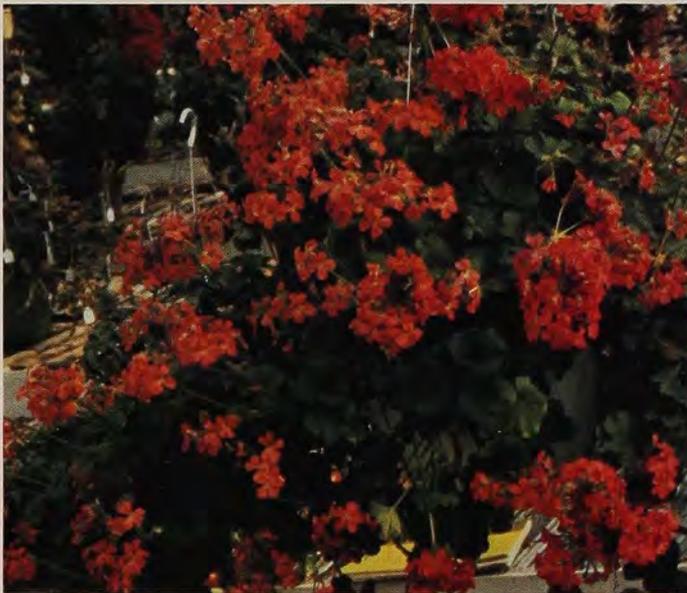
**10 Tagetes 'Bonanza Yellow':** A clear-yellow flowered marigold, 'Bonanza Yellow' combines the early flowering characteristic and plant habit of cultivars such as 'Yellow Boy' with the large flower size of the Royal Crested Series cultivars. Mature plants are from 10 to 12 inches tall. Seed is available from Stokes and Joseph Harris. Plants should be available from local nurseries and garden centers.



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11 *Petunia Ultra Series*: 'Ultra Red', 'Ultra Pink', 'Ultra Salmon' and 'Ultra White' are grandiflora petunias with the concentrated colors characteristic of the multiflora types and the large flowers of the grandiflora. Ultra series petunias are compact, mat forming plants that reach a height of from six to eight inches. They bloom early, flower throughout the summer and will tolerate bad weather and air pollution. Seed is available from Park Seed Company.

12 *Cucumber 'Burpless Bush'*: The first bush cucumber, 'Bush Whopper', was introduced in 1977, and like that cultivar, 'Burpless Bush' has a compact, space-saving growth habit. The smooth, spineless fruit often reaches a length of one foot, and the skin is thin and edible. 'Burpless Bush' is ready to harvest in only 42 days. Available from

Park Seed Company.

13 *Gerbera 'Happipot'*: A new cultivar that should be available in nurseries and garden centers this spring, 'Happipot' can be grown and enjoyed as a four-inch pot plant and then transplanted to the garden where it will bloom throughout the summer. 'Happipot' bears flowers in shades of red, pink, salmon, orange, yellow and cream that are suitable for cutting. It is compact and reaches a height of only eight to 12 inches. This new introduction blooms profusely and is adaptable to climates across the country.

14 *Pelargonium 'Cascade Orange'*: The first real seed-grown hanging basket geranium available, this new Park Seed Company introduction bears flowers that range in color from salmon-orange to scarlet. The zoned fo-

liage is dark green and the stems trail to two feet.

15 *Squash 'Peter Pan'*: An All-America Selections Bronze Medal winner, 'Peter Pan' is a scallop or patty pan summer squash whose fruits remain tender to a diameter of five inches. The fruit also can be harvested and eaten when very small. Test to see if the fruit is tender enough to cook without peeling and scooping out the seeds by pressing on the skin with a thumbnail. 'Peter Pan' is a bush type plant. Available from Herbst, Twilley Seeds and Geo. W. Park Seed Company.

16 *Salvia X superba 'May Night'*: A plant already being grown in European perennial borders but new to American gardens, 'May Night' bears intense violet-blue flowers on upright spikes. The plant's neat, dense and



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compact habit is maintained through the summer, and the plants do not exceed 15 inches in height. This new Wayside introduction flowers in May and June, prefers a sunny spot and will withstand drought. 'May Night' is mentioned in Alan Bloom's *Perennials for Your Garden*. U.S.D.A. Zones 4-9.

**17 Zinnia 'Small World Cherry':** The second zinnia cultivar to win an All-America Selections Bronze Medal, 'Small World Cherry' is a dwarf plant about the size of the popular Peter Pan Series (12 inches). When grown on one-foot centers the plants will spread to cover 18 inches. Its beehive-shaped flowers are smaller than those of the Peter Pan Series (two to 2½ inches in diameter) but they are more numerous. The flowers are a cherry-red color. Available from Twilley Seeds, Geo. W. Park Seed Company and Herbst.

**18 Tomato 'Basket King':** Just as its name implies, 'Basket King' is a cultivar developed especially for growing in hanging baskets. This new W. Atlee Burpee introduction bears small, 1¼-inch fruit in clusters of from four to seven fruits. The fruit is thin skinned and sweet. Not only will 'Basket King' bear a lot of fruit, but it also will make an attractive hanging basket plant.

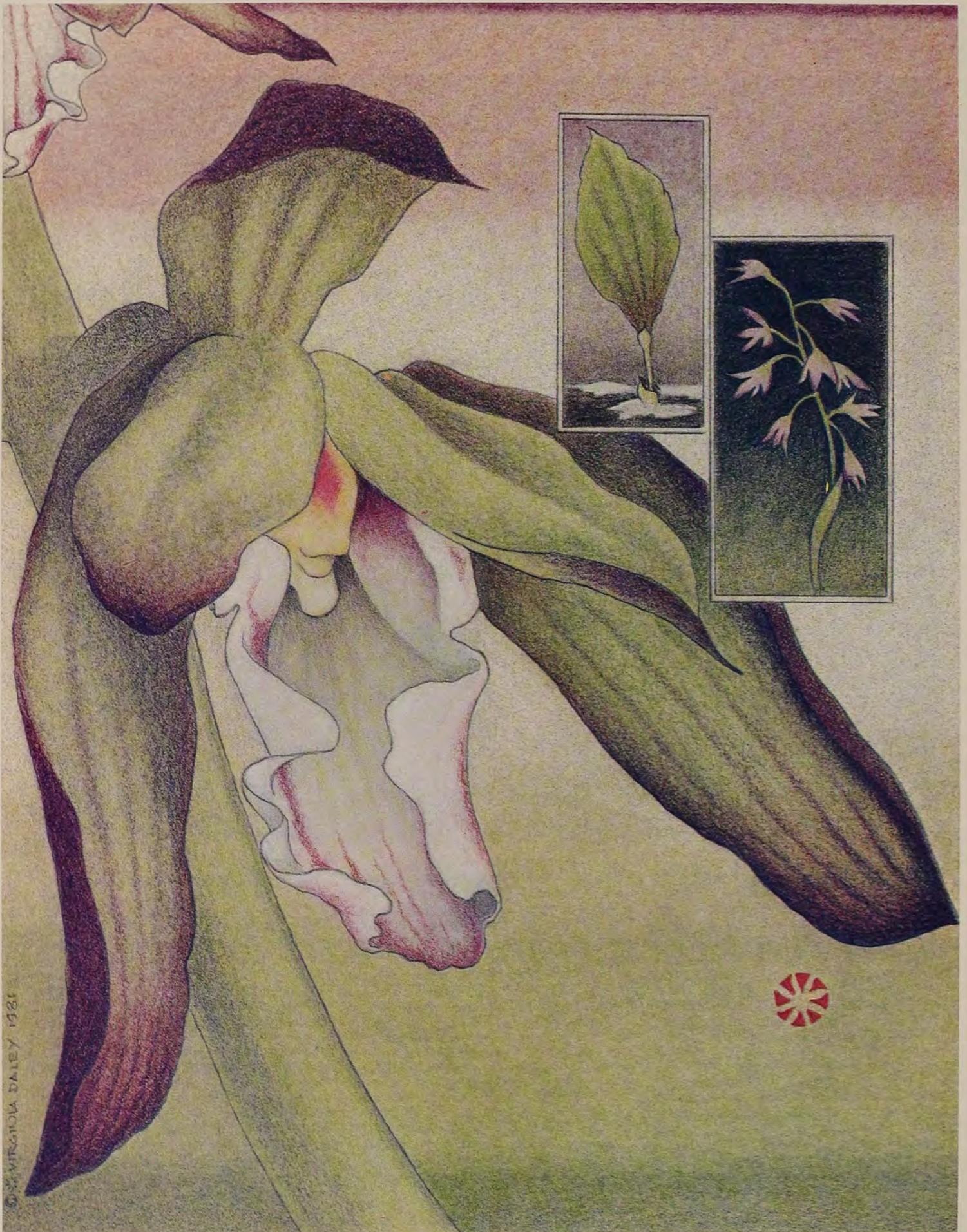
**19 Lathyrus odoratus 'Snoopea' Mix:** This new sweet pea cultivar does not have tendrils and so the free-flowering plants are neat looking without the need for nets, fences or other supports. The colorful blooms (there are eight colors in the mix) are closely spaced on 16-inch stems. 'Snoopea' has better early summer performance than many older cultivars since the leaves shade the tender root system from heat and dryness. Available from

Gurney Seed and Nursery Company and Stokes Seeds.

**20 Zucchini 'Richgreen':** Rich, dark, glossy-green fruit is the trademark of this new hybrid. 'Richgreen' is a vigorous, single-stemmed plant with an open growth habit that makes the fruit easy to spot. Harvest can begin approximately 50 days after sowing. Available from W. Atlee Burpee Company.

**21 Pelargonium 'Smash Hit Salmon':** Smash Hit Series geraniums have been available in garden centers and nurseries for several seasons; 'Smash Hit Salmon' is a new color to add to the series. These plants are early, compact, well zoned and free flowering. Available from Geo. W. Park Seed Company.

*Continued on page 36*



Baltimore winters tend to be long and dreary, the more so as I grow older. There are compensations, of course. A hearty fire in the evenings and a brisk walk on cold days are two pleasures I can think of. And for me, living next to the city-owned Robert E. Lee Park (situated in Baltimore County), the brisk winter walk usually includes a look at the puttyroot orchid.

