

American
Horticulturist



Volume 57 Number 6 Winter, 1978

A watercolor illustration of a garden scene. In the foreground, there is a white picket fence. Behind the fence, there are several large, vibrant red flowers, possibly azaleas or camellias. In the background, a large tree with green and yellow leaves stands next to a white building with a balcony. The balcony has a decorative railing with circular patterns. The overall style is soft and artistic, typical of watercolor painting.

Winter— “Gone With the Wind”

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Visits Savannah

March 18-21, 1979

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If you would like complete information, drop a note to the Savannah Symposium Committee, c/o American Horticultural Society, Mount Vernon, Virginia 22121. We will send you the registration material. In the meantime, mark the dates March 18-21 on your calendar. This year plan to experience spring—*twice.*

American Horticulturist

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Editor: Murray Keene

Editorial Assistant: Jane Steffey

Publications Committee: Henry M. Cathey, Gilbert S. Daniels, Donald P. Watson and Donald Wyman

Art Director: Rebecca McClimans/
Grafik

Book Department: Tom Stevenson

Production Coordination: John Simmons

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Cover Photo: *Bromeliad neophytum 'Ralph Davis'* by William McPherson

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Editorial

Gardening on the National Level

The official was adamant, “any plant or animal products in your possession must be declared if they are to be cleared through customs.”

His statement offended me. I felt like asking if he expected us to arrive naked and hungry. I suppressed the urge to admonish him and continued munching the smoked almonds the hostess had provided on our long flight from England.

While waiting to clear customs, I began to wonder how many people realize the significance of plants in our daily existence—food, clothing, furnishings, even the oxygen that sustains us. All are gifts from the plant kingdom.

As members of the American Horticulturist Society, we should be aware of our dependence upon the plant world. For some, this is the primary reason for our association with AHS. Membership complements our basic desire to become successful gardeners, but we have learned that gardening has more important considerations than organically growing a two-pound tomato, hybridizing a purple chrysanthemum or luxuriating on a carpet of emerald-green zoysia.

As AHS members, we are learning to relate compatibly with plants. In this relationship, there are no arguments; only responses and healthy challenges. Gardening teaches tolerance and an appreciation for beauty. But, of greater significance are the lessons we learn about individual responsibility to our green benefactors.

We as gardeners have many gaps to bridge if we are to communicate the real significance of plants in our daily lives. We must support research, create new information and promote teaching and demonstration programs. Displaying a “green survival” sticker on our auto bumpers is no longer enough.

We must rise above the concern for plants merely as decorative objects and generate more concern for horticulture in general. The phenomenal interest in gardening today is not limited to house plants, but includes plants for the landscape and food as well. This popularity of gardening for sustenance and aesthetic enhancement is not a fad . . . it is not the hustle . . . it is not the hoola-hoop . . . it is not going away.

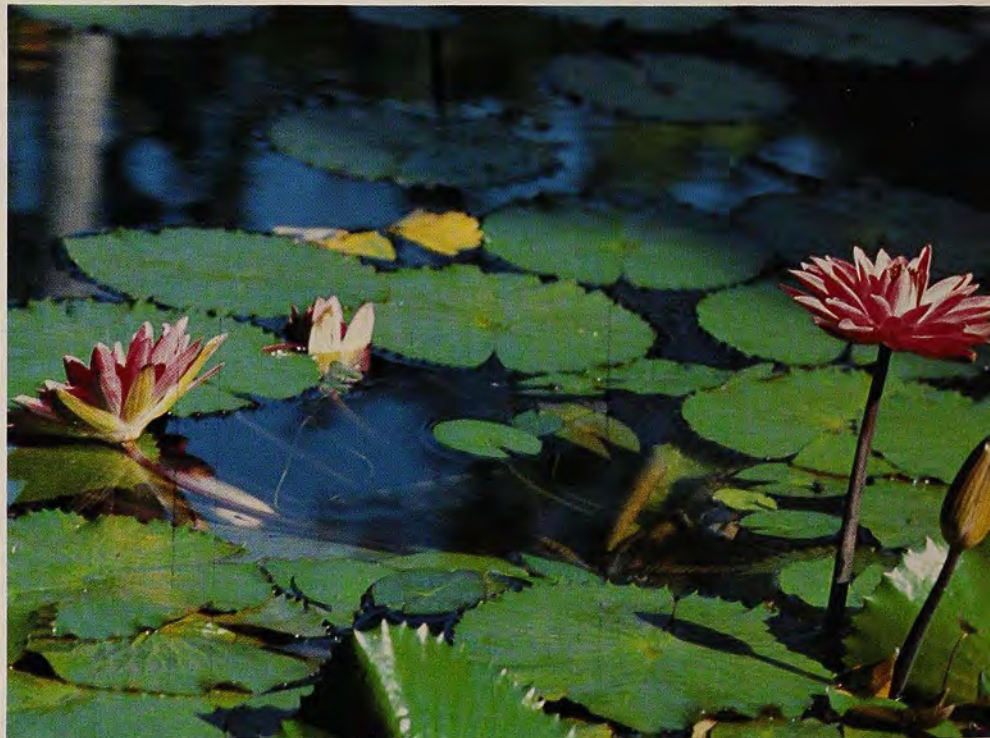
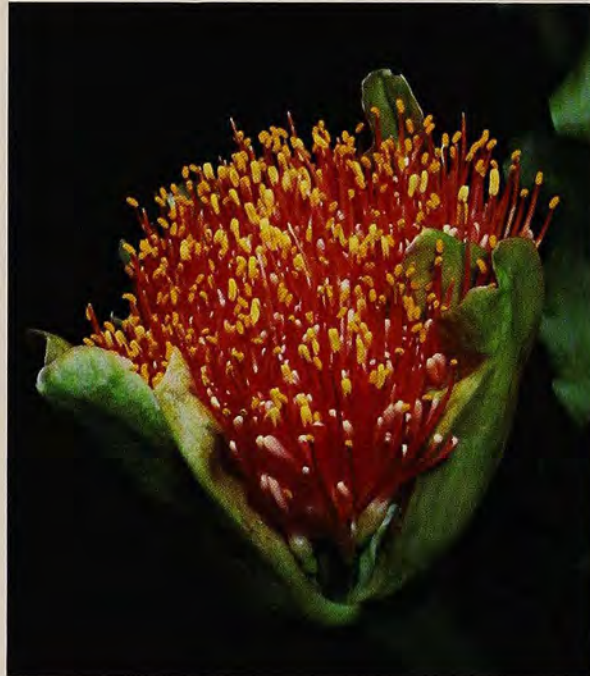
In the eyes of hundreds of local and regional plant societies, we are a source of leadership in horticultural matters of national concern. The future holds considerable expectation and promise for the Society. We must continue to provide leadership. We must continue to inspire trust.

Dr. Gilbert S. Daniels
President

A Year-round Spring

Ann Reaben Prospero
Fairchild Tropical Garden
10901 Old Cutler Road
Miami, FL 33156

The morning rush-hour traffic streams past the front gate of Fairchild Tropical Garden around the curve in the road. A low coral rock wall comes into view and above it can be seen the wooden rafters of a vine pergola which are supported by columns of small flat cut limestone. Lilac blue blossoms of queen's wreath, *Petrea volubilis*, cascade from the pergola over the wall. Out of the traffic and away from the stress of the city, an unhurried visitor can pause by the wall to see the many colors and shapes of blooms all over the pergola, and then beyond it, the trees covered with flowers: The fire bush, *Oreocallis wickhamii*, with fire red bunches of blooms against dark green foliage; the vibrant pink brush-like flowers of the shaving-brush tree, *Pseudobombax ellipticum*, that grow on branches bare of leaves; or the flame-of-the-forest, *Butea monosperma*, the petals of which look like flickering flame. Inside the gates of Fairchild Tropical Garden, the gentle springtime breezes come from Biscayne Bay just a few hundred yards away and rustle the palm leaves so that there is an island sound. The visitor has, in fact, walked into an island of tropical spring where the exotic blooms and lush forms of the plants astonish the



Above right—*Bromeliad*

Above left—*Amaryllis*

Below—Water lilies in the pool by the front gate



Photos by William McPherson

most worldly-wise visitor. Even the landscaping, carefully planned for the special needs of tropical and subtropical plants by William Lyman Phillips, gives one the feeling of having entered a world completely separate from the bustling city and neatly squared-off suburban homes.

Although springtime gives us the greatest show of blossoms in Fairchild Tropical Garden, the nature of the climate in extreme south Florida and the nature of the tropical plants themselves is to provide flowers year round. And tropical plants provide color not only in their flowers but also on their leaves, their stems, their fruit and even on cones as in the cycad.

Here at Fairchild Tropical Garden, for example, as the visitor walks around the winding paths, he will pass the dozens of hibiscus shrubs that blossom beside one of the eight lakes or the brilliant bougainvillea of many colors that line the paths of the flowering tree section. In the Rain Forest area, he may see high in the towering trees sprays of orchid blossoms or down among the leaf litter colorful bromeliad leaves and flowers. In the Sunken Garden, silvered dried leaves of *Cecropia*, a West Indian tree, float in a pool below the waterfall. Green, gold and red cones rise majestically from the crowns of cycad leaves. Red, purple, gingerbread and even pink colored fruits hang in decorative bunches from the palms.

In the Rare Plant House where the filtered light softens all colors, the iridescent orange globe of a blossom

Left—*Anthurium*

of the *Pearcea hypocyrtiflora*, a gesneriad, nestles among the green moss. The livid red trunk and petioles of the sealing wax palm, *Cyrtostachys lakka*, startle from behind gentle green leaves. The lavender spathes of *Anthurium* sp. from Panama, the size of a cat's ear, nod pertly above the leaves. The delicate orchid blossoms in colors that range from yellow to purple complement the thrust of staghorn fern leaves patterned with cinnamon colored spores.

Color, normally associated with spring or summer in more temperate climates, is an everyday companion in Fairchild Tropical Garden. The visitor has only to adjust to looking for it in places other than flowers, though exotic blossoms are abundant here also. The variety found

here is due to the fact that there are over 5,000 species of plants growing in Fairchild Tropical Garden's collections of tropical and subtropical plants, one of the largest in the continental United States. Its palm collection numbers about 500 species and it, as well as its cycad collection, is one of the world's largest and finest. Its plants have been collected from all over the world's tropics and subtropics. Dr. David Fairchild, the famous plant explorer for whom the Garden is named, personally collected many himself.

Much of the Fairchild Tropical Garden's initial collection of plants—palms, cycads and flowering trees and shrubs—were given by Col. Robert H. Montgomery, the genius behind this botanical garden. Col. Montgomery dreamed of estab-



Above left—*Oncidium* 'chickadee'
 Below left—Flame of the forest (*Butea monosperma*)
 Below right—Monkey's comb (*Combretum aubletti*)

lishing a tropical botanical garden, and with the help and inspiration of his mentor, Dr. Fairchild, he selected the site in Miami by the warming waters of Biscayne Bay. Fairchild Tropical Garden was officially dedicated in 1938 and within a few dozen months, the land was transformed from a mango grove, scrub palmetto and pineland, and mangrove marsh into a botanical garden complete with eight lakes and vistas. A skillful manipulation of mass and void by landscape architect, William Lyman Phillips, gives the visitor the impression of infinite variety within a unified whole. This masterful layout adds immensely to one's enjoyment of Fairchild Tropical Garden.

However, much here is not seen by the casual visitor looking for colorful flowers or unusual plant forms. At the research center, there is a serious scientific program in tropical botany supported by funds from the National Science Foundation, National Geographic Society and Harvard University through the Cabot Foundation and Atkins Garden Fund. Research seminars are conducted by visiting scientists and the staff. The Herbarium contains over 40,000 dried specimens. In addition, a popular and extensive horticultural study program is offered to local gardening enthusiasts who may study subjects ranging from orchids to staghorn ferns to landscape design in these classes.

During the dedication ceremony in 1938, Dr. Liberty Hyde Bailey defined the spirit of the Fairchild Tropical Garden that has remained valid to this day: "(This tropical garden) should be a retreat for reflection, an observation area where people may behold the evident processes of nature and be consoled by them, where knowledge may be gained first hand, where one may be taken beyond oneself, where one may experience the everlasting rejuvenescence."

Rejuvenescence is the essence of spring and it may be found at any time of the year at Fairchild Tropical Garden. □



Above—*Encephalartos ferox*

Below—Rosemound

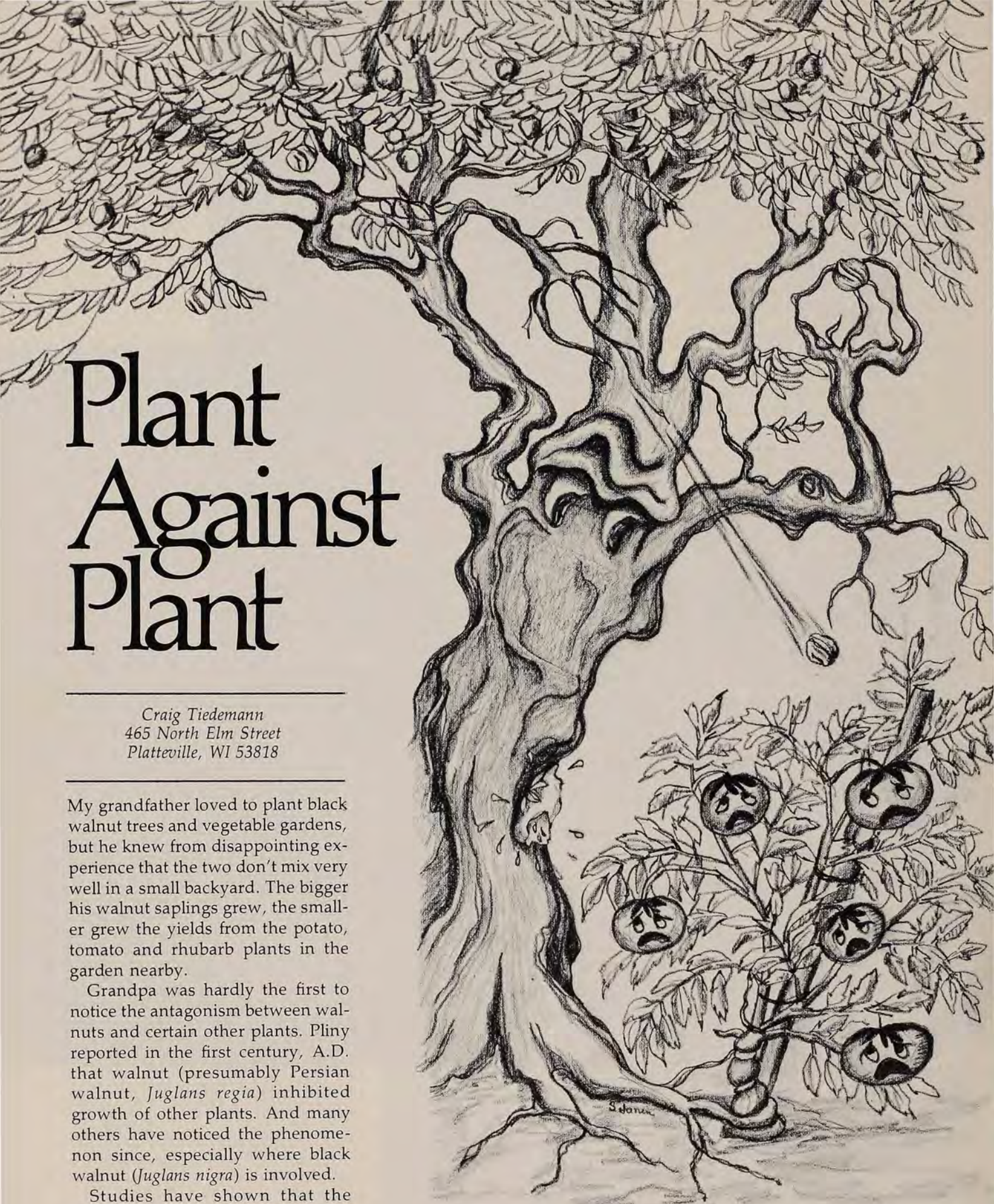
Plant Against Plant

Craig Tiedemann
465 North Elm Street
Platteville, WI 53818

My grandfather loved to plant black walnut trees and vegetable gardens, but he knew from disappointing experience that the two don't mix very well in a small backyard. The bigger his walnut saplings grew, the smaller grew the yields from the potato, tomato and rhubarb plants in the garden nearby.

