

American
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Volume 56 Number 3 Late Spring 1977



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COVER PHOTO BY: Longwood Gardens—*Canna* X 'Endeavour'—Longwood Hybrid #73331

Plan Now to Join Us in Southern California

This year's annual American Horticultural Society Congress will be held at the Huntington Sheraton Hotel in Pasadena, California, October 25-29, 1977. We have decided to extend the event one day to more adequately discover the plants and plantmen of Southern California. Following is the tentative program.

Although the arrival date for the Congress is October 25th, many of you may wish to take advantage of our pre-Congress tour, which originates in San Francisco on October 16th and ends in Pasadena on the 24th.

A unique opportunity is offered to explore some of the coastal area of California between San Francisco and Pasadena, a section of the state which is rich in horticultural interest. The mild climate is conducive to the growth of a variety of plants from many areas of the world. *The pre-Congress tour is offered to a maximum of 40 people.*

October 16th is the official arrival day; stay at the Mark Hopkins Hotel, Nob Hill, for five nights of San Francisco's fascinations.

First day—see the Golden Gate Park and Strybing Arboretum, dinner in Chinatown.

Tuesday, October 18th—University of California Botanic Garden, and explore the wine country and some outstanding wineries.

Wednesday, October 19th—visit private gardens and one of the world's largest wholesale nurseries.

Thursday, October 20th—north of San Francisco over the Golden Gate Bridge to some specialized nurseries, the Muir Woods for the Coast Redwoods; dinner in Sausalito at a restaurant overlooking San Francisco Bay, with a talk by John Bryan, Director of Strybing Arboretum.

Friday, October 21st—leave the Mark Hopkins, go south along the ocean route and visit some more nurseries; continue to Monterey, and two nights at Carmel.

Saturday, October 22nd—morning free for exploring and shopping in Carmel's charming and varied shops. Afternoon—coach tour of 21-Mile Drive.

Sunday, October 23rd—drive south by Big Sur and San Simeon—2-hour guided tour of William Randolph Hearst's extraordinary castle. Spend the night at the Santa Barbara Biltmore.

Monday, October 24th—Santa Barbara Botanic Garden and private gardens with a luncheon, spend the night at the Huntington Sheraton, Pasadena.



Tuesday, October 25th, is the official travel day. Congress registration will be held in the lobby of the Huntington Sheraton Hotel.

On *Wednesday, October 26th*, Congress Chairman Dr. Francis Ching, Director of Los Angeles State and County Arboretum, will present the opening address, to be followed by the AHS plenary and business session. A noon buffet luncheon is planned in the well-appointed Georgian, Ship and Quarterdeck Rooms.

In the afternoon you may choose eight of sixteen private home and garden tours. These magnificent Pasadena area residences will be opened exclusively to AHS members.

In the evening a rare plant sale and cocktail reception will be held in the beautiful open-air Horseshoe Gardens at the Huntington Sheraton. Later you will attend our Annual Awards Banquet in the Viennese Room, with a fascinating indoor gardening presentation conducted by AHS President, Dr. Henry M. Cathey.

On *Thursday, October 27th*, Bill Evans will conduct an informative and educational discussion on California fauna and flora. This is followed by a tour of the Huntington Botanic Gardens, with lunch at the Los Angeles State and County Arboretum.

The afternoon will be spent touring the diverse landscape of the Arboretum.

After a brief respite, we depart for a dinner and evening in Los Angeles' exotic Chinatown.

On *Friday, October 28th*, the morning will be devoted to educational gardening symposia, featuring eight horticultural specialists. Gardening topics include: bromeliads, cacti and succulents, begonias, proteas, California flora, new indoor plants, rhododendrons, and the All-America Selections.

We then depart for lunch at Lawry's Los Angeles Garden Center, and tour Sunny Slope Gardens' world-famous chrysanthemum display.

On Friday evening, you are free to rest, relax and dine on your own.

On *Saturday, October 29th*, we will continue our educational gardening symposia. This time six horticultural specialists will be featured. Topics include ferns, cycads, California natives, indoor gardening, plant photography and a discussion on horticultural nomenclature.

Later we will depart for South Coast Botanic Garden, where we will have an outdoor buffet lunch.

The afternoon will be devoted to the fauna and flora of the beautiful Descanso Garden Center.

That evening we again feature a cocktail reception in the Huntington Sheraton outdoor Horseshoe Gardens. This is followed by the President's Banquet in the Viennese Room, which includes the presentation of the Liberty Hyde Bailey Medal to one of America's top horticulturists.

This year we offer four post-Congress tours:

Tour # 1—a 3-day, 2-night event, will feature the famous California Bristlecone Pine Forest and Death Valley. Highlights include the San Andreas Fault, overnight at Sportsman's Lodge, visits to Stovepipe Wells and Scotty's Castle.

Tour # 2 is a 2-day, 1-night visit to San Diego and includes visits to Sea World and the San Diego Zoo.

Tour # 3 is a 2-day 1-night tour to Santa Barbara, with stops at the historic Courthouse and Mission areas, a drive to Solvang and Buellton.

For the world traveler we offer Tour # 4, a 24-day trip to the Orient, including Japan, Taiwan and Hong Kong.