Puttyroot is *Aplectrum hyemale* — *aplectrum* from the Greek, meaning without spur (to distinguish it from two somewhat similar terrestrial orchids whose flowers *do* have spurs), and *hyemale*, meaning winter. *Aplectrum*, like *Tipularia discolor* and *Calypso bulbosa*, has a winter leaf, and for several years I have felt that the sight of this leaf made the daily winter walk worthwhile. An unusual leaf, crinkled and light green, with longitudinal lines, it sticks up from its bed of stiff, brown, fallen oak and beech leaves.

This orchid is produced from a corm. The leaf appears in the fall, is visible all winter, often peering out from a covering of snow, and in June it withers and disappears as the flower stalk emerges. A new corm is formed underground, producing a new leaf and eventually a new flower. So it continues, year after year. Or so it would continue if puttyroot (also called Adam-and-Eve) were allowed to survive.

Unfortunately, as all the woods about us have been destroyed to build more housing developments and shopping centers, puttyroot has almost disappeared. In fact, I have only seen it in the Robert E. Lee Park in one location. The leaf is so distinctive that I'm sure I would have noticed it in other places if it were there. According to Dr. Carlyle Luer in *The Native Orchids of the United States and Canada*, the early settlers were also hard on puttyroot, using the corm to mend their broken crockery, to treat sores, to wear as amulets and even to chew. The wonder is, I suppose, that any puttyroot remains.

Thomas Nuttall, after his extensive scientific expeditions, first described the genus in 1818 (*The Genera of North American Plants*) and noted: "Annual subterranean, globose tuberoids, connected by a slender rhizome, supporting one (*Aplectrum hyemale*) or two (*Aplectrum unguiculatum*) hibernal leaves and a scapose vernal flower stalk characterize the genus."

He described the flowers as "medium-

# In Search Of The Puttyroot Orchid

BY ADELAIDE C. RACKEMANN

ILLUSTRATION

BY VIRGINIA DALEY

sized, with free sepals and petals and a three-lobed labellum bearing lamellate crests on the disc," but I seldom see the flowers, and for me searching for the leaves is the challenge and the one bright spot on a daily winter walk.

With my two dogs who dart ahead to pick up the trail of a rabbit or a squirrel or a red fox, I pick my way to the lake. I can see a few ducks and perhaps a kingfisher or the great blue heron. On the way, I note the small round leaves of garlic mustard and wish they would get bigger and greener. But the high point of my winter walk is cutting through the woods on an overgrown path, all but impassable in summer, climbing over a fallen tree and then, beneath a rotting log, spying the puttyroot.

Since the park is well over 400 acres, there are many paths to choose and I have taken them all. But the path to the puttyroot, while the most difficult, is the most rewarding.

Imagine my horror last winter when I suddenly realized the familiar leaves were not there. The winter before there had been three or four of them. Now I could see not a trace.

My first thought, an unworthy one perhaps, was that somebody had dug up the

corms. Whether to use as amulets or to mend china, I had no idea. The thought may have been unworthy, but it was not unreasonable. Some years ago a great stand of *Lycopodium* in the park just disappeared, quite probably to make Christmas wreaths. Looking down at the place where a few months earlier I had seen the leaves of puttyroot, I could see no sign of digging. The fallen leaves and the rich, woody soil seemed undisturbed.

But what a feeling of loss. Stoically, I continued my winter walks. I dutifully picked up thrown beer cans and bottles and tossed plastic cups and newspapers that had blown into the bushes and greenbrier. So the winter passed, slowly, more painfully as I missed my friend the puttyroot. January and February stayed around in their heavy-handed way, with the snow soiled and the path icy, when I ventured down to the lake. Then the snow was gone and the winds of March howled unmercifully. There were cold, rainy days and mud. All the same, I continued to trudge through the park. It was a ritual my dogs expected, and I could see that the small leaves of the garlic mustard were a little larger.

One day in mid March I took the little used path where once there had been puttyroot. By now I was resigned to having lost it, but I cast my eye along the length of the fallen log, just out of habit. I could hardly believe what I saw. Some four feet away from its old location there were two new leaves of puttyroot. Here at last was my long lost friend, not where I had expected it but not far away. Reassured by the sight, I vowed to keep a close watch on it. My spirits had lifted now that *Aplectrum* had returned.

There are several possible explanations for the disappearance of the puttyroot. The older the corms, the deeper they lie underground. It is possible they were choked out by the ever invasive honeysuckle. It is also possible that somebody, not caring that *Aplectrum hyemale* is protected under Maryland law, dug it up. (It would, after all, make a nice addition to one's wildflower garden.) Another explanation is that I did not look hard enough for it, something I find hard to believe.

But the reappearance of puttyroot has an easier explanation. It is likely that seeds from the old flowers, which take a year to produce new corms, produced the new stand of *Aplectrum*.

Difficult as the path is to find in the summer, I vow to come back when the puttyroot is in bloom. No longer will the puttyroot and I be separated. ❁

Adelaide C. Rackemann is active in the Horticultural Society of Maryland and works as a volunteer at Cylburn Nature Center and Wildflower Preserve in Baltimore, Maryland.

# Magnolia Gardens

## *Year Round Beauty*

TEXT and PHOTOGRAPHY by PAMELA HARPER

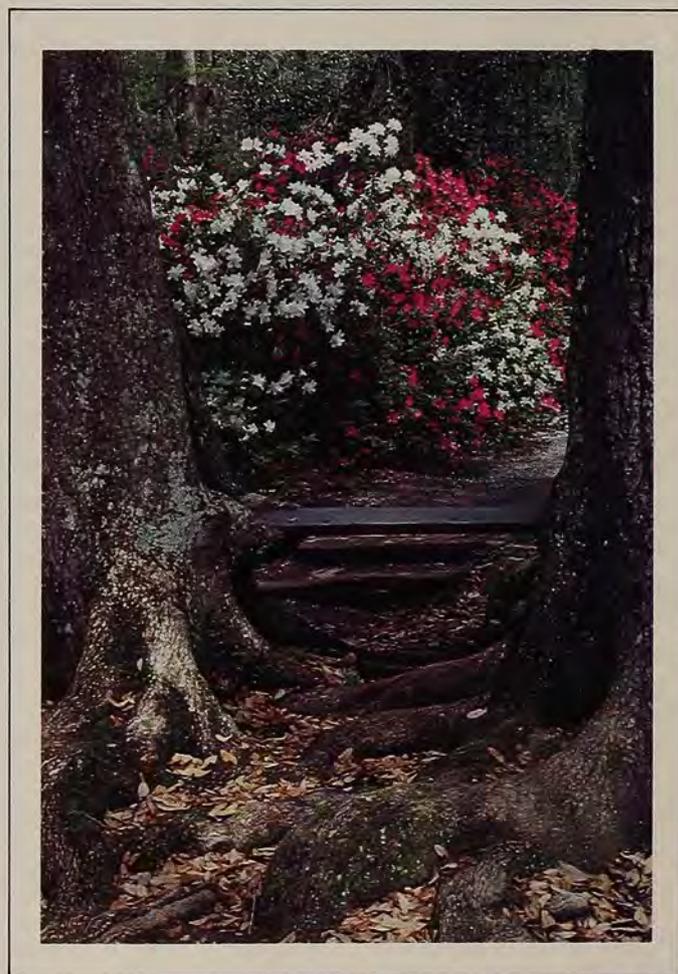
Once upon a time—many, many years ago . . . So begin all the best fairy tales, and so begins the story of Magnolia Plantation and Gardens, ancestral home for 300 years of the Drayton family. Magnolia—a romantic name, and appropriate, but perhaps a shade misleading for a garden of year-round beauty, with magnolias playing a comparatively minor role among thousands of plants. The name is a legacy of a bygone era. A picture from ante-bellum days shows hoopskirted ladies and little girls in pantalets strolling beneath magnolias (*Magnolia grandiflora*) that flanked an avenue leading from the mansion house to the Ashley River, where early visitors arrived by paddle steamer.

The fragrance of the great waxen flowers, like tree-borne waterlilies, hangs over the garden still, but today's visitors enter from the other side of the house, past miniature horses grazing behind a zig-zag fence. Fairy tales have their villains, and their poverty stricken princes. The original mansion, built in the 1680's, was destroyed by fire just after the Revolutionary War. In 1865 its replacement was burned by General Sherman's marauders. All that remained was the brick first story. The Drayton family, by then impoverished, floated a modest pre-Revolutionary summer home on barges down the river and reassembled it over the existing basement. This structure survived an earthquake in 1886 and now stands under a canopy of trees at the entrance to the gardens. The pointed tower (a Victorian embellishment) gives it a fairy tale look well suited to its surroundings. The house is open to visitors.

It is a natural reaction in man, when wilderness or danger surround him, to create a pattern of order within the vicinity of his home. The original garden at Magnolia was modelled on those of 17th-century England, with design taking precedence over plants and straight lines predominating save for scrolls of clipped boxwood within parterres of geometric design. American gardens clung to formality when the mood in Europe changed, but young John Grimke Drayton (the Rev. John Drayton), who inherited Magnolia in 1825, was in the vanguard of those preferring less trammelled beauty, that "touch of sweet disorder." Recognizing rigorously controlled neatness as ill suited to the exuberance of vegetation in the warm, moist climate of South Carolina, he envisioned instead a flowering wilderness, with the natural beauty of the wooded site enhanced but not subdued. Towards this end he introduced into America the evergreen Indica azaleas now so widely planted in the Southeast. He also saw the landscaping potential of *Camellia japonica*, until then considered a conservatory plant. One named for him, a rose-pink semi-double, is among the hundreds now to be seen in bloom at Magnolia between November and April. The very popular

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Pamela Harper has contributed many articles to *American Horticulturist*. She is a garden writer and owner of Harper's Horticultural Slide Library in Seaford, Virginia.



'Debutante' ('Sarah C. Hastie') is one of many camellias subsequently introduced by Magnolia Gardens.

Today the 500 acres include an herb garden, a maze based on the one at Hampton Court but with sasanqua camellias (*C. sasanqua*) as hedges, a petting zoo, a gift shop and a restaurant serving such Southern dishes as Hoppin' John (black-eyed peas with rice cooked in bacon drippings). These are all located where they do not impinge on the serenity of the woodland and water gardens. The dappled shade of the great trees alleviates summer heat along nature trails, and canoes can be rented and paddled through the waterfowl refuge. Among the many birds at home in the cypress swamps is the snake-necked water turkey or anhinga. An observation tower overlooks the 150 marshy acres of the waterfowl refuge where rice fields were once planted.