Grandpa was hardly the first to notice the antagonism between walnuts and certain other plants. Pliny reported in the first century, A.D. that walnut (presumably Persian walnut, *Juglans regia*) inhibited growth of other plants. And many others have noticed the phenomenon since, especially where black walnut (*Juglans nigra*) is involved.

Studies have shown that the deleterious effect a walnut tree has on tomatoes, potatoes and certain



other plants is not due chiefly to competition on the tree's part for water, minerals and light. Instead, a chemical called juglone produced inside the walnut tree crosses to nearby plants when their roots contact walnut roots. Juglone causes stunting, wilting and perhaps the deaths of susceptible plants.

Walnuts and certain other plants have used "weed killers" such as juglone to suppress competing plant life for a much longer time than the 30 or so years we humans have used synthetic herbicides such as 2,4-D to control vegetation to suit our purposes. And what's known about allelopathy, or the phenomenon of chemical compounds produced by one plant causing harmful effects on another, could help you understand and avoid some perplexing garden failures.

The list of plants seriously harmed when their roots contact those of black walnut includes alfalfa, tomato, potato, shrubby cinquefoil or potentilla, blackberry, rhododendrons and azaleas, mountain laurel, blueberry and red pine. In addition, sweet pepper, common lilac, persian lilac, autumn crocus, peony, apple, saucer magnolia, Amur maple, sugar maple and rhubarb have been observed to become stunted from such root contact.

Of course not all plants are sensitive to juglone, or there would be a "brown zone" containing no vegetation around each black walnut tree. Plants which are for practical purposes immune to juglone include Kentucky bluegrass, white clover, beet, snap bean, lima bean, onion, parsnip, sweet corn, black raspberry, grape, wild roses, forsythia, burning bush, Virginia creeper, narcissus, red cedar, oaks, hickories and poison ivy (darn!).

Black walnut toxicity is well documented but less is written of the very similar allelopathy produced by butternut (*Juglans cinerea*). Butternut also contains juglone, and I've observed a situation where both an Amur maple and a rhubarb plant remained small and stunted for

years until a nearby butternut was removed, whereupon the maple and rhubarb commenced vigorous growth. The butternut tree wasn't close enough to the two plants to shade them or provide severe root competition, so I suspect that allelopathy was involved.

Walnut is the best known cause of allelopathy, but several other kinds of plants commonly grown in yards and gardens produce toxic compounds harmful to certain other plants. A list of many of these plants and what is known of them was compiled by Elroy L. Rice of the University of Oklahoma in a book titled *Allelopathy* (Academic Press, 1974). For example, decaying sycamore (*Platanus occidentalis*) leaves release substances harmful to several grasses, including foxtail and prairie switchgrass. Since bare areas often occur where sycamore leaves commonly accumulate, these sycamore toxins may harm other kinds of plants as well. It's possible, too, that green sycamore leaves release toxins that are washed to other plants by rain, but more information is needed to be sure of these speculations.

Another common tree suspected of allelopathy is hackberry (*Celtis occidentalis* and *C. laevigata*). Again, fresh or decaying hackberry leaves release toxins which inhibit certain prairie grasses, and perhaps other plants.

Relatively open, sunny groves of exotic looking tree-of-heaven (*Ailanthus altissima*) plants often resist invasion by other more shade tolerant trees for many years. Extracts of tree-of-heaven wood and bark are toxic to many other tree species, and when tree-of-heaven twigs are approach-grafted to those of other tree species, many of the other trees are injured or killed. This is strong evidence for allelopathy.

But trees aren't the only poisoners of fellow plants. Giant foxtail (*Setaria faberii*), a common weed grass, exudes toxic substances that can reduce the growth of neighboring corn plants by 35 percent. The combination of allelopathy and competition

for light, minerals and water can reduce corn growth by 90 percent in giant foxtail infested areas.

A substance produced by chrysanthemum (*Chrysanthemum morifolium*) foliage inhibits or stops lettuce seed germination, and has the same effect on chrysanthemum seed!

Greenhouse supervisors commonly discard soil in which another flower, stock (*Malcomia maritima*), has grown because this soil doesn't work well as a growing medium for new crops.

In a variation on the same theme, young apple trees are difficult to establish and if established, often grow poorly on land which has recently supported mature apple trees. This replant problem often plagues apple orchardists, and a similar difficulty bothers peach growers. Allelopathy targeted against individuals of the same, rather than other, species is probably responsible.

Other plants about which there is some evidence for the occurrence of allelopathy include common sunflower (*Helianthus annuus*), wormwood (*Artemisia absinthium*), black locust (*Robinia pseudoacacia*), crabgrass (*Digitaria sanguinalis*), Japanese red pine (*Pinus densiflora*), *Eucalyptus globulus* and *E. camaldulensis*.

Much is still to be learned about allelopathy, both in terms of which plant species employ it against which others, and exactly what chemicals are responsible for the toxic interactions between plants and how they work. It's not inconceivable that useful new herbicides or improved cultural practices such as companion planting to control weeds may result from inquiries into this area. But for now, it may pay you to consider allelopathy as a possible cause when a plant isn't doing well despite good growing conditions and the absence of insects, diseases, mechanical and environmental injury or herbicide damage, especially when one of the plants mentioned here is growing nearby.



Are You a Garden Innovator?

James W. Wilson
All-America Selections
4546 El Camino Real
Suite A
Los Altos, CA 94022

Home garden innovators have learned to evade the tender trap of sentiment. Sentimental loyalty to old favorite varieties can do disservice to gardens and gardeners. Old varieties can deceive. They can continue to look good to the slow-to-change gardener because he or she has no base for comparison.

Innovators usually try several new flower and vegetable varieties each season and are rarely disappointed. They have discovered a fact already known to seed breeders and public display gardens . . . that garden varieties are being improved at an incredible rate, thanks to recent breakthroughs in the science of genetics and the art of hybridization.

Progressive gardeners know how to screen seed catalogs and packet seed displays for new varieties. (Before you get the wrong impression, no home gardener is a rigid iconoclast. Each leaves room for a few traditional varieties.) But how—with about 100 truly new and different flower and vegetable varieties being introduced each year—can a home gardener know which should do well in his or her garden?

Innovators have learned to look for the shield-shaped symbol



Above—Pepper 'Holiday cheer'
Left—Nicotiana 'Nicki red'

emblazoned "All-America Award." It is the imprimatur of a highly efficient, hyper-critical volunteer network of trial grounds across the USA and Canada. If a new variety has earned an All-America Selections award, it is literally the best in its class.

New varieties are always attention-getters, particularly AAS award winners, and especially among the experienced gardeners who follow garden columns. All-America Selections focuses attention on the best of each year's new flower and vegeta-

ble varieties and provides garden writers with thorough descriptions that cover not only the advantages of each new AAS winner but also its limitations.

Visualize the end product of All-America Selections as a great stream of varieties flowing along from year to year. Many of the award winning varieties introduced since the founding of AAS have been inundated by newer and stronger winners and have disappeared from the stream. Other ancient award winners are still afloat because nothing better has come along in their classes. Still others are carried along by consumer demand even though newer and better varieties are available.

All-America Selections has been active in new flower and vegetable evaluation since 1933. From 45 years of trials, 261 award winning flowers have emerged—an average of about six per year. Slightly fewer vegetables received awards—207, for an average of about five per year. New marigolds, petunias and zinnias ran away with the lion's share of the flower awards, with 44, 49 and 25 awards respectively. In vegetables, beans took 28, corn 19 and squash 18 awards. Less than half of these award winners are still in general distribution, with three still surviving from the first year's trial in 1933: Nasturtium 'Golden Gleam', Cantaloupe 'Honey Rock' and Tomato 'Pritchard'.

The persistent popularity of 11

award winners from years past emphasizes the resistance of some gardeners to change. The seed companies would love to clean house and eliminate many old varieties which are only marginally profitable. But outcries of protest from the traditionalists among gardeners and retail dealers have continued to perpetuate the "oldies." (Would that the traditionalists could visit seed company trials and see the occasional plantings of old varieties. They have "anachronism" written all over them. By comparison, earlier, modern varieties are more compact and productive, brimming with vigor and stamina.)

Many gardeners who purchase the new All-America Selections don't fully understand the assurance they purchase with each seed packet. Follow us while we track a hypothetical award winner through the evaluation process.

Here is how a new gold medal winning edible podded pea was developed. A seed company breeder in Idaho discovered a promising new edible podded pea in his fields in 1972. He saved and increased seeds and selected desirable types during the next two years, "rogueing" heavily to remove off-types. In fall 1974, he entered the new pea in All-America Selections trials and by spring 1975 seedlings were growing at 27 trial groups from Quebec to Manitoba and from Georgia to southern California.

The scenario calls for the All-America Selections Judges to compare the new edible podded pea with 'Mammoth Melting Sugar', the most comparable established variety. If the entry excels the comparison variety in yield, flavor and other eating qualities, it stands a good

chance for an award.

The new pea comes through with flying colors. Its fleshy pods are round, not flat, and they can be eaten at advanced stages of maturity. By comparison, 'Melting Sugar' pods need to be eaten before they are half grown. Total yield of edible mat-

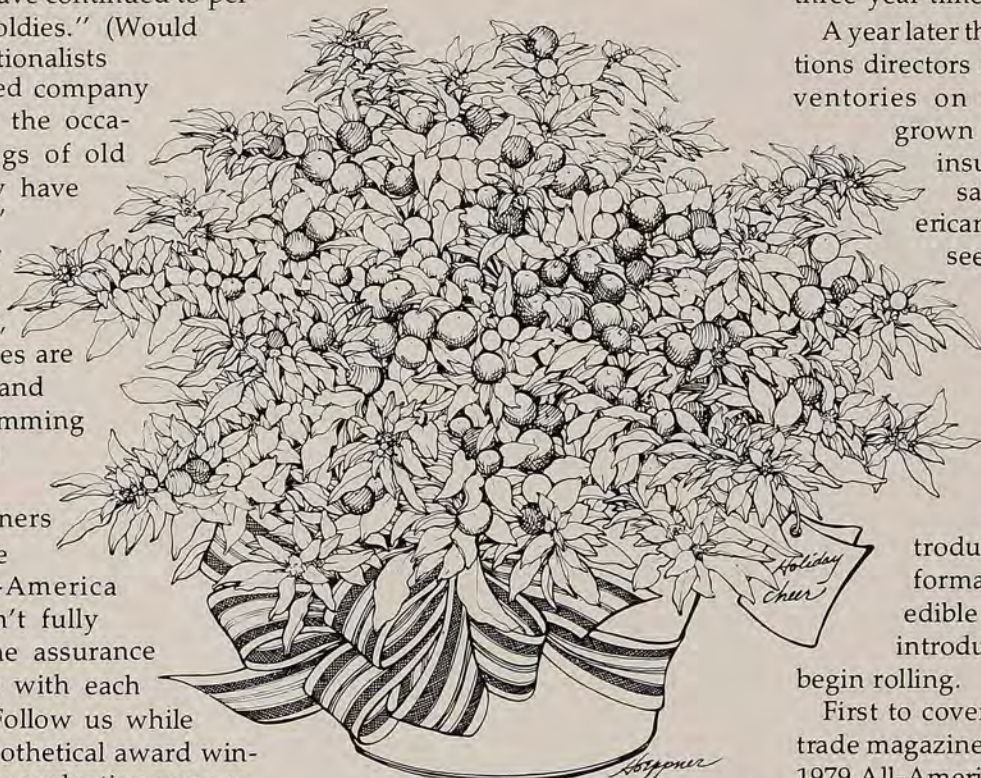


Illustration by Chuck Hoeppner

ter is good; more than twice that of peas that have to be shelled. The judges are impressed; they award the new pea sufficient points for a Gold Medal, a rare honor.

Meanwhile, back on the farm, the Idaho seed breeder decides to gamble that his new pea will win. He plants all the available seed in spring 1975 to produce "stock seed" and harvests about 5,000 lbs. in September.

By November 1, 1975, all judges' scores have been sent directly to an auditor who totals them and calculates average scores. These are handed to the All-America Selections directors for their midwinter meeting.

Five thousand pounds of pea seeds is only a drop in the bucket for a garden pea. The directors "designate" (confirm) the award but put

the new winner on "holdover" status while seeds are being increased. No one is permitted to publicize holdover varieties because it occasionally develops that seed production difficulties prevent a designated award winner from being introduced within the permissible three-year time frame.

A year later the All-America Selections directors meet. Now, seed inventories on the new pea have grown to 60,000 lbs.—still insufficient for a year's sale to the North American market. "Come and see us when you have a quarter of a million pounds in the bag," they tell the Idaho seedsman. February, 1978, and at last seed supplies are sufficient to support introduction. The directors formally schedule the new edible podded pea for 1979 introduction and the wheels begin rolling.

First to cover the award are seed trade magazines; they announce the 1979 All-America Selections in their March/April, 1978 issues. Then the nursery/florist trade magazines break the news to bedding plant growers in their May/June, 1978 issues. Take note, not a word is leaked to home gardeners. They are still wrapped up in exploring the 1978 award winners.

Concurrently, advance samples of the new pea have been mailed to about 200 display, demonstration and preview gardens where visitors can see the trials during the 1978 growing season. Key garden and food editors, TV garden personalities, Cooperative Extension Specialists and garden yearbook editors also received samples and detailed descriptions.