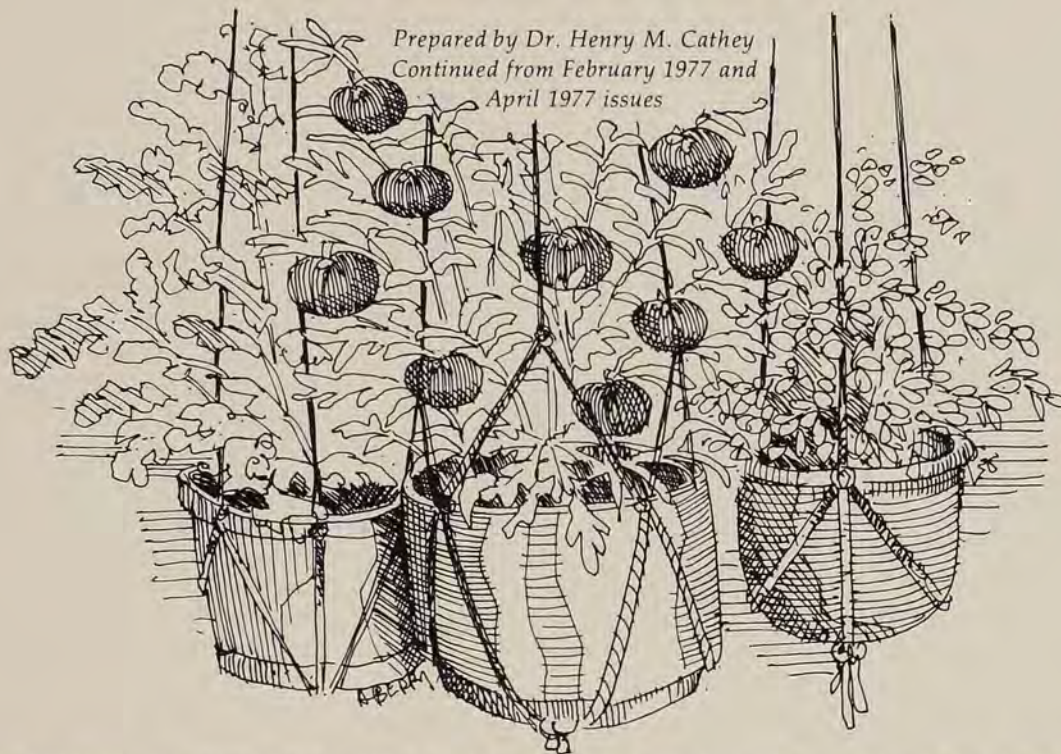
Within one month you will be receiving our preliminary Congress pre-registration package. If by chance you do not hear from us and wish registration material write to:

AHS Congress, American Horticultural Society,
Mount Vernon, Virginia 22121. M.C.K.

A Refresher for Gardeners

Planting in Containers

*Prepared by Dr. Henry M. Cathey
Continued from February 1977 and
April 1977 issues*



Holding Plants: At purchase begin to train the plants to withstand the heat, wind and rain of the exposed growing area. Do this by reducing the frequency of watering. Add water until the entire root ball is fully moistened but allow the excess to drain away. Water again when the leaves begin to show the first signs of wilting. The holding operation should not last longer than 2 weeks—if continued too long the older leaves will begin to turn yellow and fall.

Site: Plants in containers can have the best of two worlds—the growing one and the showing one. The growing world should be the ideal light and temperature condition for the plant—this preference was listed in Table 2 in Part II (April 1977). With the container garden you can move the plants as the season changes,

thus a plant that needs full sun for rapid development during the young plant stage can be moved to a partially shaded area for display when it comes into flower or fruit. Plants which normally thrive only in full shade will make the adjustments to brighter conditions once they have established a root system and the leaves are shading the stem and upper roots. Most plants can be placed in a less favorable exposure for display for days or weeks if rotated with equal or longer periods in favorable exposures. Container gardens should be portable (wheels, pallet size) to release full benefit of their design potential.

Containers: Great progress has been made from the days when window boxes were made of lumber (which rotted) or cement (which cracked). Containers are now avail-

able made out of all kinds of materials and can simulate many textures and colors. You can grow in any container which provides the following:

- Enough rigidity to support the weight of the growing media, water and roots.
- Adequate room for the development of the root system. An 8" depth is sufficient for most plants.
- Construction in such a way that the excess water can easily drain away without damaging the surrounding area.

You cannot expect every container plant to be equally attractive throughout the growing season. Thus flexibility in placement is essential for the maximum display effects.

Soil Preparation: This is the most critical step in the preparation of

your container garden. Agree at the beginning that you are *not* going to dig up soil from a garden area to fill your container. The structure of your soil is usually unsuitable for container gardening. You should buy or prepare an artificial growing mix. The commercial mixes are composed of peat, vermiculite, perlite and (more recently) wood chips. They have been blended with limestone, superphosphate, and a complete garden fertilizer. Some also contain slow release fertilizers as coated or slowly soluble forms. The bags of these preparations should be opened and 7 gallons of water per 30-lb. bag should be added. A day later the mix is ready for planting.

You can prepare your own mix—following these steps:

- Use one-half bushel of perlite or vermiculite
- One-half bushel of ground peat moss
- 4 ounces of 20% superphosphate
- 4 ounces of dolomitic limestone
- 2 ounces of 5-10-5 fertilizer
- Mix the ingredients thoroughly—by placing them in a large trash can or bag.
- Add water to the mix, one gallon at a time, until the mix is moist but not soggy. Adding water to mix prior to placing in the container insures maximum hydration of the peat cells and thus maximum porosity.

- Store hydrated mixes in sealed polyethylene bags. It can be held for many weeks and be instantly available for use.

Preparation for Planting: Visualize the container as having levels with different functions to insure the creation of a proper environment for the development of the root system. First, check the drainage holes to be sure that water readily flows out of them. Cover them with sheets of fiberglass or broken clay pots to act as filters. The second layer is drainage material—it should be coarse and porous and provide large air spaces between the particles. This open space will permit the

excess water to drain away. The drainage area must be at least 4 to 6 inches deep. The third layer is the growing mix. It should be at least 8 inches deep and applied directly over the drainage material. The growing mix should be applied without large air pockets. I use my hands to firm up the layer. I then water to saturation and check to see that the drainage holes are functioning. If something is wrong in the preparation—you should tear everything out and start again. Finally, level the growing mix, providing at least a 1-inch lip of the container. You can expect the growing mix to contract as the weeks go on—but you should provide an easy way to add water. A one-inch area is sufficient.



Planting: (1) Seed: The prior steps of preparation make this milestone very simple. Everything is prepared, sterilized and moistened. Many kinds of seeds can be planted directly in the container. The safe planting time, the germination times and requirements were given in Part I (Feb. 1977 issue). The only drawback from growing from seed is the many weeks it takes to get the plants up to the flowering and fruiting stage.

(2) Plants: Almost instant gardens can be created with purchased bedding plants. The techniques for planting into a terrestrial garden were discussed in Part II (April 1977). Similar procedures should be used when growing plants in containers.

Plant the container plant at or just above the mix line. As the season goes on, you will observe that the root ball from the plant is sinking into the mix. Once the root system is

established, add a layer of growing mix.