The heart of Magnolia is its lagoon, mirroring in pellucid water the lacy, white wood bridge which spans it, the branches



LEFT: Fluted trunks of *Taxodium distichum*. ABOVE: "The heart of Magnolia is its lagoon. In the spring hundreds of evergreen azaleas bloom here, their colors reflected in the water.



of ancient live oaks eerily hung with Spanish moss, the latticed bark of palmettos and the fluted trunks of bald cypresses with their strange, knobby “knees” resembling praying nuns. Clinging to trunks, and sheeting horizontal branches, is *Polypodium polypodioides*, called resurrection fern because the fronds turn brown and curl up during drought or frost, reviving with rain and warmer weather. Wisteria climbs high into the trees. So do two early flowering roses, the thornless Lady Banks (*Rosa banksiae* ‘Lutea’) with pale-yellow pom-poms, and the large, single white Cherokee (*R. laevigata*). Higher still climbs the yellow-flowered Carolina jessamine (*Gelsemium sempervirens*). Spent flowers drift on the water, which from March to May reflects the white, pink, red and purple of thousands of azaleas. As spring draws to a close their fallen flowers carpet the paths. In April an island in the lake is snowy with the pristine chalices of rain lilies, *Zephyranthes atamasco*, a rare and lovely flower native to the Southeast.

To John Galsworthy, author of *The Forsyte Saga*, Magnolia was hauntingly beautiful . . . “Beyond anything I have ever seen, it is other-worldly.” The dreamlike quality remains; time stands still and the garden seems to be waiting. And always there is fragrance—from February daphne (*Daphne odora*), hyacinths, banana shrub (*Michelia figo*), roses, gardenias, magnolias and sweet olive (*Osmanthus fragrans*).

Magnolia is an old garden, among the country’s oldest, but not a static one. Famous until recently only as a spring garden (remembering that spring comes early in South Carolina), it has been the aim of the present, ninth generation owner, John Drayton Hastie, to make the garden interesting in every season, an attainable goal in Charleston, where the growing season is long

and freezes are seldom prolonged. In 1981 two new bridges were built, and no year goes by without the addition of new plants; not in ones and twos but in hundreds and thousands. 1980’s additions included the autumn and winter flowering cherry, *Prunus subhirtella* ‘Autumnalis’, a cloud of soft pink during the “off” season, the Cornelian cherry, *Cornus mas*, massed with little puffs of bright yellow in February, and the satiny-purple hardy orchid, *Bletilla striata*.

In summer there are hydrangeas in blue, pink and white, oleanders, yellow *Cassia*, waterlilies, caladiums, daylilies, and blankets of bedding plants. In late September, when Northerners prepare for winter, the South begins a second peak season of bloom. Floribunda and hybrid tea roses flower again, as abundantly as they did in May. Crape myrtles are massed with trusses of crinkled flowers in white, pink, red and purple. Abelias will continue blooming until hard frost, as will *Hibiscus*. There are red spider lilies (*Lycoris radiata*), and the shining, clustered fruits of blackberry lily (*Belamcanda chinensis*) glisten in the warm autumn sun. Annuals continue to flower, and now chrysanthemums join them. The star of autumn is, however, the sasanqua camellia, blooming in late October and continuing into January.

If January is a cold one there may be a brief lull in flowering sequence, but there will still be color from the red berries of *Nandina*, *Pyracantha*, *Ardisia* and *Ilex*. By the end of the month there may be paper-white narcissus, aconites (*Eranthis hyemalis*), crocus and snowdrops. By mid-February forsythia heralds the start of another spring spectacular.

Magnolia, located on Highway 61 just south of Charleston, SC, welcomes visitors from 8:00 a.m. to dusk every day of the year. ☼



LEFT: The Mansion House at Magnolia Gardens has been there since soon after the Civil War when it replaced a home destroyed by General Sherman's marauders. ABOVE: Magnolia Gardens is full of pathways and surprise vistas, and azalea blossoms abound during the spring.

# Fragrant Flowers

TEXT and PHOTOGRAPHY  
by MRS. RALPH CANNON

The garden holds many delights, not the least of which are plants with a pleasing fragrance. Who can resist the sweet aroma of lilies-of-the-valley in spring or the scent of roses in a summer garden? Gardens should not only be pleasing to the eye, but also to the nose. Happily, there is a wealth of lovely scented plants to choose from that are attractive additions to the landscape and at the same time provide scent in the garden during the day or at night, as cut flowers in the house or as garden "room" fresheners that spread their fragrance over a wide area outdoors.

The fragrance of *Dianthus* makes the air a pleasure to breathe, especially in the morning. Called pinks because of their scalloped or "pinked" petal edges, and not because they are pink in color, these charming old world favorites have been hybridized for many years. Many new cultivars provide attractive color and fragrance.

Montagu Allwood of England crossed a perpetual flowering carnation (*Dianthus caryophyllus*) with the oldest of the garden pinks, *D. plumarius*, and in the course of several years developed a new hybrid species, *Dianthus X allwoodii*. This plant has revolutionized the dianthus world by producing hundreds of hybrids with new colors, perpetual flowering, hardy constitutions and fragrance. The most fragrant of all is 'Loveliness', a hardy dianthus that blooms from spring until fall.

Not to be forgotten is *Dianthus gratianopolitanus*, the cheddar pink. This plant has blue-gray leaves and small, rose-pink single flowers on four-inch stems. It will flourish year after year, seeding abundantly, and has the sweet scent of cloves.

The exquisite fragrance in daffodils varies, but *Narcissus jonquilla*, a native of Spain, with its golden flowers and rush-like foliage, has the strongest, most powerful honey-sweet scent of all. Its erect stems

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Mrs. Ralph Cannon has contributed to the pages of *American Horticulturist* many times. She gardens on 26 acres of Illinois woodland.

***Scent is essential for a summer night garden. When dusk arrives, so does the potency of the scent. The flowering tobacco plant, Nicotiana alata 'Grandiflora', cannot be excelled for its lovely, white flowers and powerful scent.***

carry up to five flowers in a head. Provide these plants with rich, well drained soil in a sunny spot, and they will reward you with beautiful flowers and magnificent perfume over a wide area.

To get larger and taller blooming stalks, *N. jonquilla* has been crossed with some of the large hybrid narcissi. The famous daffodil breeder P. D. Williams did this and obtained one of the best, 'Trevithian'. Few narcissi rival this cultivar for vigor and honey-sweet scent. Another cultivar of Williams' is 'Hesla', which has the same sweet aroma.

In Victorian days every garden had a lily-of-the-valley bed (*Convallaria majalis*), and no modern day garden should be without one either. Have plenty of humus and leaf mold in the soil, and plant the crowns singly about one inch deep and four inches apart in dappled shade. If there is not space for a bed, let them grow through the grass or among the deep rooted shrubs. The strong perfume can then still be enjoyed. 'Fortunei' is a particularly nice cultivar because its flowers are larger than those of the species.

The lovely, sweet scent of lilies-of-the-valley is worth any trouble spent on their cultivation. Their aroma fills the air for some distance in the garden, and when a bouquet is picked and brought indoors, the flowers will perfume a whole room. In time the bed will get too congested, and the lilies will have to be lifted and re-

planted. They resent this disturbance and refuse to flower the following year. To encourage flowering, dig out square pieces from the bed and fill the holes with good soil and humus. Replant the square pieces elsewhere. If the bed has to be made over, dig out the plants in large clumps and pry them apart with two forks. Planting pieces, each containing about six shoots, can then be reset about two inches deep and nine inches apart. Poor flowers will indicate overcrowding and the need for replanting.

No plants give better value in scent and form than peonies. A large number of peonies, especially the Chinese type, are very sweetly scented. They inherit their sweet scent from *Paeonia lactiflora*. A border planted with fragrant, herbaceous peonies will scent the air of the garden for weeks. These double varieties are very fragrant, many having rose scent: 'Festiva Maxima', a white flecked with red; 'Snow Mountain', 'Kelway Glorious' and 'Ann Cousins', all white; the soft pinks, 'Sarah Bernhardt', 'Myrtle Gentry', 'La Perle' and 'Mons Jules Elie'; the bright reds, 'The Mighty Mo', 'Richard Carvel', 'Karl Rosenfield'; and the crimson, 'Philippe Revoire'. All of these double flowers last longer than the single ones and are generally more satisfactory for cutting to bring scent indoors. If a border of peonies is planted it does not need to be cultivated, only top-dressed with rotted manure annually. The foliage will make a complete groundcover so there is no need for hoeing—just a few weeds to hand pull.

Of course there must be lilacs. There are many colors to choose from—lilac, blue, purple, pink, red-purple and white. Single and double forms are also available. The majority of these flowers have a sweet, heavy odor, and the deeper the color of the flowers the sweeter the odor. The scent of lilacs is especially strong in the evening. These plants like a rich, slightly moist soil and will grow anywhere. There are many new cultivars, grafted plants and plants on their own roots. One entrancingly scented example is 'Toussaint L'Overture', which



has red-purple single flowers and a heavy, sweet fragrance. Suckers from the main plant can be used for propagation since this is a plant growing on its own roots. 'Mrs. Ellen Willmott', a double white, is extremely fragrant. 'President Poincare' is violet with a two-tone effect, and 'President Grevy' is light blue with double flowers. At the feet of the lilacs, strew lilies-of-the-valley. They bloom at the same time and the combination of fragrances is very nice.

Then there is the delicious fragrance of the white flowered Siberian crab apple, *Malus baccata*. When in full bloom it is something to see. Besides being showy it scents the garden with a far-reaching aroma. Branches from the tree, loaded with buds in early spring, can be forced to bloom even earlier indoors.

Scent is essential for a summer night garden. When dusk arrives, so does the potency of the scent. The flowering tobacco plant, *Nicotiana glauca* 'Grandiflora', cannot be excelled for its lovely white flowers and powerful scent. The tubular blossoms open in the evening and remain

*Continued on page 38*

ABOVE: *Dianthus gratianopolitanus*, the cheddar pink. LEFT: *Paeonia* 'The Mighty Mo', a particularly fragrant cultivar.