October 1, 1978 is "D-Day" (D for deadline). After that date, garden editors are free to announce the 1979 award winners. They will have been supplied with line drawings, black

and white photos and, if they can use them for reproduction, large-format transparencies. Coverage begins at once in mild winter areas and continues through May where spring comes late.

Simultaneously, the new pea appears in *Recommended Lists of Varieties* published by the Extension Service of the various states, in broadcast and print media, and in slide programs for classrooms and lecture series. By the end of spring, 1979, anyone who likes peas or cares about new varieties will have heard about the new Gold Medal winner.

That's the story line. There will actually be a new edible podded pea available after October 1, 1978, along with eleven other deserving flowers and vegetables, the largest crop of winners for a single year in the history of AAS. And the edible podded pea did win a Gold Medal. Here are the 1979 Award winning Vegetables and Flowers:

Gold Medal Winner:

Snap Pea—'Sugar Snap'

Silver Medal Winner

Kohlrabi—'Grand Duke' Hybrid

Bronze Medal Winners

Cucumber—'Saladin' Hybrid

Pepper, Sweet Yellow—'Dutch Treat'

Squash—'Early Butternut' Hybrid

Squash—'Sweet Mama' Hybrid

Marigold—'Queen Sophia'

Nicotiana—'Nicki-Red' Hybrid

Pansy—'Orange Prince' Hybrid

Pepper, Ornamental—'Holiday Cheer'

Zinnia—'Gold Sun' Hybrid

Zinnia—'Peter Pan' Hybrid

Garden flowers contribute more entries to All-America Selections than vegetables. For a while, aspiring new petunias dominated among AAS entries and understandably so because petunias are easy to transplant in full flower, tough as a boot and as versatile as a Swiss Army knife. Now, however, seed breeders are recognizing fundamental changes in flower gardening tastes. Gardeners want flowers that are compact, shade or bright sun tolerant, durable and showy.

Marigolds and zinnias are gaining in bedding plant preference. Impatiens, "wax" begonias and coleus are rapidly growing in favor for lightly shaded locations. But, if you could visit the "back 40 acres" of seedsmen worldwide, where they are working years in advance on breeding projects, you'd see more research on geraniums than on any other garden flower. Geraniums from seeds may, within the next decade, become the dominant garden flower in the USA and Canada.

It might seem that garden flowers would have lost ground to vegetables during the tremendous expansion in home food growing beginning in 1971. Not so. While a garden plot is required to grow a significant amount of vegetables, containers of flowers are sufficient to provide living color for apartments, condominiums and mobile homes. Consequently, "landless" households figure prominently in the demand for plants and seeds of garden flowers.

Flowers have "backed" into vegetable gardens. Some food gardeners at first stuck strictly to vegetables but soon found that food gardens cannot be maintained in picture perfect condition. Soon they begin to look gap-toothed and weather-beaten. Little spots of color from garden flowers can relieve the tired look of food gardens without detracting significantly from production. After all, when one has been sweating away hoeing and pulling at purslane, *Poa annua* and pigweed, it is not very inspiring to straighten up and look a kohlrabi in the eye.

All-America Selections is gearing for the boom in community gardening that is already underway. The average community plot covers only about 300 sq. ft.—considerably less than the 770 sq. ft. farmed by home gardeners. For these small plots, community gardeners want compact, productive vegetables and self-contained flowers that don't sprawl all over small vegetables. And, Praise be! many community gardeners are shiny-new; they have

no sentimental attachment to obsolete varieties. You are right if you have jumped ahead to conclude that All-America Selections will be sampling seeds to demonstration plots in community gardens and expanding free educational services designed to reduce the failure ratio in new gardeners.

One minor caveat concerning award winning varieties. No single variety of flower or vegetable will perform equally well in all gardens across the USA and Canada. If a garden differs greatly from the "central USA norm," a new variety, regardless of its bred-in superiority, may not be adapted. When you read the description, look for clues such as "days to maturity," "withstands hot weather," "resists diseases," etc.

For example, an 85-day watermelon would mature reliably on Long Island or even South Dakota but not in Maine or in high altitude gardens. A new hybrid carnation might be relatively heat resistant and bloom except during the dog days in mid-America but would require fall planting in hot summer areas. A new hybrid tomato might resist verticillium, fusarium and nematodes but could lack tolerance to blights that are severe in your area.

After you have read the new All-America Selections announcements, where do you buy seeds and plants? Most mail order seed companies offer all new winners. Packet display houses pack all but the most expensive hybrids. Versatile bedding plant growers, those not locked into just a few bread and butter varieties for mass marketers, have seedlings ready for sale soon after public announcements appear.

"Readers of *American Horticulturist* can receive names and addresses of All-America Selections trial grounds and display gardens by writing to 4546 El Camino Real, Suite A, Los Altos, CA 94022." Plan to visit next summer and see the latest and best flowers and vegetables for home gardens. You are cordially invited! □

Zelkova

Hubert P. Conlon
Extension Horticulture Specialist
Iowa State University
Council Bluffs, IA 51501

Zelkovas are large ornamental trees which are distinctly elm-like in growth and form. The Japanese Zelkova or Keaki (*Zelkova serrata*), in particular, has been acclaimed as one of our finest shade trees and is considered a leading candidate to replace our disease-prone American Elm. Three other species, Elm Zelkova (*Z. carpinifolia*), Chinese Zelkova (*Z. sinica*), and Vershaffelti Zelkova (*Z. vershaffelti*), have limited ornamental value and are rarely found in the United States.

Zelkovas are members of the elm family (*Ulmaceae*). They are found to be resistant to the dreaded Dutch Elm disease and to the leaf-feeding insects and bark beetles which plague our native American Elm (*Ulmus americana*). Zelkovas are prolific seed producers and are easily propagated by seed or by grafting. However, since its introduction into the United States over a century ago, the Japanese Zelkova has never attained the popularity shared by some of our less desirable trees such as the poplars, willows and silver maple.

The Japanese Zelkova, infrequently called Zelkova Elm or Japanese Elm, was introduced into the United States from Japan in the early 1870's. The plant explorer, George Rogers Hall, whose name honors many of our garden plants, planted several of these first zel-



Photos by Author

Above & Right—*Zelkova serrata*

kovas on his estate in Bristol, Rhode Island. Plants and seeds were also sent by Dr. Hall to Parson's Nursery Company in Flushing, Long Island (now Kissena Park).

A tall dense stand of zelkovas lines a portion of the drive leading into the former Hall estate, now a residential development called North Farm on the Bay. At North Farm are the original two Japanese Yews, *Taxus cuspidata* and *Taxus cuspidata nana*, brought to this country by Dr. Hall in 1861. Maintained in this park-like setting are magnificent mature specimens of *Ginkgo*, *Chamaecyparis*, *Phellodendron* (Cork Tree), Sweet Gum, Japanese Red Maple, Wisteria, et al.

Now one hundred years later, the zelkovas of Bristol exemplify many fine elm-like qualities and several distinctive characteristics of their own. Trees are 75 to 100 feet tall and illustrate the vase or upright form and graceful arching branches we

have learned to associate with American Elms. The smooth outer bark of mature zelkovas flakes off with the passing years, exposing patches of the orange or yellow inner wood.

During spring and summer the dark green zelkova foliage is generally blemish-free. The leaves, similar to those of elm, are smaller and provide a slightly finer texture to the landscape. The fall foliage colors of zelkova may vary from a dark yellow to the more common russet, and the leaves are retained longer than those of elm.

Zelkovas are hardy in zone 5 (–10° to –20°F) although the trees seem less comfortable in extreme northern portions of this zone. Zelkovas can reach heights of over 100 feet in Rhode Island, but 60 to 70 feet is common in most other areas. Such large trees are useful in plantings along boulevards, wide avenues, and in landscapes where space is no problem.

Trees should be spaced 40 to 50 feet apart at planting. Zelkovas seem to be less susceptible to wind and ice breakage than are our native elms. Standard bracing and guying procedures need not be employed except in those areas where fall planting is anticipated, where wind currents are unusually strong, or when newly planted trees are top-heavy.

Zelkovas prefer a well-drained soil which may be either slightly acid or alkaline (pH 5.5 to 7.5). An extra large planting hole should be dug and later refilled with good quality loam to which has been added organic matter such as peat or compost.

A complete fertilizer such as 10-10-10, specially formulated for slow release, should be broadcast around each tree after planting and applied at the rate of 2 to 4 pounds for each inch of trunk diameter measured at breast height. Soil moisture should be maintained adequately through the first two years to insure rapid tree root development.

At the University of Rhode Island zelkovas have performed well under

a low maintenance program and have exhibited none of the problems of establishment that have been reported elsewhere. Zelkovas in one 12 year old planting now average 25 feet in height and measure 8 to 10 inches in trunk diameter. Trees of approximately the same age on the campus of Michigan State University are less than 15 feet tall. Also the U.R.I. campus plantings have not experienced outbreaks of a canker disease that have been reported elsewhere.

There is a definite lack of uniformity in both size and form within zelkova plantings. This variability can, no doubt, be attributed to a natural diversity observed commonly among seedling populations. Differences can be observed among trees in leaf size, fall coloration, and in total vigor. The selection of the planting site and the climatic conditions in an area may markedly enhance differences previously not observed among seedling trees.

The only zelkova cultivar available to date is *Z. s.* 'Village Green', introduced by Princeton Nurseries several years ago. This selection grows to a mature height of 50 to 60 feet and is considered a faster grower than most available seedling stock. 'Village Green' develops a smooth, straight trunk, a characteristic unfortunately lacking in some nursery stock.

Now in its second century, the Japanese Zelkova shall gain the acceptance in the United States it deserves. For years the tree has been identified solely as a replacement for the elm, and many of zelkova's other fine features have been overlooked, Zelkovas can provide a fresh look to public and private grounds. To this end some nurserymen have suggested that taxonomists derive a more appealing name than "zelkova".

It has been this "elm fever" which has caused us to look at some of our native trees more closely. For example, during the 1930's and '40's the Common Honeylocust (*Gleditsia*

continued on page 33





The Aristocrat of Trees

Philip Coma
2904 Spruce Street
Harrisburg, PA 17109

Long before the ancient Greeks worshipped their gods, and the Egyptians built their pyramids, the Hercules and Adonis of trees had been growing in European forests. The very personification of vigor and strength can only describe the aristocrat of the trees: *Fagus sylvatica*, the European beech. Interesting fables and traditions have grown up around the European beech and many authors have expressed great praise for this truly noble tree.

The European beech is indigenous to England and Central and Southern Europe to the Crimea. Fossil remains of the beech have been found in the pre-glacial deposits in England.

Beeches are massive, slow growing and eventually reach heights of 100 feet or more with a spread of 60 to 70 feet. Old beeches have strange, distorted shapes and are so gnarled and wrinkled that they suggest prehistoric monsters. Though the brownish flowers are inconspicuous and come late in the spring, the beech has traits which make it peculiarly attractive at all seasons. In winter, the smooth, silvery-gray bark and the delicate tracery of its many branches suggest a light white mist hovering in and about the trees. According to ancient authorities, the numerous and crowded branches that cross and grow into each other first gave man the idea of grafting.

During the spring and summer, the delicate mantle of foliage forms a dense and cooling shade. In Autumn, the warm, yellow tints of foliage, the nuts enclosed in triangular prickly burs, and the long persistence of the dead leaves on the branches, all have peculiar charms.

Beech nuts provided nutritious food for the Stone Age man. They are still eaten by the peasants of Central Europe. The tree also produces a sweet oil used by some in cooking.

Primitive books of Northern Europe were made from beech. In fact, "book" is derived from the Anglo-Saxon word "bece," the name of this tree. Beech leaves were used to fill mattresses. The god, Evelyn, vowed he never slept so sweetly as on a bed of beech leaves.

The timber is marvelously enduring. Winchester Cathedral was built on piles of beechwood driven into a peaty marsh. When recently examined seven hundred years later, the piles were found still to be in good shape.

The European beech is not difficult to grow. It is hardy to Zone 4. *Fagus sylvatica* prefers full sun but is extraordinarily tolerant of shade and is a fine tree for underplanting, however, its own dense shade makes it very difficult for other plants to grow beneath it. It is adaptable to almost any soil but attains its greatest perfection on calcareous land or on a deep loam with a pH of 6.5 and 7.0. Young trees should be mulched when first planted. Beeches should be pruned in the summer or early fall. Older plants

rarely require pruning. Beeches have a fibrous root system with heavy surface feeders and cannot withstand compaction of soil or even moderate fill around the roots.

Seed can be sown in the spring, but because there is a considerable variation among the leaf forms and colors, it is recommended that beeches be vegetatively propagated by grafting.

The European beech has few disease or pest problems. The fungus *Nectaria* occasionally attacks it in early youth, but the canker formed usually does not kill the tree. The beech is susceptible to sunscald and should be given protection when young. Woolly aphids may be a problem though they are generally not serious. Horticulturist, Mr. David Paterson of Longwood Gardens, feels that the most common problem is that the smooth and tender gray surface of the beech's bark has always invited the wandering lover to carve the name of his adored on the tree. If you find an old beech in the woods, hacked by some love-struck boy with the outline of a heart and his girl's initials in it, forgive him. He is only following a custom older than Shakespeare, who wrote:

"O Rosalind! These trees shall be my books,

And in their bark my thoughts I'll character;

That every eye which in this forests looks

Shall see thy virtue witness'd everywhere."

In the landscape the beech is not suited for street tree planting be-



Illustration by Robyn Ross

cause it is large and requires much room to grow. Beeches can be effectively used in isolation as a specimen tree in parks and lawn plantings where unpruned branches sweep the ground.

The European beech also may be pruned to produce arbors or hedges. The most famous hedge is in Scotland. It is 580 yards long, 95 feet tall and is dense from the ground up. It was planted in 1745.

Many interesting selections have been developed from the Old World

species. *F. sylvatica* 'Atropunicea'. Its leaves have a purple color. *F. sylvatica* 'Cuprea,' the Copper Beech, is usually a form of the Purple Beech with leaves of a lighter color. *F. sylvatica* 'Laciniata,' the Cutleaf Beech, has narrow leaves often deeply cut to almost regularly lobed. *F. sylvatica* 'Pendula,' the popular Weeping Beech, makes a fine appearance when its branches are allowed to sweep the ground. In winter, its branches look like a monster ready to reach out and grab anyone who

ventures close to its base.

The beech is probably more prolific in varying forms than any other broad-leaf tree. As an ornamental, it is truly an aristocrat with few peers. Without the beech, our parks and gardens would lose much of their charm. The glossy green or purple leaves, the excellent gray bark in winter, the massive branching, the dense habit, and the interesting variations of foliage, make this species and its varieties a most graceful ornamental. □

Holiday Holly



R. Wayne Mezitt, President
Weston Nurseries, Inc.
East Main Street
Hopkinton, MA 01748

For thousands of years the superstitions and beliefs associated with genus *Ilex* have created a special interest for the plant that is used so much during the holiday season. Some people contend that the name holly actually is a corruption of "holy" and thus aptly suited to use at Christmas. Past cultures revered it in folklore as a symbol of good luck, foresight, protection against evil spirits and contended it possessed magical powers. Today it is valued largely for its beauty and versatility and is without doubt one of the most interesting plants available for use during the holidays.