Water: Growing plants in containers is time consuming during the first weeks following planting. You will be striving to establish root systems which penetrate the entire growing mix. If you fail to establish a completely expanded root system, you can expect some plants to die. The way you water determines how your plants will grow through the summer months. Immediately following planting, water until the excess begins to flow from the drainage holes. Now wait until the surface of the mix is fairly dry to the touch; you will observe a change in color—dark to pale brown. This means that the surface is dry but the interior mix may still be quite moist. Add only enough water to restore the moisture in the upper level. During this critical stage it may be necessary to cover the plants with plastic film (even old garment bags) to prevent a downpour of rain oversaturating the mix.

Once the roots fill the area, heavy downpours of rain or overwatering with the hose (or automatic system) will not cause any damage. Plan to add about 1 inch of water every 7 days throughout the growing season. Never let the plants wilt and never over-soak them—either extreme will set up a condition where secondary problems of disease or gas exchange will rapidly kill the plant. Water should always be applied as droplets to growing mix—it is readily absorbed. Never turn a hose directly on the mix—the force of the water ruptures the fine root system at the surface. Proper watering will insure healthy plants.

Mulches: Container grown plants are seldom mulched. It should be done, for just the same reasons as discussed in Part II for the terrestrial gardens. I prefer to use decorative mulches on container gardens such as cocoa shells, salt hay, pine needles, and coarse bark. Finely ground material should not be used. It can form a seal on top of the growing

Continued on Page 33

Table III: Milestones: Planting in Containers

Species	Location	Minimum size container per plant = Diam. × Depth	Adapted to direct seeding in container	Preferred season of growth	Grooming requirements	Preferred types to grow
Ageratum	Sun, partial shade	4"	Avoid, seedlings grow slowly	All season	Remove faded flowers to permit water to drain through	All types useful
Alyssum	Sun	3"	Direct	All season	Remove faded flowers	All types useful
Aster	Sun	5"	Direct	Spring and fall crop	Replant for second crop	Dwarf types—early flowering
Balsam	Sun, partial shade	5"	Direct	Spring crop	Staking required to hold up plants—easily broken by wind and rain	Limited range of types available—highly mixed material
Begonia (fibrous rooted)	Sun, partial shade, shade	3"	Avoid, seedlings grow slowly	All season	Remove seed pods	All types useful
Browallia	Partial shade	4"	Avoid	Spring and fall season	Cut back to maintain compact growth	Limited range of colors (blue, silver, white)
Cabbage	Sun	8"	Direct	Spring and fall	Replant for fall crop	Dwarf types are available; ornamental kale-variegated foliage, other decorative types
Celosia	Sun	6"	Direct preferred	Summer	Allow all shoots to mature on plant without pinching	Dwarf types—feather and crested types
Coleus	Sun, partial shade, shade	3"-8"	Avoid	All season	Remove flower stalks by nipping shoots as they emerge	All types useful
Dahlia	Sun	8"	Avoid	Summer and fall season	Staking required	Dwarf types can be grown from seed, cuttings, or tubers
Eggplant	Sun	10"	Direct	All season	Harvest fruits as soon as possible to maintain productivity of plants	Dwarf types with white and green fruit available
Geranium	Sun, partial sun	5"	Avoid	All season	Remove all seed pods—do not prune, self branching	All types useful
Marigold	Sun	3"-8"	Direct	All season	Remove all faded flowers	All types useful
Nierembergia	Sun, partial sun	3"-4"	Avoid	All season	Trim to maintain compact growth	Limited selection
Onion	Sun	6"	Direct	Spring and fall season	Keep on dry side as bulbs mature	Seldom attempted
Pepper	Sun	8"	Direct	All season	Continuous harvest of fruit to maintain productivity	Dwarf types—all types and uses are available
Petunia	Sun	4"	Avoid	All season	Constant trimming back of shoots to promote basal branching	All types useful
Portulaca	Sun	3"	Direct	Summer	Remove seed pods	Grow F-1 hybrids for larger flowers and greater plant vigor
Salvia	Sun, partial shade	6"	Avoid	Summer and fall season	Trim faded flowers to maintain single flower color	Wide range of colors and plant height
Snapdragon	Sun	6"	Avoid	All season	Remove flowering shoots to promote growth of lateral shoots	Wide range of colors, flower types height
Tomato	Sun	8"-12"	Avoid	Summer and fall season	Remove sucker shoots, stake, harvest fruits to maintain productivity	Determinate types are easier to train than vining types
Verbena	Sun	6"	Avoid	Summer season	Remove faded flowers	Spreading and upright types
Vinca rosea	Sun, partial shade	5"	Avoid	All season	Trim to maintain compact growth	Dwarf types are available
Zinnia	Sun	6"	Direct	Summer	Remove faded flowers; do not trim, naturally self-branching	Wide range of types and sizes

A Preview of Huntington Botanical Gardens

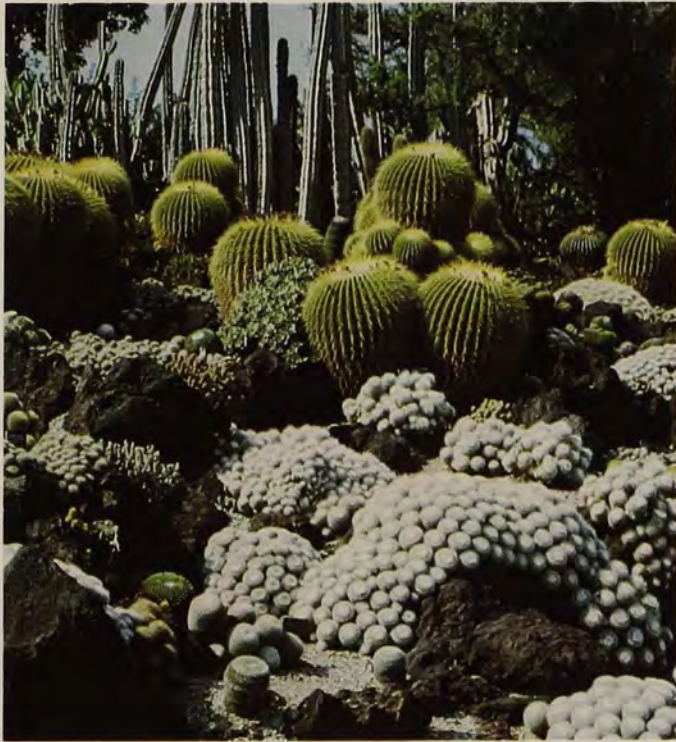
Myron Kinnach, Curator

*For AHS members planning to attend our
Annual Congress in Pasadena, California,
October 25-29, 1977,
we offer the following preview of
Huntington Botanical Gardens.*