# BIOLOGICAL CONTROL OF INSECT PESTS

FIRST OF A TWO-PART SERIES

BY MIGUEL ALTIERI, JUNJI HAMAI, ANN HAJEK and KATHY SHEEHAN.

Americans are planting more and more home gardens to save on the high cost of food. At times insect pests can seriously limit vegetable and fruit production, so control measures become necessary. Many of these same pests also damage ornamental plants. Of all insect control strategies, preventive measures are most relevant for gardeners. The degree of success of a given preventive insect control program depends on the gardener's biological knowledge of insects present in his garden. Understanding all ecological, interactive forces that determine the abundance of a particular insect in the garden makes for practical, economical and environmentally safe control measures. Timely and proper sanitation, continuous scouting of the garden, interplanting to provide suitable habitat for natural enemies, mulching, introduction and release of beneficial insects, use of repellent plants and botanical insecticides are but a few ways in which to achieve harmonious pest regulation.

**Aphids.** These are very small (one-tenth of an inch), soft-bodied insects of many different colors that often feed in groups and suck plant sap of tender new growth and sometimes kill plants. They produce a sticky sweet substance, honeydew, which covers leaves and attracts ants. Honeydew often becomes coated with black fungus. Aphids may carry various plant diseases. Aphids have complex life cycles and switch food plants; usually each species only feeds on specific parts of a few species of plants. Aphid problems can often be prevented by maintaining healthy plants. Natural enemies (lady beetles, lacewings and syrphids) are very effective in reducing populations of some aphid species. A direct, hard spray of water from a hose can decrease aphid numbers, as will a spray of water mixed with garlic or onion. Foil mulches will deter aphids from landing on plants and yellow traps attract flying aphids. Botanical insecticides such as Rotenone, Ryania and colicine (an alkaloid present in *Conium maculatum*) have been used for aphid control with varied results.

**Cabbage looper (*Trichoplusia ni*).** A widespread pest of cabbage, beans, lettuce and glasshouse crops. Caterpillars are pale green "inchworms" with light-colored

stripes. They feed on the undersides of leaves. They spend the winter as pupae attached to the plants; three or more generations occur per year. They are usually kept under control by natural enemies such as the encyrtid parasite (*Copidosoma truncatellum*) and the pathogen polyhedral virus. Plow in early spring while pupae are still attached to plants. Hand pick caterpillars. Use *Bacillus thuringiensis* (Bt) if necessary. Be sure it reaches the underside of leaves.

**Codling moth (*Laspeyresia pomonella*).** This insect is a common destructive pest of apples and occasionally other fruits or nuts. The adults are about 15-18 mm long, grey-brown with a bronze patch at the ends of the wings and are active at dusk. The larvae are pinkish-white with a brown head. They bore into the fruit and ultimately into the core. When grown they form thick silken cocoons, spending the winter under the tree bark or other shelters. Moths emerge when apples are in bloom. Females deposit some 30-40 eggs.

This is an extremely difficult pest to control by any means since it directly damages the fruit and even low populations can do considerable damage. Also much of its life span is spent protected in the fruit. Climatic factors, especially temperature, can determine their abundance. Temperatures below 60°F inhibit egg laying. The cater-

pillar usually cocoons in sheltered places within three feet of the ground, so by providing suitable cocooning sites such as burlap or large core cardboard strips wrapped around the tree trunk the cocoons can be collected and destroyed. Biological control agents are also of some value. The most important are the egg parasites, *Trichogramma minutum*, and braconid larval parasites, *Macrocentrus ancylivorus* and *M. delicatus*.

**Colorado potato beetle (*Leptinotarsa decemlineata*).** These yellow and black striped beetles feed on leaves and terminal growths of the potato. They also can attack tomatoes, peppers and other vegetables. Adult beetles overwinter in the soil and emerge in spring, laying yellow-orange eggs on the undersides of leaves. Larvae are dark red and feed on foliage for two or three weeks and then pupate in soil. Adults can transmit spindle tuber, bacterial wilt and ring rot of potatoes. Two generations per season are usual. Interplanting flax plants (*Linum usitatissimum*) in potato rows can reduce numbers of this beetle. Eggplants used as borders around potato patches can work as trap plants.

**Corn earworm (*Heliothis zea*).** This pest is also known as cotton bollworm or tomato fruitworm and is similar to tobacco budworm (*Heliothis virescens*). Host plants include corn, tomatoes, cotton, tobacco,

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Wireworm



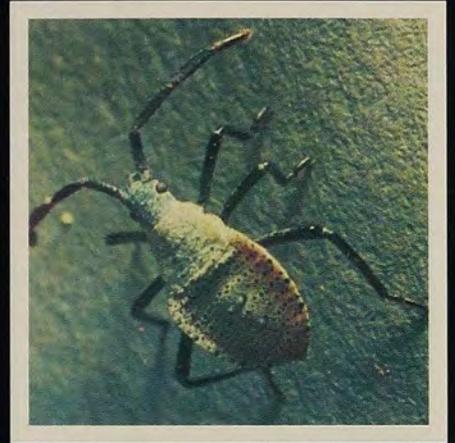
Spittlebug



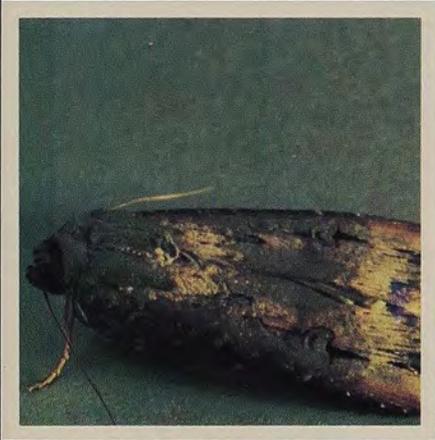
Peach Tree Borer



Aphid



Squash bug



Diamond back moth



Leaf beetle



Colorado potato beetle



Cutworm



Mexican bean beetle



Imported cabbage butterfly



Corn earworm



Scale insects



Spider mite damage



Cabbage looper



Whiteflies



Codling moth



Slug



Root maggot



Leafhopper

beans, alfalfa, clover, peppers, lettuce and peanuts. These pale-green to very dark-brown caterpillars feed on fruit and/or foliage. On sweet corn it feeds on the tips of ears and provides an entrance for molds. Earworms spend the winter in the soil, so plow or hoe in the late fall or early spring to disturb them. Genetically resistant plant cultivars are sometimes available. Apply 20 drops of mineral oil just inside the tip of each ear three to seven days after the silks appear, or cut off the silks close to the ear every four days. Releases of *Trichogramma* wasps can reduce egg abundance, but these releases must be done in concert with applications of moth scale extracts or water extracts of pigweed (*Amaranthus* sp.).

**Cutworms.** Cutworms are the caterpillars of many species of moths and have many hosts. Cutworms cut off plants (especially new seedlings and transplants) at ground level. "Climbing cutworms" feed on aerial plant parts. Cutworms are grey, brown or black, often mottled. They curl up when disturbed and are up to 1½ inches long when mature. They usually feed at night and hide in soil litter during the day. Cutworms are often the culprits causing foliage damage that mysteriously disappears overnight. They produce one to four generations per year and overwinter in soil. Hand pick larvae by flashlight at night. Uncover larvae during the day by raking one foot around a plant (larvae are usually found in the first few inches of soil). Protect individual plants with a three-inch wide strip of stiff paper (or tarred paper) placed one inch into ground, about one-half inch away from the stem. No-till or reduced till may lead to increased damage since the overwintering cutworms are not disturbed. Oak leaf mulch or tan bark spread in strips in beds has been effective in cutworm control.

**Diamond back moth (*Plutella maculipennis*).** This is a minor pest of cabbage and related crucifers that overwinters as a moth. Tiny eggs are laid on leaves from which pale green larvae emerge. Larvae become fully developed in two weeks, spinning a silky cocoon, and change to pupae. In dry seasons larvae may become abundant, feeding on the undersides of leaves, leaving many small holes in the foliage. Moths emerge a week or so later. As many as seven generations in one growing season have been recorded. A small ichneumonid wasp (*Horogens insularis*) can effectively reduce larval densities. Interplanting tomatoes in cabbage rows has

been shown effective against several cabbage worms. Southernwood (*Artemisia abrotanum*) is a moth repellent and can effectively protect nearby cabbages against worms.

**European corn borer (*Ostrinia nubilalis*).** The major host is corn attacked by the larvae that chew the leaves and tunnel through all parts of the stalks and ears. Borers overwinter as full grown larvae.

### ***Aphids have complex life cycles and switch food plants; usually each species only feeds on specific parts of a few species of plants.***

Larvae are three centimeters long and are flesh-colored with brown spots. Pupation occurs in late spring and moths emerge in May or June. Females lay eggs in groups on the underside of leaves; they hatch in about seven days.

Very dry summers and extremely cold winters greatly reduce infestations. Some degree of biological control is achieved by tachinid parasites (*Lydella thompsoni*), and braconid wasps. A protozoan parasite heavily attacks hibernating larvae. Fungi (*Beauveria bassiana*) also kill corn borers. Cultural control practices include planting resistant corn varieties, avoiding very early or very late planting, mechanical destruction of stalks and stubble in winter and rotations with soybean, red clover or alfalfa. One egg mass per corn plant is considered a critical infestation level.

**Fall armyworm (*Spodoptera frugiperda*).** This Southern insect migrates northward each year and becomes abundant in summer and fall. It attacks corn, sorghum, alfalfa, clover, peanuts, tobacco, several grasses and many garden crops. Moths lay eggs at night on plants in masses of 100 or more. Larvae vary in color from light tan or green to black. They pupate in the soil. In the North there are usually one or two generations, whereas in the South there are several. They do not overwinter in the North; in the South all stages may be present in winter. When abundant, the caterpillars exhaust their food crawling in great armies into adjoining fields. This movement can be stopped by plowing deep furrows in front of their line of advance and drawing a keg of water back and forth in the furrow until a fine dust mulch has been worked up. Gardens

may be invaded and consumed in a few nights. Suddenly, larvae disappear and dig into the ground to pupate. Within two weeks a new swarm of moths emerges to reinfest the garden. Several naturally occurring parasites such as braconid wasps (*Chelonus texanus*, *Meteorus laphygmae*, *Apanteles* spp.), ichneumonid wasps and tachinid flies and predators (ground beetles, predaceous stink bugs, etc.) can greatly reduce fall armyworm populations. Intercropping beans in corn or maintaining acceptable levels of certain weeds in the corn plots can help reduce infestations.