In the United States, most familiar Christmas holly is the English Holly, *Ilex aquifolium*, native to the British Isles and introduced to Oregon in the mid 1850s. The climate in western Oregon was well suited to English Holly and acres of holly orchards were planted. By the late 1800s shipping of cut branches out of Oregon had become an important industry. The success of these ventures continues today; hundreds of acres supply the entire United States with many varieties during November and December.

The cut holly industry in other parts of the country has been slower in developing. In the mid-Atlantic and southern United States, some conditions are favorable for orchards while others are not. English Holly does not seem to be a feasible large scale crop in the east because of the less predictable climate, especially spring frosts and frequent humidity, moisture and temperature fluctuations. Other varieties appear to hold more promise although nothing on the scale of the Pacific Northwest has yet been attempted.

Probably the most important Christmas holly for the eastern United States is the American Holly, *Ilex opaca* and its hundreds of cultivars. American Holly is native to the United States from as far north as Massachusetts, southward and westward into Texas and to mid-Florida. Experts tell us that the potential growing range of *Ilex opaca* cultivars extends throughout the entire area east of the Mississippi as far north as central Michigan, middle New York States and the northern Massachusetts border.

American Holly exhibits many attributes which make it a feasible alternative to English Holly. It differs from its British cousin in ways that are significant to some people and inconsequential to others. Its growth tends to be less vigorous, thereby making the berries more noticeable. The berries are often more numerous and have a remarkable propensity to retain red color without blackening

throughout the holiday season and usually into spring. While American Holly is generally considered more susceptible to leaf miner and fungus infections, these problems are easily avoided with a reasonable spraying program. In general, most users of holly would probably be equally satisfied with either English or American Holly for holiday uses.

Using Holly

Cut Holly

Dry Branches: Indoor use of cut holly is usually disappointing because it deteriorates if kept for longer than a few days. Its appeal rapidly diminishes as the leaves lose gloss and change color, soon becoming brittle and finally desiccating. The berries shrivel, become darker and sometimes turn black and then shatter from the stems upon being touched. Dry cut branches outside the house last somewhat longer, but rarely retain an attractive appearance for more than a couple of weeks. Antidesiccants alone are of limited value in arresting this process. Hormone treatments used in shipping holly from the Pacific Northwest are more successful but only if proper temperature and moisture conditions are satisfied as well.

Holly in Water: Substantially longer life and attractive appearance can be expected by putting cut branches in water. English holly will last several weeks in water, depending upon how freshly it is cut. American Holly, especially if freshly cut in temperatures above freezing, excels in keeping qualities. Cut branches of many cultivars put in water within an hour after cutting have retained nearly their original appearance for longer than a month in normal inside-the-home conditions. Some loss of luster should be expected from the foliage, but further deterioration is drastically delayed.

Wreaths—A New Approach: The holly wreath is perhaps the epitome of holiday decorations. Its drawback until recently has been its short keeping qualities and consequent unattractive appearance after only a week or two even in most favorable conditions. The problem has recently been solved by using a moisturizing element in the construction of the wreath and thereby extending the attractive life to as much as three months under outside the home conditions.

Sphagnum moss is moistened and packed into a prepared wreath frame, and the entire assembly is wrapped with a continuous strip of polyethylene to seal in the moisture. The assembled frame is soaked in water until ready to use. Branches of holly are cut at an angle to proper length and inserted into the moist frame forming what is essentially a circular "vase" in which each branch is kept moist. The foliage is sprayed with a colorless antidesiccant, and the wreath is hung outside. During December the whole assembly soon freezes and does not

dehydrate or deteriorate. The wreath will remain attractive until the weather warms or the moisture is used up. During extended warm spells it is advisable to soak the entire wreath in water for a few minutes to renew the moisture in the sphagnum.

This method works with both English and American Holly but excels with the latter. American Holly remains especially attractive, retaining bright red berries and dark foliage throughout the winter.

Although the moist holly wreath is not suited to indoor conditions, with daily soaking it sometimes retains its beauty for a week or longer. The key to long life seems to be the "locking-in" of the moisture by freezing. When frozen, the wreath is remarkably resistant to deterioration even with sub-zero temperatures and drying winds.

Living Holly

Plants in Containers: Live berried plants of holly in containers are attractive to use around the home during the holidays. It is not recommended to bring plants into the home for more than a few days because low humidity and warm temperatures tend to dry out the plants excessively. Out-of-doors, *Ilex opaca* roots are damaged by being exposed to temperatures below 20°F. Plants in pots must be stored under proper temperature and moisture conditions until spring arrives.

Plants in the Landscape: Holly plants in the landscape are not subject to the same root damage as those above

ground because soil temperatures are moderated by ambient ground heat, proximity to buildings, snow cover, mulch and other factors. Only in those northern areas where it is difficult to grow holly reliably is there likelihood of root damage in a landscape planting. Astute planting of holly for maximum effect during the holidays and throughout the winter is yet another way to take advantage of its landscape attributes while, at the same time, providing a source of cut branches.

Growing Holly in Massachusetts

Our nursery is located in east-central Massachusetts on a hillside where winter temperatures reach -10°F. every winter and occasionally -20°F. We are at the northern fringe of the feasible area for growing American Holly and too far north for consistent reliability with English Holly. We grow holly to sell as plants primarily but have considerable experience with using cut branches of many varieties.

Field Growing

Some of the "secrets" of our location and culture may be of interest to you and help in your success. Our soil is acid and clayey but with good drainage and medium to high organic content. Our air drainage is good on the hillsides and helps avoid early and late frosts which can damage fruit set and quality. We also avoid the high summer temperatures better than do lowland areas.

Humidity Display Table



Introducing a new, unique and practical way to display plants. Made of an extra-heavy durable plastic with an elegant satin black finish, the humidity display table provides a near-perfect environment for displaying bonsai, flowering and foliage plants, and cacti. It is particularly excellent for rock plantings. As the plant is watered, the excess water is retained in the tray providing humidity for the plant's environment. Simply add small pebbles, crushed rock or sand to the tray to keep the plant container above the water level. Neither direct sun nor water will adversely affect the table, as the quality material will not crack, chip, warp or peel.

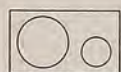
Now you can display sun-loving plants, special or finicky plants, cut or dried arrangements with confidence and pride...and control the growing environment at the same time. Write us for details and prices.

Ole Orchard Hill

Route One, Kingsley, MI 49649



Rectangular
12" x 16"



Rectangular
12" x 16"



Square
12" x 12"

Products designed for you with your plants in mind.

Snow cover is not reliable; we often have several weeks of open ground in mid-winter.

Most of our plants are raised from cuttings and segregated by variety and sex. We mulch with two-three inches bark or wood chips to control moisture, weeds and to help moderate soil temperatures especially in open winters. Our plants are transplanted every two to three years until they are about four feet high. Suitable males are usually planted within 100 feet of the females. All plants are sheared when necessary and are fed with a balanced organic fertilizer as required by plant and soil conditions. New growth is sprayed with a fungicide every year and an insecticide when necessary. The majority of our plants are grown in full sun in the open fields.

Container Culture

To supplement field grown plants, we grow some varieties in containers because they are easier to handle, less winter-hardy or otherwise better suited. We have had excellent success with this type of culture despite the more exacting requirements of winter root protection and more frequent watering and feeding requirements. If plants are transferred from pots frequently, we avoid the tendency of the roots to "girdle" or grow around the edges of the pot and eventually choke the plant. We have found that virtually all hollies can be successfully grown in containers and moved when larger to the field without root problems. With proper attention to cultivar requirements it is entirely feasible to produce a reliable annual crop of cut greens from varieties not hardy in outdoor conditions.

Our Favorite Varieties

We raise several cultivars of *Ilex aquifolium*, our favorite being 'J. G. Esson'. This is a vigorous plant often growing two-three feet in a season. It has dark bronze-green glossy leaves with sharp spines and large red fruit. Even though it is not reliably winter-hardy, its vigorous growth quickly covers the branches that have died-back and it appears to produce a consistently good crop of berries on the new shoots. 'J. G. Esson' is well suited to Cape Cod and southward, and performs superbly in containers.

We grow about a dozen cultivars of *Ilex opaca* proven suited for our area. Our favorites are 'Merry Christmas', 'Old Heavy Berry' and 'St. Mary'. We believe *Ilex opaca* to be the best type of holly for consistent berry production and good foliage, and we constantly test new cultivars for superior characteristics. Even in our most severe winters when the plants suffer winter injury, our best cultivars recover sufficiently to bloom properly and produce a reliable crop of berries and attractive foliage for Christmas cutting.

An interesting yellow-berried form is *Ilex opaca* 'Goldie'. This cultivar has thick, dull green leaves and an abundant display of yellow fruit. It performs very well for us and gives an interesting contrast that appeals to some

tastes. On the negative side, 'Goldie's' foliage turns bronze colored in our exposed fields nearly every winter and is somewhat unattractive from late January until the new growth comes. We are currently testing other yellow-fruited forms but believe 'Goldie' has enough merit to continue growing it.

In addition to these cultivars, we grow several varieties which we believe hold promise for holiday use and culture in New England. These are all broadleaf evergreen hollies with red berries, although there are many other varieties of *Ilex* (such as *Ilex glabra*, *crenata*, *verticillata*) suitable for holiday use as well.

'Nellie R. Stevens', a hybrid of *Ilex crenata* and *Ilex aquifolium*, is an attractive orange-red berried fast-growing shrub with large crinkled glossy dark foliage and soft spines. Its berries color early and its keeping qualities are good. It is not reliably winter-hardy in our area but adapts well to container culture. It is pollinated by male *Ilex aquifolium* in our area and reportably by *Ilex cornuta* in more southern areas. This hybrid is well suited to southern New England, Cape Cod and southward.

Ilex pernyi veitchi performs well in our area, flowers heavily and is apparently an excellent pollinator. It is a pyramidal growing male with medium size sharp leaves and prominent flower buds in winter. Even without berries it is valuable on its own merits as an outstanding compact foliage plant.

Ilex pedunculosa, the Longstalk Holly, is hardy in our area and has some interesting characteristics. The long narrow foliage is spineless, the berries are spaced along the stem and are persistent. It is a fast-growing, multi-stem plant which, surprisingly, has proven especially suited for colder areas. The male *pedunculosa* tends to suffer leaf burn more than the female but recovers sufficiently to flower reliably.

The new *Meserve hybrids*, the so called "blue" hollies, appear to hold much promise. They are hybrids of *Ilex aquifolium* and *Ilex rugosa*. 'Blue Girl', 'Blue Angel', 'Blue Boy', 'Blue Prince', and 'Blue Princess' are the ones we have tried and all seem to perform well. 'Blue Girl' tends to produce berries earlier in the season and appears to be less persistent than the others. All are winter hardy here and have outstanding foliage on compact wide growing plants that have substantial landscape potential. All the males will pollinate any of the females. They have a very long blooming season and females often have berries at varying stages of maturity throughout the year.

Many new varieties are currently being hybridized, tested and introduced throughout the country by many individuals and institutions. We expect the next few years to produce hollies that are superior in many ways to what we have now with respect to leaf shape and texture, size, color and quantities of berries, keeping qualities, winter-hardiness, disease resistance and ease of culture. Why not try some yourself and see how rewarding it can be to grow your own holiday holly? □

ARIZONA

Sonora Desert Museum

Lorraine and Guy Burgess
202 Old Broadmoor Road
Colorado Springs, CO 80906

If you are looking for a world of startling, natural beauty and mystery, visit the Arizona-Sonora Desert Museum, west of Tucson. For gardeners in particular, it offers an exciting presentation of more than 300 kinds of native desert plants, and a demonstration garden suggesting practical, easy-care landscape designs of surprising beauty.

This open museum stands on a vast, mountain park acreage adjacent to the Saguaro National Monument, one of the great saguaro forests of the world. Desert plants are displayed and labeled for your review and study. A cactus garden of considerable scope shows all the plants that survive and prosper in this harsh desert environment.

Travel through the gardens is along near-level paths and there are shade ramadas and drinking fountains along the way to bolster the unaccustomed desert traveler.

Arizona-Sonora is an innovative museum, located on a hillside, overlooking a long sweeping segment of a great desert 'sea', and reaching west across the Papago Indian Reservation and 60 miles south beyond the Mexican border. In museum parlance, it is considered a real gem. It is sought out by more than a half million visitors each year from every



Photos by Guy Burgess

Above—Arizona desert
Right—Cactus patterns (Organ pipe)

part of the country and by museum people from countries all over the world.

Wisely this concentration of desert plants serves too as a natural habitat for desert animals big and small. Exhibits range from centipedes to scorpions, from boa constrictors to snakes and lizards. Desert tortoise, prairie dogs, javelina, and Mexican wolves are represented. Underwater viewing corridors provide a new vantage point for observing the antics of river otter and beaver. Bird enclosures allow for an intimate introduction to the golden eagle and the western horned owl. Hawks, vultures, quail and doves provide studies in contrast. Tunnel exhibits

allow visitors to see the underground hiding places of kit fox, ringtail cats and rattlesnake, and the root systems of certain desert plants.

An Earth Sciences Center allows you to enter the underground world of limestone caves to experience the powerful forces that have shaped this desert. This underground meandering will take you through four and a half billion years of geologic time.

The museum enables visitors, especially gardeners, to gain knowledge in a few hours of what would otherwise require years of wilderness searching. Summer visitors are advised to visit the gardens in the early morning or late afternoon and to wear hats as protection against the sun. Admission charges are \$3.00 for adults, \$1.50 for teens (13-17), and \$.50 for children 6-12. Group rates are available on request and certain educational groups at the college level are admitted free by pre-arrangement.

Photographers are invited to bring their camera equipment. Many of the desert plants that border the nature paths provide singular 'close-up' possibilities. For those wishing to spend the day on the site, there are snack bars and a restaurant on the grounds. Picnicking grounds are available in the nearby mountain park.

So bring your notebook, your camera and your lunch and spend a glorious day in the Arizona sun. □



Zero-Based Budgeting for Lighting Plants

Henry M. Cathey and
Lowell E. Campbell

Florist & Nursery Crops Laboratory
and Agricultural Equipment
Laboratory

U.S. Department of Agriculture
Beltsville, MD 20705

Indoor gardening with plants has gone full circle. We started by growing plants in windows. We had to select plants which would survive. We were literally taking away the available sunlight and trying to adapt the growth of the plants to cope with the often meager natural lighting. The foliage plant industry introduced the word "acclimatization" to explain why some plants would survive and others would rapidly decline and eventually die in these locations.

This does not need to be the situation for indoor gardeners. The avid indoor light gardeners have already learned that many plants can be grown when they assume that the contribution from natural light to the growth of plants is generally insignificant. They operate a "Zero-Base" budget for their plants. They have learned that the use of human vision lamps can insure the growth of a wide range of foliage, flower and fruiting plants.