Though one of the most public of gardens (some 600,000 visitors came in 1976), the Huntington Botanical Gardens began its existence as a private garden. To visitors, that remains one of its most appealing features, for to walk through the spacious grounds and over the lush lawns or through the great mansion (now the Huntington Art Gallery) is to partake vicariously of the enjoyment Henry E. Huntington must have felt during his residence here. He purchased the 600-acre San Marino Ranch in 1903, building his home there soon after. This imposing building now contains the finest collection of English art of the Georgian period outside of England; such well-known paintings as "Blue Boy" and "Pinkie" attract large crowds each year. His passion for book-collecting resulted in such important collections that by the early 1920's he had built a large library building adjacent to the home so that scholars could use his collection. Specialized in English and American history and literature, the Huntington Library is a rich repository of early printed books and manuscripts, many of them on display to the public.

It is, however, the gardens that will most interest the reader. In the early years Mr. Huntington, together with superintendent William Hertrich, created a beautifully landscaped garden at the same time they were carrying on a ranch operation of extensive groves of oranges and avocados, as well as vegetable and fruit gardens for the home. Huntington travelled widely yet always kept a fond place in his heart for his California home: "I have seen no place as nice as the Ranch" he wrote from Paris in 1913. Gradually ranching became less emphasized, especially after his death in 1927.





Today about twenty acres each of oranges and avocados are retained because of their historical and decorative interest—it is no longer easy to find an orange grove within many miles of Los Angeles. The avocados, some dating from 1906, form the oldest commercial grove of these trees in Southern California.

Horticultural display increasingly became an interest of Huntington's. Among the earliest of the specialized gardens on the grounds were two started about the same time—the Desert Garden and the Japanese Garden, now the most popular areas of the garden. The twelve-acre Desert Garden contains some 3000 kinds of succulents and other desert plants, the largest outdoor collection of such plants. Planted in rockeries of lava, they are grouped more or less by country. Most spectacular in color are nearly 200 species of aloes, mostly in bloom in January and February; their masses of red or yellow blooms are a gorgeous sight in winter on a sunny day against the often snow-covered mountains in the distance. Visitors are surprised to learn that cacti are much less colorful in their display, though the individual flowers are indeed beautiful. Bright reds and yellows appear in waves periodically in spring, May



being the peak. At night, unseen by visitors, the mysterious night-blooming cereus opens its huge and ghostly flowers. The most showy cacti are not grown for their flowers at all—the pincushion cacti or mammillarias that form coral-like mounds on the steep slopes, and the golden barrel cacti. These are favorite subjects of visiting photographers. In May the amazing puyas, desert members of the bromeliad family, raise their spikes of chartreuse or bluish green flowers.

The Japanese Garden is one of the earliest of its kind in the United States. Over the years it has matured so that it now appears centuries old. It consists of two parts—the first, installed in 1912, represents an upper class home and garden of the nineteenth century: ponds with a red moon-bridge, lanterns and pagodas, a two-story house with sliding outer walls that are opened during visiting hours to reveal authentically furnished rooms, and a great variety of plants traditionally used in Japanese gardens. The second part, added in 1968, represents a contemplative garden based on the Zen religion. Our Zen Garden is inspired by the garden of Daitoku-ji in Kyoto; unlike the more famous garden of Ryoan-ji (of which there is a replica at the Brooklyn Botanic Garden), Daitoku-ji contains not only an expanse of sand and rock but also a variety of plants whose shape and texture play an important role in the design. In a separate courtyard are collections of bonsai and sui-seki. The latter are not yet sufficiently appreciated in this country but should gain great popularity. The aim is much as in bonsai—to represent natural objects in miniature but through stones shaped by nature. Several shows of bonsai, sui-seki and sai-kei (miniature landscapes) are presented by local specialist societies each year in the Japanese Garden.

The earliest part of the Huntington Gardens to be developed was the lily ponds, begun in 1906. This is a beautiful area, lush with tropical water lilies, bamboos, and rare subtropical conifers (including *Taiwania*, *Keteleeria* and *Araucaria*). The proximity of the ponds to the Desert Garden affords a startling contrast. Somewhat north and west of the ponds are three gardens developed recently. First, the Australian Garden contains species that are highly decorative and which thrive in Southern California, where the climate may bring several degrees of frost each winter as well as dry heat of 105 degrees in summer. Here one can see bottlebrushes in flaming reds and purple, kangaroo paws with amazingly shaped and colored flowers, and purple mint-bush. On the slope above is the Subtropical Garden, where African and Mexican plants in particular are featured. Most spectacular are the cassias, chorisias, *Leucospermum reflexum*, with its brilliant orange flower-heads, and *Tabebuia chrysotricha*, a yellow trumpet-flower from Brazil. Many of the plants in the Subtropical and Desert Gardens were collected on the botanical expeditions the Huntington sends to Mexico yearly.

The Herb Garden, long a feature at the Huntington, has recently been completely redone, with new brick walks and a rearrangement of the plants according to usage, whether for medicine, flavoring, perfume, dyes, etc. Included are many rare and unusual herbs little known except to advanced herb enthusiasts. The Rose Garden has also been extensively revised during the last four years, with an increase in varieties from 150 to over 900. All have been arranged in a historical sequence illustrating the history of the rose. Beginning with the oldest known varieties the sequence proceeds to old shrub roses that bloom once a year; tea roses (the largest collection in the United States), frost-tender and grown mostly in the warmer parts of the world; both old and new climbers; and bed after bed of hybrid teas and floribundas in chronological order. Eventually a booklet on the history of the rose will be available as a guide. Our roses now form such a major collection that we have a yearly Huntington Symposium on Old Roses, attended by enthusiasts from all over the United States.