**Flea beetles.** These small (2 mm), shiny insects leap away when disturbed. Adults damage a wide range of plants such as potato, eggplant and corn, leaving small, ragged holes in the leaves that give the whole plant a bleached appearance. Most plants can tolerate moderate amounts of damage so controls are not necessary until populations are quite high. The entire life cycle of the pest may be completed in six weeks. One to four generations develop each year. The larvae are unnoticed since they are worm-like and live underground feeding on the roots of the host plant. Important species are the potato flea beetle (*Epitrix cucumeris*), the eggplant flea beetle (*Epitrix fuscula*) and the tuber flea beetle (*Epitrix tuberis*). Damage by the beetle is most severe in cold, wet years. Some flea beetles can disseminate a bacterial wilt of corn (Stewart's disease) and diseases of potato.

Control is aided by garden sanitation in the fall (plowing under weeds and plant stalks), since the insect overwinters as an adult in the debris. Control of host specific flea beetles can be achieved by avoiding susceptible plant species for one year. Sowing a row sequence of lettuce-radish-kohlrabi-radish-lettuce effectively lowers flea beetle populations. Flea beetles also seem to be repelled by wormwood and mint.

**Imported cabbage butterfly (*Pieris rapae*).** This worm feeds on cabbage, cauliflower, broccoli, kale, mustard and lettuce. Butterflies have yellowish-white wings with a few dark spots. The green caterpillars with orange and tan stripes feed on foliage and may bore into cabbage heads. Two to three generations occur in the North; more may occur in the South. They overwinter as pupae suspended from plants or other objects. The southern cabbage butterfly (*Pieris protodice*) is very similar to *P. rapae*. Since the caterpillars feed on the leaves, hand pick them or use *Bacillus thuringiensis* (Bt) if necessary. The small

braconid wasp (*Apanteles glomeratus*) can substantially reduce worm numbers.

**Japanese beetle (*Popillia japonica*).** Adult beetles are less than one inch long and metallic green with coppery-brown wing covers. Larvae are soft-bodied, dirty white with brown heads, C-shaped and resemble white grubs. This introduced pest is now spread widely throughout a large part of the United States. Quarantines are in effect to prevent further spread. Larvae feed in soil on roots, commonly occurring in lawns. Adults feed on foliage, flowers and fruit of over 275 different plant species. Two parasitic wasp species and one fly species provide control. Moles, skunks and birds feed extensively on adults and larvae. Trap crops that may be beneficial in reducing widespread damage include soybean, African marigold, evening primrose and woodbine. White geranium attracts the beetles, thus acting as a trap crop. Jimson weed (*Datura stramonium*) seems to protect nearby plants from beetles. Best control is the bacterial milky spore disease of the larvae. Spore dust may be purchased and applied to lawns or areas with larvae in the ground. Adults may be hand-picked from plants or trapped with baited yellow traps.

**Leaf beetles (*Diabrotica* spp.).** *Diabrotica* species are called corn rootworms or cucumber beetles, depending on their host. Hosts include corn, cucumbers, peanuts, sweet potatoes, rice and melons. Small, pale larvae feed on roots, crowns and stems; this may lead to windthrow of corn. Adult beetles (green, often with black spots or stripes) chew on foliage, stems or corn silks. They may transmit bacterial wilt on corn or cucumber and virus of corn. One to two generations occur per year. The insects winter as eggs or adults in soil beneath crop remnants, so plow or hoe in early spring or late fall. Reduced or no-till practices may increase problems, especially for species that overwinter as eggs. A few radish seeds sown beside cucumber plants can help reduce densities of this insect. Dry powdery materials, including lime, tobacco and road dust sprinkled over cucurbits can also reduce the number of striped beetles.

**Leafhoppers.** Plants attacked by leafhoppers show a lack of vigor, retarded growth and in some cases, feeding produces a burning effect that causes leaf tips to wither. Susceptible plants include clovers, alfalfa, beans, small grains, orchards and vineyards. Some leafhopper species carry and transmit plant diseases. Problem

species include the potato leafhopper (*Empoasca fabae*) and the beet leafhopper (*Circulifer tenellus*), which carries the virus causing "curly top." Some leafhoppers overwinter as eggs in plant stems, others as adults and nymphs in uncultivated areas. Adults are one to five millimeters in length and are good jumpers of various colors. Natural controls result from many parasites and predators. Growth of resistant

***Most plants can tolerate moderate amounts of flea beetle damage so controls are not necessary until populations are quite high.***

varieties, early plantings, control of weed hosts or replacement of preferred weed hosts by other non-preferred host plants are all cultural control measures of practical value. Nicotine sulfate has been used to control leafhoppers. Grape leafhopper biological control by *Anagrus* wasps can be enhanced in vineyards where patches of blackberries are planted. Borders of grass weeds (*Elyusine indica* and *Leptochloa filiformis*) around bean plots effectively reduce colonization of bean leafhoppers (*Empoasca kraemeri*).

**Mexican bean beetle (*Epilachna varivestis*).** This pest attacks bush, pole and lima beans, soybeans and cowpeas. Native to the Southwest, it has spread to the eastern United States and to California. Adult beetles are rounded, yellow to bronze-colored and have 16 dark spots on their wings; larvae are green to yellow colored and covered with spines. Adults and larvae feed on the undersides of leaves and leave "skeletonized" foliage. They may also feed on bean pods and stems. They produce one to four generations per year. Destroy orange-colored eggs found clustered on the undersides of leaves. Plow infested crops after harvest. Rows of potatoes between bean rows has proved to repel beetles.

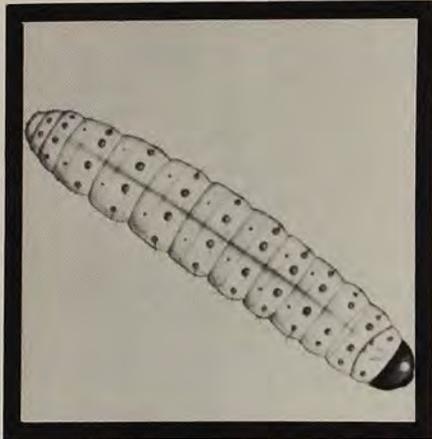
**Peach Tree Borer (*Conopia exitiosa*).** Immature stages of this destructive insect bore just under the bark of trees near the ground, often girdling the trees. This borer, found throughout the United States, attacks primarily peach and other fruit trees. Larvae are white with brown heads and may be over one inch long. Larvae overwinter inside the tree, from a foot above the ground to several inches below. Adults are clear-winged moths, steel-blue with

yellow or orange markings, flying during the day. Larvae are difficult to detect although tree gum mixed with borings will exude from entry holes. One control is to dig out larvae with a knife. The best approach is preventive. Maintain tree vigor, since moths prefer injured or weakened trees. Keep ground clear of grass and weeds at tree base and mulch. Swab bases of trees with Tanglefoot before planting to trap moths. Planting garlic around the bases of trees can prevent borers. Natural enemies include parasitic wasps and predaceous ants, chrysopids, spiders, moles and birds.

**Plum curculio (*Conotrachelus nenuphar*).** A widespread pest east of the Rocky Mountains, this insect attacks stone fruits as well as fruits of apple, pear and quince. Adults are brown beetles with grey mottling, less than one-half inch long, with long snouts and four humps on their hardened wing covers. Larvae are white, legless grubs found inside of fruit or pupating in the soil. Both adult and larval feeding cause abnormal growth of fruit and early fruit drop. Control of adults includes jarring beetles from trees and catching them on sheets placed on the ground during early spring and from midsummer through fall. Good sanitation is advisable since adults hibernate in sheltered areas, such as under trash or debris. Fallen fruit should be removed frequently, before larvae move into the soil. Plowing or cultivating soil during early summer will kill pupae. Natural controls of the beetles include winter mortality, birds, insects, larval and egg parasites and a fungal disease (*Isaria anisopliae*). Hens can eat plum curculio, especially in trees planted near chicken yards.

**Potato tuberworm (*Phthorimaea operculella*).** These insects attack potatoes, tobacco, tomatoes and eggplants. Dark-headed, pale caterpillars burrow in stems and leaves early in the season and later move to tubers (or fruits). Only 25 to 30 days may be required per generation. They will breed in stored potatoes if the temperature is above 50° F. In problem areas of the garden, rotate with non-host crops; also destroy volunteer potatoes. Keep potato plants deeply hilled and don't allow soil to crack (worms don't burrow very deep). Burn infested vines. Don't use contact insecticides, since the tuberworm is usually burrowed within plant parts.