Do your zero-base budgeting for plants by following these steps:

Selection by response of plants:

All human vision lamps can be used as a sole source to grow plants. The standard light source for many years has been cool white (CWF) or warm

white (WWF) fluorescent. Table 1 describes what the different types of lamps do to plants. We can control stem elongation, branching, flowering, foliage color and senescence. Note that some lamps promote lengthening; others do not.

Selection by lamp efficiency:

Cool white (CWF) and warm white (WWF) fluorescent lamps are widely used by indoor gardeners—they have an efficiency of 70 and 71 lumens per watt of input power (table 2). Of the energy required to generate the light, only 20 percent is produced as visible light; the remaining energy (non-visible radiation, convection and conduction, ballast loss) must be gotten rid of in some way to avoid over-heating the plants. The grow-lamps are all less efficient in generating visible light and produce more waste energy than CWF and WWF. The discharge lamps require large fixtures and heavy ballasts to operate.

High pressure sodium (HPS) lamps are being used in many malls and shopping centers for lighting large areas. Low pressure sodium (LPS) lamps are not yet available through most retail outlets. Incandescent (INC) lamps produce a spot of intense light (7 percent) and heat (93 percent). The inefficiency and the short life make this light source an energy-intensive system. The self-ballasting incandescent-mercury lamps have the convenience of a medium base socket. They permit you to use the socket you now use for INC lamps. Their efficiency is not greater than INC and they cost 5 to

10 times more than a comparable INC lamp.

Selection by color rendering of plants, people and furnishings: Indoor gardeners also expect their plants, viewers and furnishings to look attractive while they are growing the plants. Table 3 will guide you in selecting lamps by identifying which colors are enhanced (color intensified) or grayed (color distorted). The grow-lamps tend to enhance while the most efficient ones (HPS, LPS) tend to gray colors. INC and INC-HG lamps create an environment which appears similar to sunlight.

Conversion from one lamp to another: Most plants can be maintained when we grow them with energy equal to that provided by 300 foot-candles of light from cool white fluorescent lamps. If for various reasons (efficiency, distance between lamp and plants, color rendering), you wish to use some other kind of lamp for growing the plants, you need a rule of thumb to interconvert from one light source to another. Table 4 suggests the approximate distance the plants should be placed from the lamp to provide equal energy for growing the plants. A light meter such as GE Model 214 is the best way to insure that plants are receiving the recommended foot-candles of light. For information on where to buy one, look through your garden supply catalogs. It has three ranges: 10-50 fc, 50-250 fc, 200-1000 fc with a X10 multiplying cover. Position the top of the meter parallel

continued on page 29

Table 1

Lamp	Plant Responses
Fluorescent—Cool White (CWC) and Warm White (WW)	<ul style="list-style-type: none"> • Green foliage which expands to parallel the surface of the lamp • Stems elongate slowly • Multiple side shoots develop • Flowering occurs over a long period of time
Fluorescent Gro Lux (GL) and Plant Light	<ul style="list-style-type: none"> • Deep green foliage expands, often larger than on plants grown under CW or WW • Stems elongate very slowly, extra thick stems develop • Multiple side shoots develop • Flowering occurs late, flower stalks do not elongate
Fluorescent—Gro-Lux-WS (GL-WS), Vita-Lite (VITA) Agro-lite (AGRO), and Wide Spectrum lamps	<ul style="list-style-type: none"> • Light green foliage which tends to ascend towards the lamp • Stems elongate rapidly, distances between the leaves • Suppresses development of multiple side shoots • Flowering occurs soon, flower stalks elongated, plants mature and age rapidly
High Intensity Discharge—Deluxe Mercury (HG) or Metal Halide (MH)	<ul style="list-style-type: none"> • Similar to CW and WW fluorescent lamps compared on equal energy • Green foliage which expands • Stems elongate slowly • Multiple side shoots develop • Flowering occurs over a long period of time
High Intensity Discharge—High Pressure Sodium (HPS)	<ul style="list-style-type: none"> • Similar to Gro-Lux and other color improved fluorescent compared on equal energy • Deep green foliage expands, often larger than on plants grown under H and MH • Stems elongate very slowly, extra thick stems develop • Multiple side shoots develop • Flowering occurs late, flower stalks do not elongate
Low Pressure Sodium (LPS)	<ul style="list-style-type: none"> • Extra deep green foliage, bigger and thicker than on plants grown under other light sources • Stem elongation is slowed, very thick stems develop • Multiple side shoots develop even on secondary shoots • Flowering occurs, flower stalks do not elongate <p>Exceptions: Saintpaulias, lettuce and Impatiens must have supplemental sunlight or incandescent to insure development of chlorophyll and reduction of stem elongation.</p>
Incandescent (INC) and Incandescent-Mercury (INC-HG)	<ul style="list-style-type: none"> • Paling of foliage, thinner and longer than on plants grown under other light sources • Stem elongation is excessive, eventually becomes spindly and easily breaks • Side shoot development is suppressed, plants expand only in height • Flowering occurs rapidly, the plants mature and senesce <p>Exceptions: Rosette and thick leaved plants such as Sansevieria may maintain themselves for many months. The new leaves which eventually develop will elongate and will not have the typical characteristics of the species.</p>

Table 2

Lamp	Total lumens per watt	Visible Radiation Percent	Non-Visible Radiation conduction & convection Ballast loss Percent	Average Useful life of lamp hours (1000s)	Time 12 hr/day (months)
Fluorescent (F)					
Cool white CW	70	20	80	8-10	12-24
Warm white WW	71	20	80	8-10	12-24
Gro Lux-Plant Light (GL-PL)	20	13	87	4-5	6-12
Gro Lux-WS (GL-WS)	37	15	85	4-5	6-12
Agro-lite (AGRO)	41	15	85	4-5	6-12
Vita-lite (VITA)	47	18	82	8-10	12-24
Discharge					
Mercury Deluxe (HG)	50	13	87	15-20	24-36
Metal Halide (MH)	75	20	80	10-15	12-18
High Pressure Sodium (HPS)	100	25	75	15-20	24-36
Low Pressure Sodium (LPS)	143	27	73	12-18	15-20
Incandescent (INC)	17	07	93	1-3	2-6
Incandescent-Mercury (INC-HG)	18-25	—	—	8-10	12-24

Elissa's Bromeliads

Ruth Farmer Campau
114 Willow Road
Greenfield, IN 46140

Why does a librarian-homemaker living in central Indiana choose to grow house plants as exotic to her surroundings as bromeliads?

Well, as Elissa Hafsten of Indianapolis puts it: "Bromeliads have class and style. They're different from the usual green house plants, and one can take pride in growing them successfully."

She first saw the plants in their native habitat in 1973, while driving along the Tamiami Trail enroute to Naples, Florida.

"The colors of the *Tillandsia fasciculata* were startling with their violet flowers and red bracts," she recalls. From that moment, her enthusiasm for bromeliads grew steadily.

She purchased a few specimens at a Fort Myers nursery, and wrapped them individually in newspapers. Soon, they had a new home under artificial lights in Indianapolis.

Today, in a greenhouse built onto the south side of her home, she has some 200 species in her collection. Among her favorites are those in the *Pitcairnioideae* subfamily. "They're so-called 'primitive' bromeliads, and look more like cactus than some of the tropical bromeliads," she explains. One plant, *Pitcairnia tabuliformis*, grows into a green compact rosette, resembling a table and is rather unusual in Indiana. Other plants special to her are *Neoregelias* and *Vrieseas*.

She has hybridized two species of *Neoregelia*. Seedlings are now about two years old and only inches high. Though commercial nurseries usually bring seedlings to bloom within two years, these may be somewhat slower—perhaps due to the cooler temperature of her greenhouse.

As Phoenix Plants, Ltd., she supplies bromeliads to a growing market from her own greenhouse as well as

from outdoor plantings tended by her father-in-law in Florida.

The former librarian (she has a master's degree in library science and was employed by the Graduate Library of Indiana University) has thoroughly researched bromeliads. She edits a newsletter for the Indianapolis Bromeliad Society and is also serving as its president.

She enjoys discussing bromeliads, referring to each curious plant by its scientific name, since most bromeliads do not have "common" names.

"They're terrific house plants. Although interest in them is somewhat recent in Indiana, they have been popular in some parts of the country for 20 years or more," she points out.

Because some species grow on trees, bromeliads are often mistaken for parasites. Actually, they are epiphytes (air plants) and derive their nourishment through their leaves, from air and rain water. Roots serve only to hold the plant onto its host tree, although bromeliads' root systems do quickly adapt to growing in soil.

Spanish moss (*Tillandsia usneoides*) is an epiphytic bromeliad.

With more than 2,000 varieties currently identified, it is not surprising that individual members of the family vary in size and flowering habits. For example, in addition to the epiphytes, some bromeliads are terrestrials (growing in soil). The familiar pineapple (*Ananas comosus*) is one of these.

Others are saxicolous (rock dwellers) such as *Orthophytum*.

In size, they vary from the huge *Puya raimondii* towering at 35 feet, to a tiny *Tillandsia bryoides*, only a few inches in height at maturity. Oddly enough, these are both natives of the same area in Bolivia.

Flowering is another individualistic trait. Though most bromeliads bloom only once in their lifetime, some species (*Dyckias* for one) bloom every year in the spring.

Some bromeliads bloom within 18 months from seed, others are thought to be 150 years old before they produce their first bloom.

Most commercially grown varieties available on the



market will bloom within 12 to 24 months.

Although the "once-and-only" bloom concept may seem discouraging, the bromeliad redeems itself by producing offsets, or "pups" from which new plants are grown. Most grow from the base of the plant, although some (such as *Vriesea splendens* and *Guzmania sanguinea*) produce one or two pups from the center of the plant.

Of course not all bromeliads, even of the same variety, have identical requirements, but in general, success in growing them indoors in central Indiana depends on three things: adequate light, high humidity and lots of circulating air.

"Don't put them in a dark corner. A bromeliad on a table in a corner with no light and no air may look nice, but it won't be happy," Mrs. Hafsten cautions.

If a brightly lighted spot (not necessarily full sun) is not available, bromeliads can be grown under 14 to 16 hours of artificial light per day.

Because they are natives of the tropics, humidity of at least 30 percent (and preferably even 50 percent) will help them stay healthy. Misting the foliage is also desirable and use of pebble trays and mechanical humidifiers can also help.

Good air circulation is of great importance. A circulating fan is an excellent idea.

As for water requirements, bromeliads should never get absolutely dry. Mrs. Hafsten keeps the cups of her plants filled with water during the growing season. She uses water of room temperature (never cold), pouring it right into the cup until it runs out the pot. However, the plant should not sit in water. "Soggy feet will cause rot in many bromeliads." For this reason, she uses a potting mix that is very fast draining and slightly acid.

Use of fertilizer on bromeliads is a matter of varied opinion among growers. Mrs. Hafsten uses a quarter teaspoon of 15-30-15 fertilizer per gallon of water to feed seedlings. But she stresses that the source of light must be adequate particularly when fertilizing, because otherwise the foliage tends to overgrow.

Besides being attractive potted plants, bromeliads lend themselves to various decorative forms. For example, epiphytic bromeliads are spectacular in a "tree" arrangement, which displays them as they live in their home in the wild.

Mrs. Hafsten suggests starting with an unrooted offset. Attach this "pup" very tightly to a wood branch with plastic coated wire, so when the roots form they will not be disturbed. To avoid rot, she does not wrap the plant with sphagnum moss, but allows the roots to grow directly onto the wood as they do naturally.

Terrariums are another interesting way to display bromeliads. The *Crypthanthus* (Earth Stars) varieties do very well in this environment, and she suggests adding some humus or soil to the fast draining potting mix for the growing medium.

If you are a first-time buyer of these unusual house plants, she offers these tips:

Prices will vary in different areas of the country, of course, but generally you can expect to find a good plant for a reasonable price. Some collectors' plants will be priced at \$20 or more. She suggests starting with a *Neoregelia*. "They're very showy, very generous with offsets and they can stand some neglect. They do very well here in Central Indiana."

Aechmea fasciata 'Silver Vase' is another variety good for beginners.

Make your purchase only through established, reliable growers. Reputable growers sell only plants grown from seed or offsets of older plants—not collected from the wild. Illegal pirating of wild bromeliads is a serious problem, disturbing Mrs. Hafsten and other growers.

"Many natural populations of *Guzmania monostachia*, which is native only to a limited area in the Florida Everglades, have been completely destroyed in order to provide material for the novelty market," she laments.

Unscrupulous pickers skim the Everglades in swamp buggies, snipping the plants from their high perches with long pruning saws.

In so doing, they not only kill the bromeliads thus preventing their propagation, but they also disrupt the natural life of the swamp.

Bromeliads provide shade and moisture for other wild plants, as well as water and nesting material for birds. In addition, certain amphibians and insects actually make their homes in the plants.

"It can't go on forever. The situation will soon be similar to the depredation of cactus in our desert areas," Mrs. Hafsten warns.

Illegally collected plants can often be identified by brown, broken leaves. Their root systems are not as developed as those of plants grown in nurseries, and they are in general "just raunchy looking plants" she says.

Motivated by her interest in bromeliads, Mrs. Hafsten joined a botanical tour of Arizona, New Mexico and Texas in May, 1977.

While at Big Bend National Park in Texas, she found "huge masses of *Hectia scariosa* all along the northwest slope of Boquillas canyon. Clumps of 12 or more plants measuring between two and three and a half feet in diameter were growing in an oval shape," she recalls. Later the group found another colony, growing at an elevation of about 3,000 feet in the Santa Elena Canyon. "I marveled at this plant's adaptation to its environment. Both colonies were on rocky slopes facing southwest, in areas that receive minimum rain and maximum sun year round, with severe temperature extremes."

The experience has enhanced her pleasure in the challenge of raising the plants in her home. As she says, "Here in central Indiana we just don't have the balmy weather of Florida or California, so we can't plant them in our yards. We have to use special techniques to grow them indoors. By so doing, I like to think we're making an important contribution to the body of knowledge about bromeliads." □

Zero Based Budgeting

continued from page 24

to the surface being measured for light, then shift switch position from high to medium to low to determine the intensity of light in foot-candles. Take several readings and average the results.

Photographic light meters are seldom satisfactory for measuring plant lighting. Converting and correcting the measurement to foot-candles is complex due to spectral variations of fluorescent lamps. They can be used to determine relative levels of light. There are substitute systems, based on dials, probes and light sensitive papers. These gadgets, unfortunately, give only relative readings and cannot be used to convert from one artificial light source to another.