One of the great treasures of the Huntington is its collections, not only of art and books but also of plants. In addition to those already mentioned there is the largest public collection of *Camellia*, some 1500 named kinds, planted on both sides of the North Vista—an Italianate garden with fountains and statues—and in a separate area north of the Japanese Garden. The cultivars of *C. sasanqua* are in bloom in November, those of *C. japonica* are at their height in February and March. Growing amongst them is a substantial collection of azaleas, all of the evergreen type. Palms comprise the largest public collection in the U.S. outside of Florida; several hundred mature specimens of about 100 species cover five acres. Often confused with palms are cycads, distant relatives of the conifers. This, again the finest public collection in the west, is located around the Art Gallery and on the slope below. Some of these specimens were obtained as early as 1908 yet are still small, for cycads are of ponderously slow growth. They have an exotic otherworldly appearance useful in gardens of exotic plants.

Established in the 1950's, the Shakespeare Garden was begun because of the Huntington Library's collection of early editions of Shakespeare's works. Here, in a modern version of the Elizabethan knot garden, are plants and flowers mentioned by Shakespeare; where possible the actual quotation is placed on a label for each plant. Scattered throughout the grounds are fine collections of magnolias (some fifty kinds), flowering fruit trees and unusual shrubs. In all, about 9,000 kinds of plants can be found in the gardens and if these are not sufficient one can always walk a mile through the old orange groves to the Huntington mausoleum, a beautiful structure designed by John Russell Pope shortly before he did the similar but much larger Jefferson Memorial in Washington.

'Penngift' Crown Vetch

Robert S. Ross
Pennsylvania Department of
Transportation
Harrisburg, PA 17120

Anyone traveling through Pennsylvania in summertime cannot help but notice the masses of dark green plants covered with pink and lavender flowers that grow along many of the highways. And although this plant, known as 'Penngift' Crown Vetch (*Coronilla varia*), is attractive it is its unseen virtues that have made it a landscaping and environmental miracle. Crown Vetch has to be the near perfect natural control

for erosion, weeds, poor soil and even litter. It has earned its name as the "roadside conservation plant."

A cousin to the pea and clover, this legume not only grows in the poorest soil but enriches it as it grows. Since it can fix atmospheric nitrogen and add it to the soil, once established it needs no fertilizing. This is an important cost saving these days.

Because of its amazing ability to

smother weeds, it eliminates the need for chemical herbicides. And it practically "eats" litter, keeping waste paper and other trash out of sight until it decomposes naturally. Again, both these features help cut the cost of roadside maintenance.

Crown Vetch is the ideal erosion control plant because it will grow on the steepest slopes and its dense foliage and intricate root network break up the rain and hold back the

Crown vetch makes an ideal ground cover for highway planting. This view is along PA Highway 322.



soil. Another plus is that it is easy to control and never needs cutting, saving additional millions of the taxpayers' dollars. In fact, once established, Crown Vetch completely takes care of itself.

Crown Vetch is a dense dark green mass of foliage during its growing season, which lasts from May to November. In midsummer, the plants are literally covered with small fragrant pink, white and lavender flowers. From December to March the plant is dormant and turns brown. Even in its dormant state Crown Vetch provides erosion control, with its foliage forming a thick, tangled mat. The use of a non-evergreen ground cover presents few aesthetic problems, since in Pennsylvania, the roadsides are snow covered an average of 63 days a year. In spring, the plant quickly recovers to become fully green by early May. And it is well able to endure long periods of hot dry weather during the summer.

This excellent plant is not native to North America. It ranges from southern and western Europe to North Africa and Western Asia. In June of 1935, Dr. Fred V. Grau, an extension agronomist for the Pennsylvania State University, discovered a plant he did not recognize, tenaciously clinging to a pile of cinders and shale near Virginville in southeastern Pennsylvania. Since the plant was found growing on the farm of Robert Gift, it was later given the varietal name of 'Penngift' Crown Vetch.

Dr. Grau took cuttings and harvested seed from the Gift plants. He established plantings on two small farms near State College, Pennsylvania. It is interesting to note that all Pennsylvania Crown Vetch is descended from the original plants found on the Gift farm. It is believed that the Gift Crown Vetch arrived as a contaminant in a lot of imported alfalfa seed sown on the farm in about 1905.

By 1940, the first commercial plantings had been established and in 1946 the first commercial seed

harvest had been made. Then, a joint field test was sponsored by the Pennsylvania Department of Transportation and Penn State's Agricultural Experiment Stations.

The first trial planting was made on a highway cut near Port Matilda, Pennsylvania. After other test plantings were made and studied, a favorable report on 'Penngift' Crown Vetch was published in 1954.

The development of Crown Vetch could not have come at a better time. The nation was about to embark on a highway building spree that would include construction of the Interstate system. To build these new superhighways through rugged terrain such as that found in Pennsylvania would require cutting into



hills and mountains and building on fill across valleys. This construction would leave many embankments that needed to be protected from erosion.

In the past, the Pennsylvania Department of Transportation relied on such ground cover as Hall's Japanese Honeysuckle (*Lonicera japonica halliana*), American Bittersweet (*Celastrus scandens*), Memorial Rose (*Rosa wichuraiana*), Coralberry (*Symphoricarpos vulgaris*), Acacia (*Robinia hispida*) and various mixtures of grasses and legumes. Each of these had its own problems and none was entirely satisfactory for erosion control.

Crown Vetch is normally planted with a straw mulch and a cover crop of annual ryegrass, which helps hold the soil until the plants are established. It takes about two years to establish a successful planting. One of the best things about its use is the fact that it does not have to be mowed, although it can withstand mowing. I have seen it kept at a 3-inch mowed height for years and then released, when it will im-

mediately develop into an 18"-24" high vegetative blanket. It is inevitable that woody seedlings will eventually get in roadside plantings, but a dormant basal treatment of such seedlings with 2,4,5-T, or the use of Du Pont's new herbicide "Krenite" has proven effective without permanent Crown Vetch damage. We recognize the inability of any grass or legume to prevent the invasion of woody seedlings, but feel the years gained in delaying this forest encroachment in 'Penngift' Crown Vetch has deterred millions of dollars in brush cutting expense.