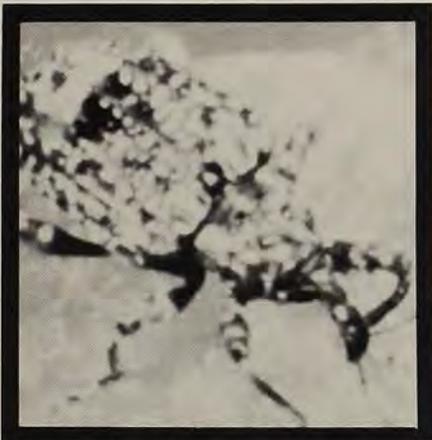
**Root maggots.** Maggots are fly larvae that tunnel into the underground part of the plant causing serious damage. Two common root maggots are the cabbage maggot (*Hylemia brassicae*), which at-



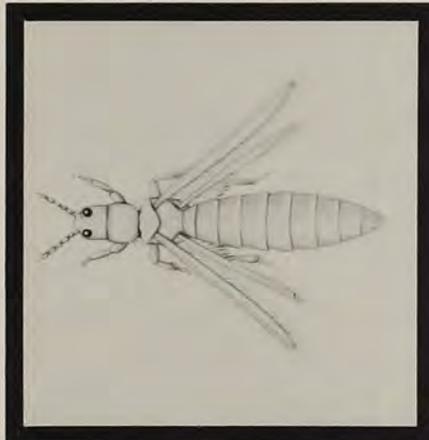
European corn borer



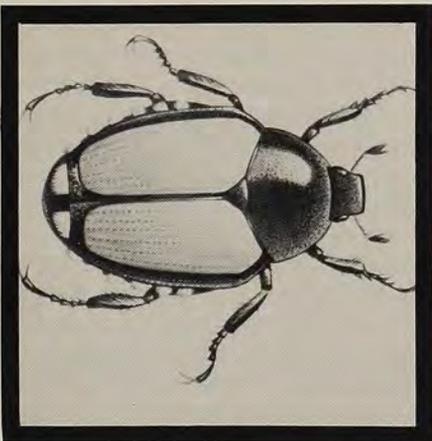
Flea beetle



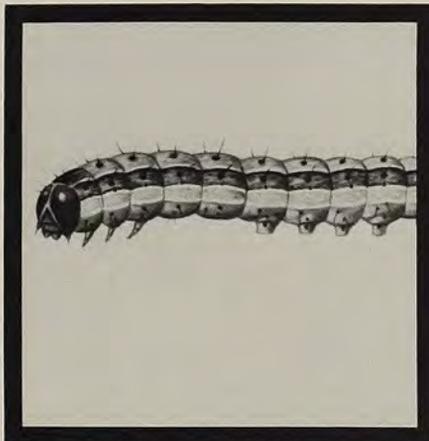
Plum curculio



Thrip



Japanese beetle



Fall armyworm

tacks cruciferous crops, and the onion maggot (*H. antiqua*). They are typical white maggots about 10 millimeters long when fully developed. The grown maggots pupate in the soil next to the plant. Later, adult flies emerge, mate and lay eggs at the base or in the axils of the leaves of suitable host plants. The eggs hatch and the young bore into the roots. The adult flies are grey with black bristles and are about the size of houseflies.

Since these flies do the most damage on young seedlings, screening the plants to prevent egg depositing is an effective means of control. Rotation of susceptible plants with resistant plants is also another method of control.

**Scale insects.** Scales are common pests of perennial plants such as apple, pear, quince, peach, plum, apricot, etc. Adult females are immobile and covered with a hard round or oval shell. Scales are class-

ified into two main groups, the armored scales and the soft scales.

The armored scales are small (2-3 mm) and flat, with the cover free from the body. Examples include the San Jose scale (*Aspidiotus perniciosus*) and the oystershell scale (*Lepidosaphes ulmi*).

The soft scales are larger and more humped-shaped, with the body attached to the scale covering. These scales commonly produce honeydew. Examples include the black scale (*Saissetia oleae*) and the hemispherical scale (*S. hemisphaerica*).

There are many naturally occurring parasites (wasps of the genus *Aphytis*) and predators (aphid lions, syrphid fly larvae, lady beetles) of these pests; by encouraging these beneficial insects control can usually be achieved. Chemical insecticides can be toxic to these beneficial insects. Control of ants that may protect scales from beneficial species is important.

**Slugs and Snails.** These are common garden pests. There are about 32 species of slugs in the United States; important pests are the spotted garden slug (*Limax maximus*) and the greenhouse slug *Milax gagater*. There are hundreds of snail species; important pests include the brown garden snail (*Helix aspersa*), the bush snail (*Zonitoides arboreus*) and the white garden snail (*Theba pisana*). Slugs and snails pass the winter in sheltered situations outdoors. Most slugs overwinter as eggs.

One method of control is the use of traps that takes advantage of the behavior of slugs and snails to seek out dark, protected places to hide during daylight. Boards, overturned flower pots, etc. all provide excellent traps where these pests may be found and removed. Predators such as the rove beetle, (*Ocypus olens*), or *Scaphinotus* spp. ground beetles can also be released under these boards to prey upon the snails and slugs. Another method is hand picking or squashing, especially at night, with the aid of a flashlight, when they come out to feed. This method is especially effective in a small area, although many of the young may be missed. A mulch of oak leaves or tan bark can keep slugs away. Placement of sawdust or wood boards between crop rows can minimize the movement of slugs or snails from row to row.

**Spider mites.** Several groups of mites can attack garden plants. The twospotted spider mite (*Tetranychus bimaculatus*) is the most prevalent. This small (0.5 mm), eight-legged pest is usually yellow-green in color with two dark dorsal patches. The over-

wintering form is dull reddish. In the spring small, shiny, spherical eggs are laid giving rise to several overlapping generations per year. A complete generation is produced every 20-40 days. The mites' usual habitat is the underside of the newer leaves, where they spin a fine webbing. These mites most commonly injure beans, corn, tomato, eggplant, celery and onion and leave characteristic stippled feeding scars. In heavy infestations the leaves dry up, often turning reddish-brown in blotches or around the edge. There are many naturally occurring predators of spider mites, the most common being predaceous mites, predaceous thrips, lady beetles and lacewings. If these predators are not eliminated by insecticide applications, they normally keep mite populations under control. Frequent syringing of the underside of the leaves with a strong stream of water will be enough to reduce heavy mite populations.

**Spittlebugs.** External signs of spittlebugs are spittle masses created by air mixed with the excretory products of spittlebug nymphs. Yellow or green nymphs are under the spittle feeding on plant sap. Adults, one-half to one inch long and variously colored, resemble stout leafhoppers and also feed on plant sap. Eggs are laid on plant stubble near the soil surface. Many species of spittlebugs occur in North America, feeding collectively on a variety of different plants. The meadow-spittlebug (*Philaenus spumarius*) is a common pest of alfalfa, other legumes and many ornamentals. Dense populations of this species can cause stunting of growth and loss of vitality. However, usually feeding by spittlebugs does not cause much damage and should be of little concern. Spittle masses may be considered unsightly. Picking insects out of spittle masses or hosing off masses with a direct, hard spray may control low level populations. Turning under plant stubble in the fall may decrease the spring population of nymphs. Females are killed by cold winter weather.

**Squash bug (*Anasa tristis*).** Nymphs and adults will suck sap from leaves of squash, pumpkin and related cucurbits and vines. This feeding can cause plant wilting. Winged adults are gray-black, 25 millimeters in length. Unmated bugs overwinter under all kinds of shelters. Egg laying occurs early in the spring on the undersides of leaves. Hatching occurs in 10 days and nymphs require four to six weeks to reach the adult stage. Only one generation develops per year. Winter mortality is high and parasitism of adults by tachinid flies, *Tricho-*



Potato tuberworm



White-fringed beetle



Squash vine borer

*poda pennipes*, can be quite high. Hand collecting of eggs and bugs from infested vines is also effective. Burying infested crop remnants after harvest can reduce populations. Use of resistant squash cultivars such as the butternut hybrids 'Royal Acorn' and 'Sweet Cheese' helps. Nasturtium plants (*Tropaeolum majus*) repel squash bugs from gardens. Placement of onion skins in newly planted cucumber hills have been used against squash bugs.

**Squash vine borer (*Melittia satyriniformis*).** This insect damages squash and pumpkins. Hubbard squash is highly susceptible. Adult moths are green-black metallic with a 37 -millimeter wing expanse and hind wings that are almost without scales. They are flyers. Full grown larvae are 25 millimeters long and white. The larvae bore into the stems and kill the plants. They overwinter in soil as larvae or pupae. Emergence occurs in early summer and egg laying starts in April or May in the South and June or July in the North. Larvae spend four to six weeks within the stems, then leave the plants and pupate in soil. Two generations per season occur in the South. Control is difficult because larvae are protected within the plant stems. Plant squash as early as possible to avoid borers, which lay eggs from May to July. Melon, pumpkin and winter squash are not very susceptible once they pass the seedling stage.

**Thrips.** These are small to minute, elongate insects. Immature stages and winged adults are similar in appearance and are active when disturbed. Most species feed on living plants, although some are beneficial scavengers or predators of mites and other insects. Thrips species vary as to the number of different plants they feed on and the plant parts they damage. Usually, rapidly growing tissues such as young leaves, buds, flowers and fruit are preferred. Feeding damage includes silvering, scarring and distortion with later discoloration and early drying and abscission. One simple control is to give plants with thrips plenty of water to promote rapid growth. Directly hosing off infected foliage may decrease their numbers. Naturally occurring predators and parasites of thrips may control low level populations. Oil, diluted with water, may be sprayed on the foliage of some plants as a preventive measure. In the fall, debris on the ground under which thrips could hibernate should be buried. Botanical insecticides have been used with varied results.

**Whiteflies.** Adults are small (1-2 mm) insects whose wings are covered with a white powdery wax. They have a characteristic fluttering flight and are commonly found in large numbers on the undersides of leaves. The nymphal stages resemble scale insects in that they are oval, flat and immobile. These insects suck the plant's sap and produce large amounts of honeydew. They commonly attack cucumber, tomato, lettuce, geranium, fuchsias, begonia and many other plants.

There are several parasites of whiteflies

that aid in their control. The eulophid wasp, *Encarsia formosa*, is commercially available and is widely used for whitefly control in greenhouses. Another method of control exploits the attraction of adult whiteflies to the color yellow. Yellow painted boards covered with a sticky substance such as Tack Trap or Stikum are placed among the infested plants to trap whiteflies. The juvenile hormone preparation Kinosprenne is effective in controlling whiteflies in glasshouses. Interplanting French marigold (*Tagetes patula*) or nasturtiums with tomatoes can reduce whitefly (*Trialeurodes vaporariorum*) infestations.

**White-fringed beetle** (*Graphognathus* spp.). Introduced from South America to Florida in 1936, this insect is now widespread in the southeastern United States and quarantined from other areas. Adults are flightless, so spread of this species is easily controlled. Adults are dark-grey snout beetles, one-half to one inch long with a white fringe outlining in the abdomen. Soft-bodied larvae are white and legless, living in the soil and feeding on roots. Adults are active from May to August with one generation per year. Around 385 species of plants may be attacked, although extensive damage may be done to cotton, peanuts, okra, soybeans, beans and peas. Flightless adults can be trapped by digging steep-sided ditches, one foot wide, which they can't climb out of. Sticky bands can be painted on stems or trunks of larger plants to exclude the adults. Plantings can be rotated so very susceptible plants (e.g., summer legumes) are only planted in problem areas every three to four years. Land heavily infested with beetles is most profitably planted with oats or winter legumes.