Our personal choices: There are two basic lighting situations, one for growing and one for showing plants. For growing, we suggest you use one CW or WW and one grow-fluorescent lamp or one CW and one WW in an alternating pattern. We find that most plants grow well and are attractive in appearance. The lamps can be placed 6 to 18 inches away from the plants when built into shelves, under counters, or in ceilings. For showing in malls or entrances to your home where the lights must be built into the ceiling, and the plants placed on the floor, HPS lamps are the most efficient. They illuminate the floor to give the required light intensity and can be conveniently and safely built into the ceiling. You will need to work with a residential lighting firm to have HPS lamps installed. Make sure that the lamps, as installed, are shielded to avoid glare.

The final steps: Be sure to remember to install a time-clock to automatically turn the lamps on and off 12 hours daily. To increase the available light by at least 25 percent, cover all surfaces (walls, ceiling, floor) with mirrors (glass, plexiglass, mirrored mylar). Finally, wash all surfaces, plants and surroundings, at bi-weekly intervals with warm

soapy water to remove the accumulated dust and litter. Clean plants and surfaces to insure that your zero-base budget for lighting will have the greatest impact in creating an environment for vigorously growing plants. □

Note: mention of a trademark name of a proprietary product does not constitute a guarantee or warranty of the product by the USDA and does not imply its approval to the exclusion of other products that may also be suitable.

Table 3

For The Interior Designer Color Rendering of Plants, People and Furnishings

Lamp	The General Appearance on a Neutral Wall of Surface	Complexion (the actual appearance of skin)
Fluorescent		
Cool White CW	White	Pale Pink
Warm White WW	Yellowish	Sallow
Gro Lux-Plant Light GRO-PL	Pink White	Reddish
Gro Lux-WS GRO-WS	Light Pink-White	Pink
Agro-lite AGRO	White	Pink
Vita-lite VITA	White	Pink
Discharge		
Mercury (all types) HG	Purplish White	Ruddy
Metal Halide MH	Greenish White	Greyed
High Pressure Sodium HPS	Yellowish	Yellowish
Low Pressure Sodium LPS	Yellow	Greyed
Incandescent INC	Yellowish White	Ruddy
Incandescent-Mercury INC-HG	Yellowish White	Ruddy

Atmosphere (The general feeling of room)	Flower Color Colors Improved or Strengthened	Greyed (undesirable)
CW	Neutral to cool	Red
WW	Yellow to warm	Blue, Green, Red
GRO-PL	Purple to pink	Green, Yellow
GRO-WS	Warm	Green
AGRO	Neutral to warm	Green
VITA	Neutral to cool	Green
HG	Cool	Red
MH	Cool green	Red
HPS	Warm	Blue, Red
LPS	Warm	All Except Yellow
INC	Warm	Blue
INC-HG	Warm	Blue

Table 4

Lamp	Equal Energy Equal Radiant Energy (visible) (footcandles)	Approximate Lamp Wattage	Equal Growth
			Lamp Distance from Plants (inches)
Fluorescent			
Cool White (CW)	300	40	15
Warm White—WW	300	40	15
Gro Lux-Plant Light	140	40	10
Gro-Lux—WS	200	40	13
Agro-Lite	225	40	13
Vita-lite	240	40	13.5
Discharge			
Mercury	HG	325	400
Metal Halide	MH	260	400
High-Pressure Sodium	HPS	260	400
Low-Pressure Sodium	LPS	400	180
Incandescent	INC	100	150
Incandescent-Mercury	INC-HG	150	450
Sunlight		160	N/A

Mini-Citrus Fruits

Edward M. Vasilcik
Phipps Conservatory,
Schenley Park, Pittsburgh, PA 15213

Consider what prerequisites you would insist upon if choosing a perfect houseplant. Your rigorous

guidelines might include attractive foliage; abundant and fragrant flowers; ornamental and edible fruit; manageable size and adaptability to less than perfect indoor environmental conditions. "Impossible" some would say, and yet dwarf cit-

rus varieties truly fulfill all of the above requirements while providing a touch of the tropics in the sun room or den.

These numerous members of the family *Rutaceae* are diminutive evergreen shrubs grown for their



Photo by Author

edible fruits, heavily scented flowers and glossy leathery foliage. When all their attributes are considered, it is easy to see why this plant group has been popularly grown for years, both indoors and out.

Fruit production on dwarf citrus can occur all year. Most often flowers and fruit in all developmental stages are present simultaneously. The heaviest fruiting is initiated with the numerous blooms produced in the warmer months of summer and autumn.

Specimens purchased at local shops or nurseries are usually complete with flowers or fruit. Plants of smaller size purchased from mail order establishments may take one to two years to reach fruit bearing age. The plants adjust to home conditions if they are kept moist and in direct or bright, indirect natural light. Some leaf drop is to be expected in the adaptation period. Even if all the leaves should drop, the plant will develop new foliage if the roots are not permitted to become waterlogged. Newly formed foliage has a decided advantage over the original leaves because it is more adaptable to a less than perfect environment.

Newly obtained plants usually do not need repotting and respond best if the roots are kept confined. However, sluggish growth in the spring may indicate a need for a fresh soil mixture and larger quarters. If this is the case, a good general soil mixture would be made up of two parts acid peat moss, one part garden loam and one part coarse sand or perlite with the pH adjusted to 6.5. Perfect drainage is critical. No fertilizer should be used for several months after transplanting. Later, regular fertilization can be maintained on a bi-weekly basis from early spring through fall. A high nitrate, acid plant food is considered best and additions of chelated minerals, especially iron, will prevent leaf yellowing.

A watering schedule which allows the soil surface to become dry to the touch between waterings will avoid overwatering—a major cause

of failure with these plants. Moderately high humidity levels and proper air circulation promote optimum growth.

Rapid temperature change should be avoided. Warm day temperatures of 72°-75°F promote flowering, especially if preceded by a combination of cool temperatures (55-60°F night temperature) and slightly drier soil in winter.

Citrus aurantiifolia, the Key Lime, is the least cold hardy. The Kumquat on the other hand is quite rugged—capable of withstanding temperatures of even 12-15°F for short periods.

The plants adapt to shade, but do best in bright indoor light with at least four hours of sun each day. When using fluorescent light setups, 12 to 16 hours of light each day is best.

Pollination outdoors is easily provided by native insects. This is also easily accomplished indoors. Since the citrus flower's stamens and pistil are quite pronounced, transfer of pollen from the stamens to the moist, pistillate surface is easily accomplished with a small brush or cotton swab.

Minimal pruning maintenance is necessary for most dwarf citrus, although proper branch removal coupled with root pruning every two years can produce handsome bonsai specimens.

Standard fruit market citrus do not yield seeds suitable for growing dwarf citrus. The results from commercial fruit will often be large plants whose flowering and fruiting are drastically delayed. The special dwarf varieties are readily available as genetic dwarfs propagated from tip cuttings of half ripened wood in late summer. Commercial citrus varieties often produce good results if grafted on dwarfing rootstocks. Both forms as container plants are easily maintained at sizes less than three feet tall.

The most prevalent insects associated with dwarf citrus are scale insects and mealy bugs. Less common visitors are red spiders, thrips and white flies. Newly purchased

plants should be quarantined to thwart possible infestation.

When choosing specific varieties for the home, lemons are the most popular as they bloom continuously and bear early. *Citrus limonia* 'Ponderosa', the Ponderosa or American Wonder Lemon, produces two-pound fruits indoors which are excellent for pies and lemon drinks. This variety adapts to less light than other citrus.

Citrus limon 'Meyeri' is an almost thornless lemon and is a natural dwarf. Because of its prolific flowering all year and the excellent flavor of its medium-sized fruits it is highly recommended.

Citrus mitis or Calamondin Oranges are the most often available dwarf citrus plants. They are natives of the Philippine Islands and the small, somewhat tart fruits are decorative as well as suitable for limited culinary purposes.

A somewhat larger fruited indoor orange is *Citrus taitensis*, the Otaheite Orange. Its dense foliage provides an excellent background for the plum-sized oval oranges.

Fortunella margarita or Kumquat comes in several small, bushy varieties that produce interestingly flavored fruits. They are among the most manageable of the dwarf citrus trees and their dense branch structure makes them excellent for use in bonsai culture.

Citrus nobilis 'Deliciosa' plants are often grafted dwarfs whose varieties produce tangerines, temple oranges, Satsuma oranges and Mandarin oranges.

If you are not acquainted with the dwarf citrus or have had problems with them in the past, purchase a variety or two. You'll find that with some basic care and attention, the miniature citrus tree on the window sill may indeed be your perfect indoor plant. □

Some of the many sources of Mini-Citrus Trees: Armstrong Nurseries, Inc. P.O. Box 473, Ontario, California 91761. They have an extensive list of 24 dwarfs. Merry Gardens, Camden, Maine 04843 and Spring Hill Nurseries, 110 West Elm Street, Tipp City, Ohio 45366.

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Christmas Books

by Tom Stevenson

Humidity and an abundance of light in the Tropical and Subtropical zones have evolved plants with grand and spectacular foliage in unusual patterns, with flowers a rainbow of colors, often with haunting fragrance, especially at night, according to Dr. Alfred B. Graf.

"It is exciting," he says, "that most of these plants can be grown quite well under conditions very different from their native homes. Most species can adapt to other surroundings, in fact, it would be a challenge to try them."

"I have found that plants used in gardens are apt to be very similar in all warm-climate regions and many may be adapted to widely varying conditions—outdoors or on the patio where climate permits, and indoors where they may not survive the cold of winter."

In fact, many of the tropical foliage plants are now grown in homes in cold-climate regions. Other tropicals are grown as annuals in summer gardens.

Graf is a widely traveled plant explorer of the world's tropics and subtropics. Horticulturist, botanist and professional photographer, he is headquartered at the Exotic Nurseries of the Roehrs Company where he has presided over one of the world's most complete plant collections.

He is the author of a new book, *"Tropica,"* published by Scribner's, 1120 pages, 7000 photos showing the best of the tropical plants, all in full color, priced at \$115. It would make a wonderful Christmas present.

It is, in fact, an encyclopedia, with instructions on how to care for plants in the home, office or greenhouse, how to take care of blooming plants received at holidays, plant descriptions with photo index and climate guide, propagation methods, pest control and diseases, orchids, bromeliads, cacti, succulents, and on the cover the picture of a beautiful Tahiti girl with a crown of tropical flowers on her head.

With this book around, how could anyone deeply interested in plants and gardening ever feel lonesome?

A century ago rhododendrons and azaleas (both are classified as rhododendrons) were rarely grown in American gardens. There were only a few native species and a small group of ironclad hybrids developed in England from which to choose. The ironclads were introduced in 1876 and were so-called be-

cause they had the ability to adapt to the climate of the Atlantic Coast.

During the next 50 years, the development of new rhododendron varieties was done mostly in England, Belgium, Holland and most of these new hybrids were not able to adapt to the regions where the ironclads would grow.

Rhododendrons are climate-specific and lack the general adaptability of other garden flowers such as the rose and marigold. Successfully adaptable new varieties had to come from those bred and raised in the same region where they were to grow.

Thus it fell to American breeders to produce hybrids that could perform well in their region. For parent stock, they used the hardy species and hybrids introduced by plant explorers, brought principally from the East Coast of the Asian continent.

Only seedlings with the right genes survived the three to seven years between their germination and first flowering. Natural selection eliminated the unfit and the hybridizer selected the most beautiful. The fruits of this process produced a major garden miracle in eastern America during the past sixty years.

The hybridizers who made the major contribution to this miracle were: Charles Dexter, patrician New England industrialist; Joe Gable, devout farmer; Guy Nearing, brilliant, nonconforming intellectual; Tony Shammarello, inner city kid who made good; and, Ben Morrison, scientist-aesthete.

"It would be hard to assemble a more incongruous lot, with so little in common," according to David G. Leach, often referred to as a hybridizer's hybridizer, past president of the American Horticultural Society, author of many articles on Rhododendrons and azaleas, and the book *"Rhododendrons of the World."*

"The five hybridizers have given a new lilt and grace to eastern gardens through the phenomenal rhododendron and azalea hybrids they have produced," says Leach.

A new book, intended to provide a permanent record of the hybridizers which produced this miracle and commemorating their lives and their plants, *"Hybrids and Hybridizers—Rhododendrons and Azaleas for Eastern North America,"* edited by Philip A. Livingston and Franklin H. West, has just been published by Harrowood Books, 3943 N. Providence Rd., Newton Square, PA 19073. 256 pages well illustrated, including more than 100 in full

color, priced at \$25.

The book would make a wonderful Christmas present for a rhododendron and azalea loving friend, and can be ordered direct from the publisher to be sure of getting it in time.

"Their hybrids, with appraisals of both qualities and hardiness, and how they were produced, their thoughts on promising prospects for improvements, and much more are here for the hobbyist to read and relish," Leach says. This book has no parallel in its interest for both the novice and the knowledgeable.

"The information published gives the reader what he needs to know when dipping into the treasure trove of over one thousand new azaleas and rhododendrons, all perfectly at home in eastern gardens. It also equips anyone who chooses to apply the hybridizers' know-how in developing beautiful new hybrids for future gardeners to enjoy."

Weeds are an aspect of history. The story of the introduction of plants into Britain and America tells of the invasions of civilized man. To England with the Romans came among other plants the Corn Cockle, Field Spurrey and Rough-headed Poppy; with the monks came culinary and medicinal herbs—and Borage escaped to make waysides gay with its blue rocket flowers.

To America with the Pilgrim Fathers came the Dandelion, Shepherd's Purse, Stinging Nettle, Couch Grass, Chickweed, Groundsel and ubiquitous Plantain.

Weeds can be benevolent or toxic says Mea Allen, an English gardener (her garden contains many plants that are as old as three centuries, having belonged to Robert and Thomas Tradescant, kinsmen of the famous English botanists John Tradescant and his son John).

Allen is the author of a very good new book, "WEEDS—The Unbidden Guests in our Gardens," published by The Viking Press, New York, NY, 191 printed pages, well illustrated, \$14.95.

Some weeds, including poison ivy are dangerous to man. Some like dodder, are parasitic, living on other plants. Others excrete harmful substances which depress the growth of neighboring plants, and some become transit hotels for pests which overwinter in them.

If weeds are capable of rousing the gardener's wrath and making him or her despair of ever winning the battle, let me assure him and her there are ways of eradicating them or at least controlling them, she says.

Some ways are safe. Some are dangerous, and across the world alarm bells have sounded. Man, with all the mate-

rials of death in his hands, can apply extinction when and where he will.

He is being warned that his life and the lives of animals, insects and plants are interdependent. This is not to say that when he uproots a dandelion in the garden he weighs the scales of survival against himself.

On the other side, a new study is revealing that some weeds may actually be worth encouraging for the help they give to garden plants, both by benefiting their growth and by quelling or killing the pests that attack them, and even by killing more pernicious weeds.

Weed seeds are dispersed by birds, squirrels, all sorts of other animals and by the wind. A bird flying to its wintering areas in central and South America, a distance of 5,000 to 7,000 miles, can take weed seeds along. The bobolink from North American meadowlands flies 5,000 miles to Bolivia, Paraguay or Brazil, the Arctic tern from the north of Greenland to the edge of the Antarctic pack-ice, 11,000 miles.