It has been estimated that the 45,000 acres Pennsylvania has planted with Crown Vetch save the state's taxpayers \$1.6 million a year in planting and mowing costs.

In addition to its usefulness as a ground cover, other uses have been made of Crown Vetch. It has been used as a perennial cover crop for no-tillage corn production for it not only reduces erosion in corn fields, but it adds from 50 to 100 pounds of nitrogen per acre to the soil each year. It has also been used as forage for livestock.

The plant is not a cure-all, and does have its limitations. It apparently does best on a limestone soil. Areas being used for this plant the first time should be inoculated with a special inoculant (either the seed or the soil) provided by the commercial growers selling the seed. Areas of less than one quarter of an acre can be planted with crowns, offered by many nurseries. But it is a vicious spreader and should be kept out of the carefully "manicured" garden where it could easily become a pest. Not all people like it, but, in general, public acceptance has been high. Favorable comments have come from residents and visitors alike.

Pennsylvania believes attractive roadsides are important for a state with a multi-billion dollar tourist industry. And during a time of skyrocketing costs and limited revenues 'Penngift' Crown Vetch is one way to keep roadsides attractive at minimal cost.

Enjoy Beauty and Bounty With Dwarf Fruit Trees



In all my years of gardening, nothing I've grown has given me more satisfaction than the dwarf fruit tree. Not only do you get a bounty of delicious, tree-ripened fruit, but also the enjoyment of beautiful blossoms in the spring, colorful leaves in the fall.

If your yard space is limited, the dwarf fruit tree is ideal. My favorite is the dwarf apple that grows to about 6 feet in height. It's easy to care for and can be pruned, sprayed, and picked without the use of a ladder.

Dwarf fruit trees vary in size when fully grown. Some stay so small they must be supported by a wire trellis (called an espalier). Two espalier dwarfs, planted in a limited space, will form a "fruit tree fence," 12 to 14 feet long, which will supply a good quantity of fruit. Some dwarf trees cover an area as much as 16 feet or more in diameter. The amount of dwarfing depends on the type of root stock or amount of dwarf interstem, as well as the type of tree and soil.

Before you buy dwarf fruit trees, be sure to measure the space you want your tree (or trees) to occupy when fully grown. When buying dwarf apples, you have a wide variety to choose from. Some of the most popular are the Red or Yellow Delicious, MacIntosh, Jonathan and Ida Red. It is desirable, but not absolutely necessary, to plant two varieties for cross fertilization.

Once you have determined the size you want, I recommend going to a nursery that specializes in dwarf

fruit trees. It can help you select the kind that best meets your needs. Order your trees in late fall or early winter to assure delivery in time for spring planting. Instructions for planting come with your tree, and it is important to follow them.

During the first summer, keep the tree well watered to avoid the stress of dry weather. Clear the grass to about 2 feet away from the trunk of the tree to prevent competition as well as injury from the lawn mower. A mulch around the tree will help preserve moisture. Fertilizer is usually not needed until the tree is in full production. Then, only a limited amount of nitrogen should be added each year. The tree should be fertilized only in early spring while it is still dormant. Over-fertilization will result in excessive growth, a slow start in fruiting, and poorly colored fruit.

About the first of August, tree growth should be slowed to prevent winter injury. This is accomplished by not adding additional water and by letting the grass around the tree absorb the excess nutrients. It is advisable to protect the tree trunk from rabbit and mouse injury with a plastic tree-guard or ¼-inch-square hardware cloth.

Sunlight is extremely important to fruit production. The tree should be planted in an open area where it receives maximum sun; it also should be pruned to let the sunlight through the branches. Shaping the tree by pruning is especially vital during the early years.

There are as many ways to prune a tree as there are people who prune.

Here are some guidelines which can be helpful:

1. Leave only a limited amount of scaffolds (main branches) evenly spaced, vertically as well as horizontally, on all sides of the tree.
2. The lowest branch should be no lower than 2 feet from the ground.
3. Select scaffold branches that have a wide angle crotch. During the second and third growing seasons it may be necessary to place spreaders between the branch and center trunk thus forcing the branch to grow at right angles to the main trunk instead of straight up.
4. Cut out cross branches or any branches that touch each other.
5. Trim back branches which are growing excessively so the tree grows evenly in all directions.
6. Remember, the purpose of pruning is to let in sunlight, shape the tree, and provide strong branches to support the fruit.

A regular spray schedule should be started the first year and continued during the life of the tree. There are two reasons for spraying against disease and insects; one is to protect

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PERENNIAL

Perennials for Today's Landscapes

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In the minds of many people, the use of perennials suggests the old-fashioned extensive English border with its high maintenance requirements. Before World War II, perennial borders were most often seen in America as part of large estates, carefully tended by crews of gardeners. These borders fell into disrepair during the war and in the post-war years many never came back into favor, in part because of the decrease in trained horticultural help.

At the same time during the 1950's and 1960's, construction of private housing and industrial building was proceeding at an unprecedented rate and most of these projects were demanding "instant landscaping". The emphasis on low maintenance curtailed the use of perennials even further. Design became monotonous with the emphasis placed on woody material. "Mounds" (in most cases poorly designed and constructed) became fashionable and pine bark mulch covered all. Finally, the younger gener-

ation misinterpreted the term "perennial" (forever free of work once planted, they thought). People quickly became disenchanted when they discovered a perennial border, as such, meant plenty of work in the form of dividing, deadheading and cultivating.

But today perennials are reappearing. The public is weary of the "low maintenance" garden. These gardens with their endless repetition of *Juniperus wiltonii* and creeping cotoneaster, with an occasional azalea and rhododendron thrown in for seasonal color, are boring. People are demanding more in the way of color and form. The public has found that it responds in a positive and happy way to the seasonal changes which they observe occurring in plant material.

The most satisfactory way to use perennials today, one that cuts maintenance to the minimum, yet provides a succession of bloom, is to use them in combination with shrubs and trees. If the woody material is carefully chosen with an eye for line, form and texture to provide a good mixture of evergreen and deciduous, it will carry the design through the year. It's the perennials, however, that will add the spice and excitement, catch the eye of the passerby and give a real flair to the design—all for very little cost.