**Wireworms.** Wireworms are soil-dwelling immature stages of click beetles. Smooth, cylindrical, hard-bodied, one-half to one inch long, they range in color from yellow to brown. Larvae are destructive pests of many root crops as well as corn, small grains, vegetables and some flowers. Seeds also may be eaten, although usually roots, stems and tubers are consumed. Damage may not be detected until harvest. Wireworms occur throughout North America, and different species are problems in different areas. Some species take several years for one life cycle and populations can build up in this way. Land that has had grass growing on it may have abundant wireworms; new plants grown there risk extensive damage. Before use, this land should be plowed or cultivated often for several weeks in early spring. Wireworm attack

can be reduced by a heavy dressing of manure applied to grassland before new plowing. Plowing or cultivating infested soil in late summer through winter exposes wireworms to predators and cold. Land with poor drainage also may have abundant wireworms. Withholding water, for plants which can tolerate this procedure, can be effective. Adding humus to soil will increase aeration and decrease wireworms. Rotating plants like alfalfa with vegetables

can deter wireworms. A cover crop of alfalfa, repeated yearly, gradually lowers wireworm infestations. ☉

*Part Two will describe biological control agents. Suppliers of these agents will be listed at the end of the article.*

Photos of insect pests courtesy of: Oregon State University Extension Service; American Society for Horticultural Science, Eugene Memmler; Entomological Society of America; Union Carbide Agricultural Products Company, Inc.

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Continued from page 19



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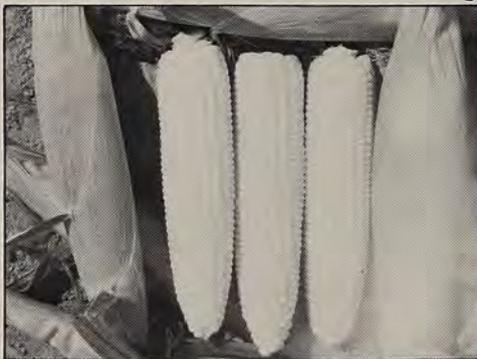
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26



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25



27

**22 Chinese Cabbage 'Two Seasons':** Unlike most Chinese cabbage, 'Two Seasons' can be grown for late spring or early summer harvest even in areas where hot weather causes most cultivars to bolt. This new introduction from W. Atlee Burpee Co. also can be grown in the fall if sown three months before the first expected autumn frost. 'Two Seasons' matures about 62 days after seedlings are set or direct-seeded rows are thinned. The heads are large, oval and measure about 10 inches tall and 7½ inches across.

**23 Potato 'Explorer':** Five years of research and development have finally led to a potato that can be sown, germinated, transplanted and grown from true seeds just like tomatoes and peppers. 'Explorer' eliminates the need to propagate potatoes from "seed" potatoes or eyes, and any gardener who can grow tomatoes should be able to grow them. Sets of this new plant should be available in local garden stores and nurseries, and seed is available from most large mail-order seed houses.

**24 Tagetes 'Snowbird':** This pure-white flowered marigold was developed from the plants that won Burpee's \$10,000 prize for the first white flowered cultivar. 'Snowbird' bears carnation type flowers that are from 2½ to three inches across. The plants are compact and bushy and will reach a height of about 18 inches.

**25 Sweet Corn 'Silver Prince':** A new silvery-white kernalled sweet corn, 'Silver Prince' is in



28

the same class as the popular 'Silver Queen', but it has some features that make it an important new introduction. 'Silver Prince' has the "sugar extender" gene that gives extra sweetness and improves the keeping quality of the corn on the stalk and after picking. It is a more vigorous and rugged cultivar than 'Silver Queen' as well. Available from Joseph Harris Seed Company.

**26 Calendula 'Lemon Gem':** The final color in W. Atlee Burpee Company's Dwarf Gem calendula series, 'Lemon Gem' bears bright-yellow, 2¾ to three-inch flowers on dwarf, bushy plants that reach a height of approximately one foot. 'Lemon Gem' makes an excellent bedding plant and it will also perform well in pots or boxes. This new cultivar, like others of its species, thrives best in moderately cool weather. Keep plants well watered during hot spells and remove flowers as they fade and 'Lemon Gem' will perform well during the summer months. Under some environmental conditions its blooms will exhibit an apricot tinge.

**27 Petunia 'White Flair':** This hybrid grandiflora, a W. Atlee Burpee Company exclusive, is a vigorous, fast growing plant that comes into bloom very early, approximately 10 days ahead of 'White Cascade'. The three- to four-inch flowers have excellent substance and are borne abundantly. 'White Flair' reaches a height of about 14 inches and is an excellent choice for bedding or in hanging baskets. Trim the plants back after the first flush of bloom and they will quickly be covered over with fresh growth and new blooms.

**28 Snap Pea 'Sugar Rae':** 'Sugar Snap' was the first edible podded pea, and this new plant is of that type but with an added advantage—the vines of this new introduction are only 26 to 30 inches tall, half the height of 'Sugar Snap'. Trellising is not necessary, but the pods will be a bit easier to pick if the

plants are given some support. Available from Joseph Harris Company and Gurney Seed and Nursery Company.

#### OTHER NEW INTRODUCTIONS

**Capsicum 'Holiday Flames':** Ornamental peppers have become popular bedding and house plants in recent years. 'Holiday Flames' is described as a "super version" of the popularly grown cultivar 'Fiesta' since it bears more fruit and has a more branching habit than 'Fiesta'. 'Holiday Flames' bears clusters of slim, elongated fruit that are a pale cream color at first and ripen to a scarlet red. Plants should be available in garden centers and nurseries this spring. Seed is available from Geo. W. Park Seed Company.

**Rhododendron 'Nancy of Robin Hill':** An attractive new azalea to add to the Robin Hill hybrids, 'Nancy of Robin Hill' blooms in May and bears clear pink flowers that age to a pastel shade. The blooms are from three to four inches in diameter. Five years after planting this new azalea will have reached a height of approximately 18 inches and a spread of 30 inches. Available from Wayside.

**Rhododendron 'Starry Night':** A unique deep-purple flowered rhododendron to look for in nurseries and garden centers on the East Coast this spring, 'Starry Night' will be available in catalogues for the 1983 season.

**Apple 'Summer Granny':** A new apple cultivar introduced by Bountiful Ridge Nurseries that has many of the characteristics of the popular 'Granny Smith' except that it matures in the Summer. Crisp, pleasingly tart, yellow-green apples mature in early August in Zone 7. The apples keep well, and the tree grows best in Zones 4-7.

**Strawberry 'Bordurella':** Hybridized in France and introduced by Bountiful Ridge Nurseries, this new strawberry is a product of tissue culture. The plants are completely runnerless and produce large, sweet tasting berries all summer long. 'Bordurella' can be used in baskets, borders and other ornamental plantings.

**Lettuce 'Sweetie':** An excellent new leaf lettuce, 'Sweetie' is the result of a cross between a red leaf lettuce and a green head lettuce. It is as easy to grow as a leaf lettuce but also has the high quality of a butterhead type. The heads can be harvested whole or, to extend the length of harvest, the outer leaves can be cut as needed. The crisp and unusually sweet leaves are rich green with a red tinge at the edge. Available from Gurney Seed and Nursery Company.

**Dianthus 'Scarlet Luminette':** An All-America Selections Bronze Medal winner for 1981, 'Scarlet Luminette' is a stiff-stemmed carnation that rarely needs staking. Average blossom size is 2½ inches, and three to four buds are borne per stem. Each plant branches at the base, producing six to eight stems per plant, and reaches a height of from 18 to 22

inches. 'Scarlet Luminette' has the heady clove fragrance of old-fashioned carnations and makes a long-lasting cut flower. Seed is available from Twilley Seed Company. Plants should be available at local garden centers. ❀

#### SOURCE LIST

Bountiful Ridge Nurseries, Inc., Princess Anne, MD 21853  
 W. Atlee Burpee Company, 300 Park Avenue, Warminster, PA 18974  
 Gurney Seed and Nursery Company, Gurney Building, Yankton, SD 57079  
 Joseph Harris Company, Inc., Moreton Farm, Rochester, NY 14624  
 Herbst Seedsmen, Inc., 1000 North Main Street, Brewster, NY 10509  
 Nor'East Miniature Roses, Inc., 58 Hammond Street, Rowley, MA 01969  
 Geo. W. Park Seed Company, Inc., Greenwood, SC 29647  
 Stokes Seeds, Inc., 2042 Stokes Building, Buffalo, NY 14240  
 Twilley Seed Company, Inc., P. O. Box 65, Treviso, PA 19047  
 Wayside Gardens Company, Hodges, SC 29695

Photos of 1982 introductions courtesy of: Wayside Gardens—1, 2, 3, 16; Pan American Seed—4; W. Atlee Burpee Company—5, 18, 20, 22, 24, 25, 27; Nor'East—6; Denholm Seeds—7, 10, 19, 21; Derek Fell 8, 9, 15, 17, 26; George W. Park Seed Company, Inc.—11, 12, 14; Ball Seed Company—13; Joseph Harris Seed Company—23, 28.

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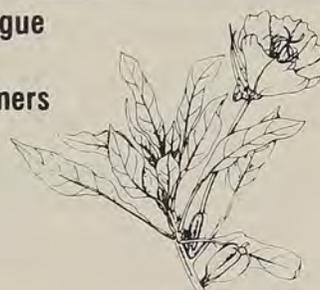


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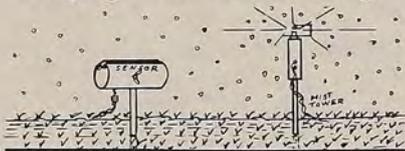
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### FRAGRANT FLOWERS CONT'D

Continued from page 27



*Hemerocallis*

open until sunrise. In moonlight, they have a shimmering quality. *Nicotiana sylvestris* is also white flowered with a delicious scent and magnificent foliage.

Sweet rocket, *Hesperis matronalis*, is another plant that gives forth its scent after nightfall. *Hesperis*, meaning "in the evening," begins to flower in May and continues until July. The flowers are white, pink or violet in color. Only a small colony of these plants is needed to perfume a wide area. Be careful of this plant seeding itself too freely. Rather than plant sweet rocket in the border, try colonizing it in an out-of-the-way area.