Alfred Newton, professor of zoology at Cambridge, sent Charles Darwin the leg of a partridge with a hard ball of earth weighing 6½ ounces adhering to it. Darwin kept the earth for three years, but when he broke it up, watered it and placed it under a bell-glass, no fewer than 82 plants grew from it.

It would be too sweeping a statement to say that all weeds can be put to a good use, says Allen. It depends, of course, on what you call a weed. What is one man's weed can become another's good garden plant.

In California, the man who probably was the greatest of all hybridizers, Luther Burbank, looked at three daisies: the Ox-eye daisy growing on the hills of Massachusetts, which was small, tenacious and hardy; an English Michaelmas daisy which was larger and coarser in stem; and the Japanese daisy, not large but of exquisite and almost dazzling whiteness.

He decided to marry the three and create a queen daisy that would have a slender stem, but firm, at least two feet tall and free from branches, with a flower larger than any daisy ever seen before, and petals of the purest white.

From 300,000 seeds Burbank grew 100,000 possible candidates, and selected again. The seeding and selecting process was repeated for eight years, and he worked not only for a queen among daisies but a plant that would grow just as well in Alaska as in Florida, Norway and Italy, for all sorts of soils and climates; one, too, that would remain fresh in water for as long as six weeks.

At last, after growing millions of

Zelkova

continued from page 15

triacanthos) received much attention as a possible elm substitute. The outgrowth of that research effort was the introduction of several improved cultivars of honeylocust in the early fifties. Recent interest has centered around our native hackberries (*Celtis spp.*). Zelkova should likewise benefit from continued varietal improvements.

A visit to North Farm in Bristol, R.I., should convince most tree lovers of the singular beauty of the zelkova. With the selection of improved cultivars, zelkova will become more popular and more available in the trade. While many wholesale nurseries have the tree listed in their catalogues, zelkova is not as easily found on the retail level. If you can not find a source for the tree, drop us a note at AHS headquarters and we will attempt to help you. □



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Williamsburg Gardening Legacy

Donald H. Parker
Frederick L. Belden*

Peter Collinson of London wrote to his good friend John Custis of Williamsburg, in a letter dated December 15, 1735, “. . . Mr. Catesby tells me there is a very pretty plant that He calls a sorrell tree that Grows between Williamsburg and York. Some seed will be Acceptable. . .” Peter Collinson, plant collector; Mark Catesby, enthusiastic naturalist; and John Custis, avid gardener, are a few of the many plantsmen who made Williamsburg an eighteenth-century plant center.

Plant introduction and horticultural exchange did not end in the eighteenth century, however. Williamsburg today is one of the most active communities in the southeast for the introduction and evaluation of new ornamentals. Colonial Williamsburg adheres to the policy of using only plant material native to the area or known to have been introduced during the Colonial period in its Historic Area gardens. However, the several additional hundred acres encompassing the modern visitor accommodations, recreation and

*Donald H. Parker, FASLA and Frederick L. Belden, ASLA are respectively Director of Landscape Architecture and Assistant Landscape Architect for The Colonial Williamsburg Foundation. Both will offer chalkboard solutions for garden design problems at workshops during the 33rd Williamsburg Garden Symposium to be held April 1-4, 1979.



The Abby Aldrich Rockefeller Folk Art Center's sunken rose garden has over 400 plants of 30 different hybrid roses.

orientation facilities of The Colonial Williamsburg Foundation offer a unique opportunity for incorporating collected and introduced plant specimens to enhance the existing plantings.

At the Williamsburg Inn, a *Zelkova serrata* (Japanese Zelkova) is used as a suitable replacement for the high-spreading canopy of the American Elm; *Betula lutea* and *B. nigra* (Yellow and River Birch) complement each other, and guests are surprised to find a white-berried form of *Nandina domestica* (Nandina) mixed with the more common red-berried form.

Also highlighted in another grouping is a Magnolia hybrid "Pinkie" with its unusual color of spring bloom set in a bed of a variety of spreading junipers with a yellow-flowered variety of the *Lonicera sempervirens* (coral honeysuckle) adding continuous summer color.

Recently planted at the Williamsburg Lodge is an *Araucaria araucana* (Monkey Puzzle tree), an exotic from Chile occasionally successful on the east coast south of Philadelphia. Also unusual is an *Aleurites fordii* (Tung-oil tree) from China, and a *Tamarix gallica* (French

Tamarisk), a European native which has "escaped" in the southwest part of this country. Camellias, very popular throughout the south, are represented by several species. In addition to the popular *C. japonica* and *C. sasanqua*, the *C. oleifera* (Oil-nut camellia) and the *C. sinensis* (Tea plant) are represented. Nearby the related genera *Clayera* and *Ternstroemia* may be seen.

The Abby Aldrich Rockefeller Folk Art Center features the handsome

crapemyrtle), less common cousin to the popular *L. indica*.

At the Providence Hall wings of the Williamsburg Inn are seen some of the more unusual plants. As elsewhere, these have come from a wide range of sources, including purchase, gift, USDA, seed from arboreta, etc., and collections from the wild. *Aesculus sylvatica* (Painted Buckeye), an unusual native tree with yellow flowers and large brown seed, was collected in southside Vir-

exposure.

Merchants Square, the unique shopping complex adjacent to the College of William and Mary on Duke of Gloucester Street, has recently undergone extensive work to improve the plantings and pedestrian orientation. Several hedge forms have been used, including the low-growing *Ilex cornuta* var. 'Carissa' (Carissa holly), *Osmanthus heterophyllus* var. *rotundifolius* (Curlyleaf osmanthus), and three barberry types—*Berberis koreana* (Korean barberry), *Berberis x mentorensis* 'Mentor barberry', and *Berberis x gladyneensis* 'William Penn.'

Shading the area are several varieties of trees, including the native *Liquidambar styraciflua* (Sweetgum). In addition to the local form of sweetgum, a specimen from the mountains of Central Mexico provides an interesting comparison. Likewise, the native *Platanus occidentalis* (Sycamore) grows near one collected in Mexico. The Mexican sweetgum was given to Colonial Williamsburg by the late Dr. J. T. Baldwin of the College of William and Mary, who had obtained seed from near San Luis Potosi.

In 1948 Dr. Baldwin obtained seed of the newly-discovered *Metasequoia glyptostrobodies* (Dawn Redwood). Today these plants grace the campus of the College of William and Mary, and the Dawn Redwoods grown from this original seed lot are considered to be the largest in cultivation. Near the Dawn Redwoods may be seen a pair of very large *Sequoia sempervirens* (Coast Redwoods), perhaps the largest in eastern North America.

The close relationship between the College and Colonial Williamsburg in horticultural endeavors illustrates the fact that plant exchange and collecting transcends political and social boundaries and, indeed, today we consider the entire Williamsburg area as an arboretum of both period and contemporary plants to be enjoyed by our many annual visitors. □



The Williamsburg Lodge East Wing Courtyard features early spring tulips, pansies, and a fringetree in bud.

Photos by Fred Belden

evergreen *Cryptomeria japonica* (Cryptomeria) in standard and dwarf form (var. *globosa nana*). *Cryptomeria* is a nineteenth century introduction from Japan and an important timber tree there. Some 400 plants of 30 varieties of hybrid roses can be seen in the sunken rose garden. These plantings have been supervised by Mr. Benjamin Williams, noted rose hybridizer from Silver Spring, Maryland. Also located in this garden are *Chionanthus retusus* (Asiatic fringetrees), a close relative of the native fringetree *Chionanthus virginicus* and *Lagerstroemia subcostata* (Formosa

ginia. The spreading herb *Lamium galeobdolon* (Golden Deadnettle), a European native, offers an interesting choice for a ground cover, while *Pinus contorta* (Shore Pine) from Oregon offers interesting accents. Especially noteworthy is the *Torreya taxifolia* (Florida Torreya). This is a very rare conifer from northwest Florida. A *Trachycarpus fortunei* (Windmill Palm), native to China, is one of the hardiest palms but five other species of Palm are also represented. A collection of cacti and succulents covers a once barren and dry bank with a southern



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Christmas Books

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daisies, he achieved his queen, a flower of remarkable beauty with brilliant white petals of great size, the center pure yellow, the stems long and graceful. He named it for Mount Shasta, which he had always revered, the snow-capped peak of the high Sierras which is one of the conspicuous landmarks of California.

In her book, Allen provides a unique identification guide covering 200 plants, all illustrated with clear line drawings, and gives her suggestions for control of weeds.

The capital of Washington is a monument to Thomas Jefferson's magnificent vision. He was indirectly responsible for its location on the Potomac River and its basic site planning there. He also established its architectural and landscape character. Although many skills were employed in its development, his guiding influence and persistent management united them all, according to *Frederick Doveton Nichols and Ralph E. Griswold, authors of a new book, "Thomas Jefferson—Landscape Architect," published by the University of Virginia, Charlottesville, 178 pages, well illustrated, \$9.75.*

Nichols is Cary D. Langhorne Professor of Architecture at the University of Virginia, and Griswold is a Fellow of the American Society of Landscape Architects.

During 26 years of his life, from the age of 40 to 66, Jefferson's energies were often devoted in one way or another to promoting and perfecting a new capital for a new type of government created for a new nation. No exact precedent for such a city existed elsewhere in the world.

Collaboration with the greatest botanists of his time, an instinctive humanitarianism, and a natural ingenuity in landscape architecture made Jefferson a pioneer in landscape architecture in this country.

With a close study of the many notes and letters which Jefferson left, the authors present a clear and detailed interpretation of Jefferson's extraordinary accomplishments in this field.

The last chapter describes Jefferson's plans for the University of Virginia as the crowning achievement of America's earliest, and perhaps most famous, landscape architect.

The joint investigation of these two scholars (authors) has produced the first

modern study of Thomas Jefferson as a landscape architect, says Walter Muir Whitehill, honorary trustee, sometime president, of the Thomas Jefferson Memorial Foundation. "It has given me pleasure to have an early opportunity to read and to introduce this welcome addition to Jeffersonian literature, which is appropriately published by the press based at the university he founded."

A garden should work as an extension of the house both practically and visually. While the form which a garden takes evolves primarily from its function, the style must above all be in sympathy with its location, according to John Brooks, Director of Studies, Inchbald School of Garden Design. Brookes is a renowned garden designer in England, has written six books on the subject of garden design, and has won four Gold awards for garden design from the Royal Horticultural Society.

Brookes is the author of a new book, "*The Small Garden*," published by Macmillan Publishing Co., New York, N.Y. 256 pages, over 600 full color illustrations, priced at \$19.95.

The book tells how to assess your soil and site, different ways to draw up a plan best suited to your personal tastes, provides new and imaginative ways to use walls, fences, paths, and terraces, how to lay paving, construct a pergola, change the level and build steps, and suggests the most effective and efficient way to use whatever space you have.

A variety of plants is included—climbers, ground cover plants, space-saving and decorative vegetables, and silver and gray foliage plants.

Three-dimensional plans are included showing layout and planting; a wide range of design approaches contains ideas for your own garden, and how to have an easy-care garden that will provide pleasure all year round.

The emphasis is on simplicity and enjoyment. There are suggestions for outdoor furniture, barbecues, lighting, storage, and children's play areas.

For hundreds of years, the maple has penetrated into the hearts and gardens of the Japanese people from all walks of life. A maple is a must in every Japanese garden, large or small—planted in the ground or as bonsai. They are cherished in the gardens because of their brilliant crimson new spring growth, bright green leaves in summer, red or gold foliage in autumn, or the shapely appearance of the branches in winter.

The native Japanese maple has the

tendency to produce great variations within the species. By selection and cross pollination over 250 cultivars have been developed. Plants to fit every need in landscaping can be found, from the extremely dwarf forms with minute leaves to the bold upright types with large leaves.

There are variations of color in foliage in spring growth which are not found in other types of trees. Fall coloration among these cultivars becomes a second period of color explosion. There are variations of leaf shape from tiny, crinkled, strap-like, and lace-like to the bold, broad leaves of Osakazuki.

Early nursery catalogs have given descriptions of some of the major cultivars. There has not been, however, a comprehensive work on the Japanese maples which provides the English-speaking world a reference tool by which these maples may be understood, according to J. D. Vertrees.

Vertrees is the author of a fine new book, "Japanese Maples," published by Timber Press, Forest Grove, OR, 178 printed pages, with over 200 photographs of Japanese maples in full color taken by the author through all the seasons. The book is priced at \$39.50. Vertrees has served on the staff of Oregon State University Extension Service and has studied and collected Japanese maples for many years, cultivating many varieties in his nursery in Roseburg, OR.

This book was prepared to provide a comprehensive source of information on and description of this general group of plants. Typical color leaf identification prints of the majority of the cultivars are presented to aid in determination of the cultivars.

The second purpose of the book is to clarify and simplify the nomenclature of these plants.

The third purpose has been to provide guidance to gardeners, landscapers, nurserymen, etc. with an authoritative guide to propagation, cultivation and horticultural characteristics of this extraordinarily useful group of plants.

This book is designed to meet the needs of four types of readers, the author says: the amateur gardener, the avid plant enthusiast, the commercial nurserymen, and the serious dendrologist.

Vertrees defines as Japanese maples the cultivars of *Acer palmatum* and *Acer Japonicum*. He also includes in his book descriptions of other *Acer* species from Japan and their varieties. These plants are hardy, growing at a variety of altitudes and in a variety of soil conditions. Because many of them provide a flash of brilliance in the spring and again in the fall, and because of their broad spectrum

of shapes, sizes, colors and leaf textures, there is a place for them in any garden.

From December through March, whether the ground is bare or covered with snow, you can enjoy your garden just by looking out the window. For me, this fourth season is full of peace and beauty, says Helen Van Pelt Wilson, one of America's best-known writers in the horticultural field, author of twenty books on indoor and outdoor gardening.

For me winter is never dull, she says, certainly never colorless. Hemlocks and hollies are a deep, living green; junipers are touched with bronze, blue-gray, even purple; birches gleam in any situation—so too, do the white clusters of the snowberries, the brilliant red fruits of Washington thorn and the American cranberry bush. Late in January or in early February the aconites offer their golden cups.

Wilson has done a new book, "Color for Your Winter Yard & Garden—With Flowers, Berries, Birds and Trees," published by Charles Scribner's Sons, 175 printed pages, very well illustrated, \$14.95.

The purpose of this book is twofold, she says; to open your eyes to the very special beauties of the winter scene and to interest you in developing a four-season garden. The wisely planted place should give you just as beautiful, though different, pictures in winter as in the other three seasons.

For key spots important all through winter, there is a long and tempting list of shrubs and small trees to be considered. If these are deciduous, they will be all the handsomer with a firm background of pine or hemlock to silhouette their forms and emphasize the brightness of their winter buds and fruits.

You can, for example, set out a few groups of evergreens of varying shades of green, along with one handsome deciduous tree and red or white berried shrubs in front of it, situating these plantings perhaps along the far boundaries of your place.