A new criterion for selection of perennials is already noticeable. The following five attributes are

most often sought and many perennials are able to fill the bill. First of all, perennials must be reliable. They must be hardy in the area in which they are to be used and this includes heat as well as cold tolerance.

Second, they must be easy to maintain, not requiring extensive staking and deadheading. The plants must be conservative in their growth habit, not rampant growers overtaking everything in sight and they should be able to remain in place five or six years before requiring division and/or replanting.

A third consideration: the plants must be disease and pest tolerant. They must not be subject to blight which could eradicate the planting or prey to harmful insects.

A fourth requirement is that the perennials should have a relatively long period of bloom; and, finally, the plants chosen should have good-looking foliage so that they are attractive even when not flowering.

The following notes are on perennials that are representative of the vast selection that is available.

Achillea—Commonly called yarrow, this genus is valuable for its pinnate foliage and ability to do well in poor soil. In fact, rich soil promotes weak growth. We are especially partial to silver-leaved *A. millefolium* variety 'Moonshine'. The flat yellow corymbs bloom for a period of 4

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PERENNIALS

Color Throughout the Year

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Perennials bring color to the garden in a very special way—a little bit at a time. Most perennials do not flower for long periods. No two objects can occupy the same space at the same time. Therefore, it quickly becomes apparent that the garden planted exclusively to perennials cannot be a mass of color from January to December. But that is not necessarily bad. The joy and pleasure that perennials bring to the garden is not dependent on an extravagant display of color. Unlike a bed of well kept petunias which looks pretty much the same throughout the growing season, a perennial garden is always changing color, character and interest. There is always something coming to perfection and something passing its peak of glory. The garden becomes a place of discovery to which we return day after day to view close at hand the many moods of the living landscape.

There is another special way that perennials help to make a garden

more colorful. They provide flowers at a time of the year when there is little else to dispel the browns and greys of winter. Even in Zone 5 there are perennials that can bloom as early as February. There are others that are still flowering well after the frosts and cold weather of October and November. Perennials are the perfect complement to flowering shrubs and trees which make up the backbone of the garden, and to the annuals that can give us summer-long color where ever we want it.

I would like to share with you some of my successes in Ohio gardens; some perennials that are colorful and add something special to the gardening year. These are a few of the plants that I would recommend for developing a garden for all seasons. In many respects they are the icing on the cake, the element that gives the garden character, variety, change and color.

In our part of the world, garden interest in February and March comes mainly from the persistent fruit of a few shrubs and trees, and perhaps the foliage of evergreens. But if you are willing to scratch for it, some color can be injected into the scene as early as late February in a mild or open winter (1977 wasn't such a year). Some of the most dependable plants that can be in flower that early are herbaceous perennials.

One of the first bits of bloom to be seen will almost assuredly be the

tiny bulbous iris. The delicate blue and white *Iris bakeriana* is generally the first to invade the hostile environment, signaling the renascence of the garden. Along with it will be *I. histrioides major*, slightly larger with less white on the falls. *I. danfordiae* will soon be along adding the first cheery spot of yellow. Isn't it curious that such delicate appearing flowers should lead the parade?

Every gardener learns in time that micro-climates are all important in producing the earliest flowering possible for a given climate. Plants near a brick wall facing south may flower as much as ten days earlier than those planted in a shady spot with a northern exposure just a few feet away. Another point to remember with these earlier plants is that they come up in very inclement weather and they are generally small in stature so they should be placed near the house where they can be viewed close at hand, preferably from within the house itself.

Accompanying or following close behind the iris is the more familiar Winter Aconite (*Eranthis hyemalis*). I have seen them in magnificent drifts in the garden of Mrs. John Aull just north of Dayton. Through the years she has naturalized "zillions" of Winter Aconite in a shady, natural garden. In March the hillsides are literally a carpet of gold. It is amazing that such diminutive plants could make such a spectacle. They

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Perennials for Today's Landscape

weeks starting in June. The plants grow to a height of 18" and we place them in informal groupings spacing the plants 12" apart in full sun. Divide these every four or five years.

We also use *A. tomentosa*, woolly yarrow, whose foliage is greyish green in color. Our preference is for the variety 'Moonlight' which has lighter yellow flowers than the species as well as being less invasive. The woolly yarrow makes an excellent ground cover in dry sunny areas.

Asclepias tuberosa—This is the Butterfly Weed and it is native. The bright orange flowers appear in July and the plants bloom for about six weeks. It is another plant which likes poor dry soil and full sun. Pest and disease free, it is not invasive. We have found the seeds easy to start in the fall in the cold frame and we move the plants to their permanent locations in the spring. We advise our clients to purchase potted stock and plant either in spring or fall. These are slow to emerge from the ground in spring, so mark the location to prevent damage by early spring cultivation.

Artemisia—The silver foliage of the artemisias forms good color contrasts with other colors in the garden. They all must be grown on poor soil in full sun. We use three of the artemisias most frequently: *A. abrotanum*, which gets to be about 3'-4' high and has the common name of Southernwood.

A. schmidtiana is the lovely Silver Mound with greenish grey leaves. This plant will split open losing the mounded shape if the soil is too rich. Here in Rhode Island we cut these back early in the spring, letting the old foliage remain on the plant during the winter to provide protection for the crown.

Along the beach we often use



Astilbe of the *Spiraea* family.



Photos by Guy Burgess, Jim Martin and Susan Plimpton

The purple-blue Siberian Iris follows the season of the tall bearded iris

Color Throughout the Year

combine beautifully with the crisp white Snowdrops (*Galanthus nivalis*) that also are easy to naturalize.

An editorial note—some writers make a distinction among perennials on the basis of their underground structures. They place those with bulb-like characteristics in a separate grouping and exclude them from an article on “perennials”. Obviously, I have a predilection not to permit the propagule to preclude perennial status!