Mignonette, *Reseda odorata*, once had a place in every garden because its scent resembled that of ripe peaches. Its flowers are rather homely, but their fragrance is so pleasant and intense only a few are needed to impart a rich aroma after twilight.

There are other plants whose fragrances don't carry over distances but which are very aromatic when smelled at close range. Many lilies have a strong fragrance. *Lilium regale*, *L. speciosum* and *L. auratum* are particularly pleasant. *L. regale* may have as many as 10 or 15 white trumpets on a single stem. This is an amiable flower and does not need extra watering or staking.

The flowers of the winter aconite bloom so close to the ground their aroma goes unnoticed unless they are picked. The starry blossoms are real harbingers of spring. They brave the cold before the leaves appear, one flower to a stem. The five to eight sepals are a spectacular gold color; the petals are smaller. The common species,



*Hosta plantaginea*

*Eranthis hyemalis*, is a native of Southern Europe and is the best to use for naturalization. Allow aconites to remain in the same place to multiply. To increase the colony, plant the small, round tubers in the fall.

Some hemerocallis in the yellow-orange range produce fragrant flowers whose scents are apparent when the flowers are open. The scent is distributed on the inner surface of the sepals and petals. *Hemerocallis citrina* has a fragrance resembling that of limes or lemons, especially in the evening. Every garden should have a clump of the old lemon daylily, *H. flava*, for its delightful spiciness and lemon fragrance. The

flowers are only medium-sized but are borne in good succession. 'Hyperion', one of the older, light-yellow hybrids, has a delightful fragrance too. There are many new hybrids, both diploids and tetraploids, that vary in quality and quantity of scent.

Gardeners are beginning once again to enjoy the value of hostas as garden subjects, but many do not realize there are a number of varieties with fragrant flowers. A collection of these types makes an attractive grouping because they flower about the same time in August or September. There are at present one species, *Hosta plantaginea*, and four of its progeny from which to choose. *Hosta plantaginea* is a robust plant with large, white, waxy, fragrant flowers. They are borne above clumps of heart-shaped, shiny, light-green leaves. They open at night and scent the whole garden. The four cultivars are: 'Royal Standard', a large plant with medium-green leaves and white flowers; 'Sweet Susan', with large, flaring, pale-purple flowers and handsome foliage; 'Honey Bells', with white flowers on tall scapes; and a small hosta, 'Surprise', with bright-green leaves and blooms with a sweet fragrance. All of these hostas are tough and tolerant of all soil conditions. They like shade and will add greatly to the late summer scented garden.

The flowers mentioned in this article are lovely to smell and lovely to look at. To the appreciative gardener, they are double delights. ☼

**MAIL-ORDER PLANT SOURCES:**

**Dianthus:**

Powell Gardens, Route 2, Highway 70, Princeton, NC 27569

Holbrook Farm and Nursery, Route 2, Box 223B, Fletcher, NC 28728

**Hemerocallis and fragrant hostas:**

Aden Gardens, 980 Stanton Avenue, Baldwin, NY 11510

Fairway Gardens, 114 The Fairway, Alberta Lea, MN 56007

**Peonies:**

Gilbert Wild and Sons, Sarcoxie, MO 64862

**Lilacs, lilies of the valley, lilies:**

Spring Hill Nurseries, Tipp City, OH or Box 758, Peoria, IL 61656

White Flower Farm, Litchfield, CT 06759

Wayside Gardens, Hodges, SC 29695

**Small bulbs:**

Van Bourgondien, 245 Farmingdale Road, Box X, Babylon, NY 11702

**Siberian crab apples:**

Mellinger's, Inc., 2364 Range Road, North Lima, OH 44452

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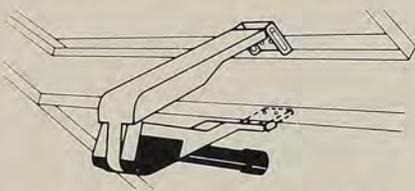
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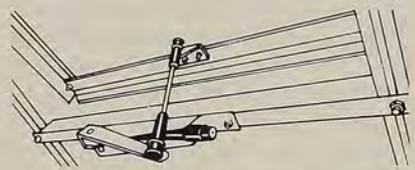
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# PRONUNCIATION GUIDE

## Guide to Botanical Names in This Issue

The accent, or emphasis, falls on the syllable which appears in capital letters. The vowels which you see standing alone are pronounced as follows:

i—short sound; sounds like i in “hit”  
o—long sound; sounds like o in “snow”  
a—long sound; sounds like a in “hay”.

*Amaranthus* am-ah-RAN-thuss  
*Aplectrum hyemale*  
a-PLECK-trum hy-eh-MAL-ee  
*Aplectrum unguiculatum*  
a-PLECK-trum un-gwick-you-LAY-tum  
*Ardisia* ar-DISS-ee-ah  
*Belamcanda chinensis*  
bell-am-CAN-da chi-NEN-sis  
*Bletilla striata* ble-TILL-ah stree-A-ta  
*Browallia speciosa*  
bro-ALL-ee-ah spee-see-O-sa  
*Brugmansia X candida*  
brewg-MAN-see-ah CAN-did-ah  
*Brugmansia sanguinea*  
brewg-MAN-see-ah san-GWIN-ee-ah  
*Brugmansia suaveolens*  
brewg-MAN-see-ah su-av-ee-O-lenz  
*Brunfelsia americana*  
brun-FELL-see-ah a-mer-i-KAN-ah  
*Brunfelsia pauciflora*  
brun-FELL-see-ah paw-si-FLOR-ah  
*Calendula* ka-LEN-dew-la  
*Calypso bulbosa* ka-LIP-so bul-BO-sa  
*Camellia japonica*  
ka-MELL-ya ja-PON-i-ka  
*Camellia sasanqua*  
ka-MELL-ya sa-SANK-qua  
*Capsicum annuum*  
CAPS-i-kum AN-you-um  
*Capsicum annuum var. glabriusculum*  
CAPS-i-kum AN-you-um var. glay-bree-us-  
COO-lum  
*Capsicum frutescens*  
CAPS-i-kum fru-TESS-enz  
*Cassia* KASS-ee-ah  
*Cestrum diurnum* SESS-trum dy-UR-num  
*Cestrum nocturnum*  
SESS-trum nock-TUR-num  
*Chimaphila* chi-MAY-fill-ah  
*Citrus* SIT-russ  
*Conium maculatum*  
KON-i-um mack-yew-LAY-tum  
*Convallaria majalis*  
con-va-LAIR-ee-ah ma-JAY-liss  
*Cornus mas* KOR-nus MAS  
*Daphne odora* DAFF-ne o-DOOR-ah

*Datura X candida*  
day-TOUR-ah CAN-did-ah  
*Datura metel* day-TOUR-ah MET-el  
*Datura stramonium*  
day-TOUR-ah stra-MOAN-ee-um  
*Datura suaveolens*  
day-TOUR-ah su-av-ee-O-lenz  
*Dianthus X allwoodii*  
dy-AN-thuss all-WOOD-ee-eye  
*Dianthus caryophyllus*  
dy-AN-thuss care-ee-OPH-i-lus  
*Dianthus gratianopolitanus*  
dy-AN-thuss gra-tee-an-o-pol-i-TAY-nus  
*Dianthus plumarius*  
dy-AN-thuss plu-MARE-ee-us  
*Eleusine indica* el-yew-SY-nee IN-di-ka  
*Eranthis hyemalis*  
air-AN-thiss hy-eh-MAY-liss  
*Gazania* ga-ZANE-ee-ah  
*Gelsemium sempervirens*  
jel-SEM-ee-um sem-per-VIRE-enz  
*Gerbera* GER-ber-ah  
*Goodyera* good-YER-ah  
*Hemerocallis citrina*  
hem-er-o-KAL-iss/hem-er-OCK-a-liss si-  
TRY-na  
*Hemerocallis flava*  
hem-er-o-KAL-iss/hem-er-OCK-a-liss  
FLAY-va  
*Hesperis matronalis*  
HES-per-iss ma-tro-NAL-iss  
*Hibiscus* hy-BISS-kuss  
*Hosta plantaginea*  
HOSS-ta plan-tadge-i-NEE-ah  
*Lathyrus odoratus*  
la-THY-rus o-door-A-tus  
*Leptochloa filiformis*  
lep-toe-CLO-ah fil-i-FOR-miss  
*Lilium auratum* LIL-ee-um aur-A-tum  
*Lilium regale* LIL-ee-um re-GAL-ee  
*Lilium speciosum*  
LIL-ee-um spee-see-O-sum  
*Linum usitatissimum*  
LY-num ooh-si-ta-TISS-i-mum  
*Lycopodium* ly-lo-PO-dee-um  
*Lycoris radiata* ly-KOR-iss ray-dee-A-ta  
*Magnolia grandiflora*  
mag-NOL-ya grand-i-FLOR-ah  
*Malus baccata* MAL-us back-CAY-ta  
*Michelia figo* mi-SHELL-ee-ah FY-go  
*Nandina* nan-DEE-na  
*Narcissus jonquilla*  
nar-SIS-us jon-QUILL-ah  
*Nicotiana alata* ni-ko-ti-AY-na al-A-ta  
*Nicotiana sylvestris*  
ni-ko-ti-AY-na sil-VES-triss

*Nicotiana tabacum*  
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fy-SAL-iss all-ke-KENG-guy  
*Polypodium polypodioides*  
pol-i-POE-dee-um pol-i-poe-dee-o-EYE-deez  
*Potentilla* po-ten-TILL-ah  
*Prunus subhirtella*  
PRUNE-us sub-her-TELL-ah  
*Pyracantha* py-ra-KAN-tha  
*Reseda odorata* re-SAY-da o-door-A-ta  
*Rhododendron* ro-do-DEN-dron  
*Rosa banksiae* RO-za BANKS-see-ee  
*Salpiglossis* sal-pee-GLOSS-us  
*Salvia X superba* SAL-vee-ah sue-PER-ba  
*Schizanthus* ski-ZAN-thuss  
*Solandra grandiflora*  
so-LAN-dra grand-i-FLOR-ah  
*Solandra guttata* so-LAN-dra goo-TAY-ta  
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so-LAYN-um dul-cam-AIR-ah  
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