Or you can add certain shrubs to otherwise ineffective plantings and so develop associations far more interesting than the haphazard specimens that have so far counted for little.

In addition to trees and shrubs, select some of the flowering plants that bloom delightfully in cold weather and situate them close to the house.

Lists of plants for the winter garden are included, with the north-south range in which they will thrive with suitable soil and moisture, dates of blooms, plus planting plans by Eloise Ray, landscape architect.



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Arboretum of Many Moods
Planting Fields



Martha Prince
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A winter day can be a time to dream ahead, to plan a trip, perhaps.

On some crisp and sunny spring afternoon (or a slumbering summer one) would you like to sit, with a book in your lap, and gaze peacefully down the sloping lawn of what seems to be an English country estate? Or amble across an endless green carpet, pausing in awe before a venerable Copper Beech (*Fagus sylvatica* 'Atropunicea') or a gigantic Weeping Silver Linden (*Tilia petiolaris*)? Perhaps, instead, you stop to admire the lacy foliage and twisted form of an elegant Japanese maple (*Acer palmatum* 'Ornatum,' called Spiderleaf). If you look up at the skyline, you find the variety of deciduous foliage edging the lawn punctuated by spruces, pines and hemlocks. Set forward for display are tall Atlas Cedars (*Cedrus atlantica*, and the blue form, *C. atlantica* 'Glauca') and a Cedar of Lebanon (*C. libani*). If it is mid-spring, a specimen Yulan magnolia, dressed in stately white, lures you across the clipped grass for a closer look (*Magnolia hepatica*). Other accents against the leafy border are clouds of white dogwood bloom (first *Cornus florida*, then *C. kousa*). Distant blooms of pink (might that be a cherry? Or a crabapple?) beckon you to explore beyond the lawn itself, and you dip into the most inviting of the paths. This is Planting Fields Arboretum, in Oyster Bay, New York. It is many things to many people, for it has an almost infinite variety of landscapes, of things horticultural and beautiful to see. To me, it is the single loveliest place on Long Island. Planting Fields has moods for all necessities of spirit—bright, colorful places to cheer one, peaceful woods and meadows for quiet thinking.

There is a unique Synoptic Garden—shrubs and trees arranged al-

phabetically for easy finding and studying. It is so subtly adapted around the old trees, so curving and beckoning in its pathways, that there is no feeling of "study garden" at all. The little brick-walled entrance, guarded by twin puffs of dwarf White Pine (*Pinus strobus* 'Nana') and by large plants of the rhododendron 'Cunningham's White', has an attractive small seating-shelter, with maps and guides. I often sit there idly admiring



Photos by Author

Left—Entrance to azalea walk
Above—Dwarf conifer garden

the welcoming color of the bedding flowers (pansies, perhaps, or begonias) so carefully tended in this tiny "foyer" to the Garden itself. Indeed, I have been welcomed already, for the entrance to Planting Fields, lined with European beeches (*Fagus sylvatica*), is beautiful. In spring thousands upon thousands of yellow and white bulbs drift along the roadway, or can be glimpsed between the trees. You may park your car near a lavender or pink *Rhododendron mucronulatum*, or, in summer, you might find a collection of hybrid daylilies (*Heemerocallis*) greeting you with bright blossoms. I feel a "lift" of anticipation even before I close the door of my car. What will I find today? Where shall I go?

The Synoptic Garden starts, of

course, with "A", and my favorite "A" is *Amelanchier laevis* (Serviceberry). I turn to the right to find the largest tree, and must check on the *Aronia arbutifolia* 'Brilliantissima' (Red Chokeberry) across the path. At "B" I am stopped by the *Berberis gilgiana* (Wildfire Barberry), especially when the drooping oval berries have turned red. If I reach "C," the *Corylopsis sinensis* (Chinese Winter Hazel) may attract, when the strange pale yellow racemes of nodding blossoms are open. Benches are tucked discreetly along the paths, under flowering cherry or crabapple trees. Some are "mine", and I sit waiting for the mocking bird to begin an aria from his treetop perch. I may have an actual destination—such as "I" for *Ilex* (although the superb Holly Collection is much too large to be confined to the Synoptic Garden), or the day may be one of those overly-busy ones when a breath of quiet beauty is really needed.

Thank goodness I live nearby! My own garden-woods are not large enough for real walking, and if a good, brisk tramp is what I want, Planting Fields has about 200 acres of woodland, filled with Mountain Laurel (*Kalmia latifolia*). One path there is home to a Great Horned Owl, for whom I have named the trail—in my own mind. If I must research something beyond the scope of my own bookshelves, Planting Fields now has a good and growing Horticultural Library. In winter, if I am feeling all of six years old, no better place could be found to put fresh tracks in pristine snow.

I would like to write a poem to Planting Fields, but I will try to be a bit less lyrical, and more orderly. This 400-plus acre garden was left to New York State by the late W. R. Coe, in 1955. His mostly Tudor-Elizabethan home (reflecting his English birth) stands as the stately focal point for the gardens. Nowadays this handsome limestone mansion, full of carved surprises from Europe, antique chandeliers, and even stained glass, is known as Coe Hall. It is used for horticultural meet-

ings and for concerts. Chamber music (perhaps a Renaissance band, playing the viola de gamba and the sackbut, or a string quartet) is heard on many Sunday afternoons in the panelled library. What could be more perfect than a walk in the garden beforehand? Planting Fields is headquarters for the New York Chapter of the American Rhododendron Society, and many other plant societies.

Mr. Coe had Olmsted Brothers design the main garden outline, incorporating a few former bits (a pool, a tea house) from an earlier home which had been lost to fire. This was added to over the years, and is still growing . . . the Synoptic Garden, the Dwarf Conifer Garden, the Wildflower Garden, et cetera, are rather new. All blend beautifully with the Olmsted heritage.

Mr. Coe was a rhododendron enthusiast and collector. Now, with yearly additions, the rhododendrons and azaleas are probably the

single brightest, most spectacular aspect of the garden. Early April finds buds opening—*R. keiskei*, a soft yellow treasure from Japan, starts a festive procession of color. The real explosion of color is during the latter half of May, and into June. In species *alone* there are some 3200 plants of approximately 160 species and species cultivars. New are three large rhododendron species groupings; one is of the Fortunei series, one Ponticum, and the third is primarily Triflorum series. In hybrids, Gordon Jones, the Director, made the wild guess that there are at least 10,000 plants (of some 700 cultivars). These dry numbers may seem astonishing enough—but not as astonishing as the sight of these plants in bloom! Breathtaking is far too small a word.

I wrote once in *American Horticulturist* (in 1976, I believe) about the Camellia Greenhouse. The Main Greenhouse has at its center a conservatory with brilliant seasonal dis-

plays. Poinsettias hold forth at Christmas . . . the white of Easter Lilies follows when appropriate . . . my favorite, the chrysanthemums, precede the red, pink and white poinsettias again. The outer portion of the conservatory is devoted to "food plants" from the tropics, such as coffee, lemons, bananas, interspersed with bright hibiscus and fragrant gardenias. Yellow blossoms of climbing *Allamanda* hang overhead. In the wings are a splendid orchid collection (especially complete is the Brazilian collection), and a meticulously designed and arranged Cactus House. Much of the "working wing" is open to the public, and it is a joy to see the neatly behaved rows of such beloved indoor plants as *Streptocarpus* 'Constant Nymph'.

There is just too much to talk about! One favorite ramble of mine is along what is really the main drive, now for walkers only. Curving gracefully, it climbs from the wrought iron "Carshalton Gate" (a fantasy in filigree, made in England in 1712), past banks of pink *Rhododendron carolinianum* set against a dense and dark forest. In autumn, Planting Fields boasts a wealth of bright foliage; many shrubs were planted for fall color alone. It is, indeed, a "Garden for All Seasons".

It may seem strange to say that this enormously costly, lavish garden from the heyday of Long Island's "Gold Coast" is on a human scale,—but it is. Huge, yes—and it gives one the breathing space all humans need now and then—but it is intimate, too. Planting Fields is a friendly place. Many Long Islanders feel the way I do about it; a "Friends of Planting Fields" was formed some years back when the Arboretum was in financial straits. The group continues to raise money for the "extras" the State does not provide. All of us feel a really personal attachment to these very special gardens.

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Presented in association with the American Horticultural Society, next year's symposium will salute 1979 as the Year of the Rose. And that's just one of the many features planned for this April 1st through 4th gathering.

This is your opportunity to hear such speakers as Russell and Deni Seibert as they report on horticulture behind China's Bamboo Curtain, and Allen P. Paterson, Curator of the Chelsea Physic Garden in Great Britain.

You'll also enjoy a special Historic Area house and garden tour, the Early Risers' Bird Walk, "how to" workshops, panels, teas, a candlelight concert and the delicious grand finale of the annual Gardeners' Banquet.

Since reservations must be accepted as they are received, make plans today to attend this 20th century gardening experience in the 18th Century.

For a detailed program and registration information, write Mrs. Peggy W. Sabol, Registrar, Williamsburg Garden Symposium, P.O. Box C, Williamsburg, Virginia 23185. Or call (804) 229-1000.

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Growing the Uncommon Violet

Tim Morehouse
856 Ludlow Ave.
Cincinnati, OH 45220

When severe winters affect major portions of the United States—ice storms, blizzards, sub-zero temperatures, snow measured by feet, not inches—I think of the poet Shelley's line: "O wind/If Winter comes, can Spring be far behind?" And when that white blanket disappears, I poke around the leaf and straw mulch covering my flower beds and borders in search of one of spring's earliest harbingers: the violet.

Most gardeners can remember the wild varieties, picked in meadows and woods: the sweet white (*Viola blanda*), the Blue Marsh Violet (*Viola cucullata*), or the Birdsfoot Violet (*Viola pedata*). Today, the spring garden can be supplied with numerous fragrant and *cucullata* varieties—not just the common blue. The two distinct types available from mail order nurseries (e.g. Lamb Nurseries, 101 E. Sharp Ave., Spokane, Washington 99202) are, first, the *V. cucullata*, and though they are not fragrant, the flowers are large and distinct. They form mats of heart-shaped, deep-green, glossy leaves, some-



Right—White czar
Insert—Yellow (*roundifolia*)

times six inches high. I recommend 'Alice Witter'—a white with a deep red eye; 'Freckles'—a large white flower dotted with blue; 'Red Giant'—firm large burgundy-red flowers on strong stems; 'Septemloba'—deeply lobed foliage and dark violet-blue flowers; 'Snow Princess'—a rare snow white bloomer; and a bright yellow violet (*Urotundifolia*). The fragrant species (*V. odorata*) produce lovely dark green foliage and flowers with that delicious violet scent all gardeners relish. Some unusual varieties include: *V. labradorica*—with purple leaves forming low mounds of delicately scented purple flowers. This variety will sometimes bloom all summer and is a native of Labrador and Greenland; *V. sylvestris rose*—a small, but extremely hardy, light rose-pink violet that will scatter itself into unexpected places and flower several times during the spring months; 'White Czar'—a luxurious white bloomer and strong grower; *V. sulphurea*—a rare, soft apricot-yellow; and 'Swanley White'—a double sweet-scented white with pointed, glossy leaves.

In regard to their culture, I spoke with my mentor, Mrs. Marion O'Rourke (O'Rourke Perennials, 3426 Banning Road, Cincinnati, Ohio 45239) who has grown them for over 40 years. When asked what she considered to be one of the most important aspects of successful violet culture, her response was: "Always plant violets in some sun, the more the better. It is a fallacy to think they prefer only deep shade." I have had much success in growing them in "open" wooded areas where they receive sunlight at least half the day. Any garden soil that will grow vegetables will grow violets. In preparing the bed, border or rock garden, do not use chicken or horse manure, as this leads to excessive leaf growth and few flowers. If your soil is light, dig in some thoroughly decayed cow manure. This, while feeding the roots, will tend to keep the ground cool and moist during the summer. Add decayed leaves, oak-leaf

mould, some coarse sand (if the soil contains much clay) and bone meal. A fish emulsion, mixed according to directions and put around the plants a month or so before the blooming season will produce abundant flowers. An extra addition of leaf mould is an advantage, especially in heavy soils that are inclined to bake and crack in the sun. Violets need a rest period and most of them become dormant in the hot summer months. During this time, cover them with mulch so they won't dry out and cut down on the watering.

My experience with violets is that they propagate themselves primarily by seeding. These tiny off-spring can be moved at will and the beds increased each year. Some violets send out runners, like strawberry plants. By cutting off the runners in the summer, strong individual crowns or clumps form. For more blossoms, cut off the runners. Violets can be moved anytime and will bloom the same season they are transplanted. Water and spray frequently if the weather is dry after planting and keep the soil hoed so they will become established. But a word of caution: violets must acclimate themselves to your area; this demands patience and care with occasional disappointment.

At times pests are a problem. Red spider, aphids, snails and slugs attack violets. Snails and slugs can be practically eliminated by constant application of snail bait; red spider by soil conditions—keep your plants cool and damp. An old-fashioned remedy for red spider is to syringe the leaves of the infected plants with soft soap and water, two ounces to the gallon. Aphids may appear during long wet spells but usually disappear when sunny weather returns.

Of historical interest, the violet provides us with numerous legends and recipes. They grow in literally every part of the world, including the arctic and antarctica. Of the 800 or so species that exist, there are probably as many stories. In mythology, the Greek goddess Per-

sephone was picking violets when Pluto abducted her. When Orpheus placed his lute on the ground as he rested, violets spring up around it. The Athenians admired these flowers so much that they learned how to cultivate them year round and used them as garlands and in perfume. An old Welsh book of recipes offers the following:

*To know whether a man who has been severely beaten will recover or not—take the violet, bruise and bind it about the forefinger; if he sleeps he will live, if not, he will die. . . .**

Even today, candied violets are a specialty with some confectioners:

To Candy Violets in Their Natural Color:

Pick the violets with no stalk, wash them clean of all earth, drain them, and then wash them in a solution of gum arabic and a little rose water. Take castor sugar and dust over them, then set to dry on a sieve in a warm oven, away from heat.

And for an ancient beauty preparation, translated from the Gaelic:

If thou anoint thy face with the milk of the goat in which violets have been soaked, there is not a prince upon the earth who will not be pleased with thy beauty. . . .

The Syrians and Turks use violets in making sherbets. The scent is so universally popular, that in France, where they have been grown since Queen Radegond grew them at a nunnery at Poitiers in the Sixth Century, hundreds of tons of the little blossoms go into a single year's perfume production.

This tiny spring flower—so rich in variety, legend and beauty—belongs in every garden, so next fall, plant a few violet species and as the long, bitter winter melts away, think of Tennyson's lines from *In Memoriam* CXV:

*Now fades the last long streak of snow,
Now burgeons every maze of quick
About the flowering squares, and thick
By ashen roots the violets blow.* □

*Taken from: Grace L. Zambra, *Violets for Garden and Market*. London: W.H. & L. Collingridge Ltd. 1938.

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