Another fine early season perennial that brings color to a garden-in-need is the Hellebore. I can recall the delightful experience of visiting the late Victor Ries’ garden in Columbus, Ohio. Early in March the beds in front of his home were overflowing with the whites and reds of the beautiful Christmas and Lenten Roses (*Helleborus niger* and *H. orientalis*). The flowers combined with the marvelous foliage establish this as one of the perennials no creditable garden should be without. Vic could never get enough of them. He reveled in the subtle differences of the new sorts he had collected. However, one does not need to be a connoisseur to appreciate these fine plants. They seem to do best when protected by high branched trees.

Speaking of Vic reminds me of another point about color from perennials. Shade is no great obstacle to getting an abundance of flower throughout the growing season. Vic’s garden was under an umbrella of massive red oaks which were one of his delights. In spite of this imposing sun shield, there was hardly a time when there was not something of flowering interest in his garden. Sun or shade, you can get color from perennials.

In April, the color spectrum broadens dramatically. Pinks come from such dependables as the Bleeding Heart (*Dicentra spectabilis*), Primroses (*Primula x polyantha*) and Creeping Phlox (*Phlox subulata*). An

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Helleborus niger - Christmas Rose



Golden yellow 'Ola Kala' - tall bearded iris



Coneflower 'Robert Bloom' (*Echinacea purpurea*)



Asclepias tuberosa

Today's Landscape

quantities of *A. stelleriana* or Dusty Miller. It is native and will get up to 20" in height. These grey leaves have a whitish cast to them.

Astilbe—This without doubt is one of the favorites for sun and partly shaded situations. The toothed foliage is handsome all season. The plants are of uniform height about 18", and the flower heads are plumes of white, red or pink extending upward another 10". They like moisture and can remain undivided for 4 or 5 years. We have lost them in situations where heavy wet soil persists in the winter. The varieties we have used include: 'Gladstone', pure white; 'Peach Blossom', pale pink; and 'Red Sentinel', dark red. Bloom appears in mid-June and lasts one month.

Hemerocallis—With proper planning, bloom from daylilies can be had from May through September. We often use 12" high *H. flava*, the Lemon Lily, which blooms for two or three weeks starting in late May. It looks well beneath *Laburnum vossi* and, of course, they bloom simultaneously. In the summer we choose 'Hyperion' which blooms for three weeks starting in mid-July and is about 3' high. There are many color options in *Hemerocallis*. They have no pests and diseases, will thrive in sun or shade, and have undemanding soil requirements.

Heuchera sanguinea—Coral Bells prefer shaded areas. We are especially fond of the cultivar 'June Bride' with pure white bellshaped flowers produced in June and July. The leaves are pretty, lobed-shaped and evergreen. This plant profits from a mulch as it heaves in cold winters. We divide these every 5 or 6 years. Coral Bells like plenty of humus to hold moisture in the summer. The flowers appear on 15" stalks.

Iberis sempervirens—Candytuft makes a neat edging plant or it can be used in groups of three spaced

12" apart in the foreground of a shrub border. *Iberis* should be sheared back after blooming so it will retain a compact habit. This plant likes full sun and the foliage is evergreen. The plants will grow 10" high and can spread out up to 2' in diameter. There are several varieties. We've used 'Snowflake' and 'Purity'. 'Autumn Snow' will repeat its bloom in September but not as abundantly as in the spring.

Iris—We use *Iris siberica*, the Siberian Iris, for its foliage accent as well as for bloom. We favor the Siberian Iris which blooms from mid-June to early July. These are easier to work into a border than the heavier German Bearded Iris and the foliage makes a delicate vertical accent. The color range is from blue to white and Siberian Iris are tolerant of full sun or light shade. The plants are 3 feet in height with flowers about 3" in diameter which form interesting seed pods. We've used *Iris sibirica* 'Cambridge Blue', a turquoise blue, 'Tycoon', a violet blue, and 'White Magnificence'. We use the German Iris sparingly due to its problems with borer and soft rot.

Lavender—Although lavender technically is considered a subshrub, we group this plant in with perennials. We find its appeal almost universal. It blooms in July for about five weeks and the foliage is attractive well into the winter. Then it gets scruffy-looking and we cut it back to six inches in late March or early April. Opinions differ but we've found our plants come through the winter well in this way. Lavender combined with pink geraniums makes a pretty combination. Lavender requires full sun and poor soil. The plants will attain the height of about 18 inches.

Paeonia—Peonies are the ultimate in perennials to be selected for today's gardens. They are of easy culture, long-lived (up to 25 years or more in one spot), produce good cut flowers and have good-looking foliage. The double-flow-

ering peonies remain in bloom for a greater length of time.

The most important part of peony culture takes place at time of planting. The peony's hole should be carefully prepared 2' in depth and 1' across. Use plenty of compost, peat and bonemeal. Avoid the use of manure as it encourages botrytis. The "eyes" of the peony should never be set more than 1" below the soil level. If they are deeper, the plants will grow but not bloom. September is a good time to plant peonies. They should be located in full sun or partial shade. Dense shade or competition from tree roots can also cause lack of bloom. Peony plants should have support through the use of peony hoops. These are put around the peonies in early spring and left through the season. Remove them after frost and cut off the foliage just below ground level. No other maintenance is required. Ants may be observed on the buds, but they cause no harm to the flowers or plants. Among other favorite peonies is 'Festiva Maxima', a huge white bloom with red flecks. Another is 'Albert Crousse' which is a fairly late-flowering soft pink. 'Phillippe Revoire' is a deep velvet red.

Platycodon—The common name for *Platycodon* is Balloon Flower. We use the variety *mariesi* which grows to a height of 18" and doesn't have to be staked. The plants will grow in partial shade or full sun. Bloom starts in July and lasts for 5 weeks. We have used both the blue *mariesi* as well as *P. mariesi album*. Recently we used a dwarf variety *P. grandiflorum apoyama* in a rock garden and found it grew about 8" high and bloomed all summer long. Mark the location of *Platycodon* which is slow to start growing in the spring.

Until recently perennials have been a relatively untapped source of plant material for today's gardens. Much of the credit for their

reemergence goes to Robert Hebb's careful analysis in *Low Maintenance Perennials*, first published by the Arnold Arboretum in two volumes (October-November, 1974, and January-February, 1975) of *Arnoldia*. The combined volumes may now be purchased as one work in bookstores throughout the country. It is a valuable reference for anyone working with the landscape.

Color Throughout the Year

especially fine plant is the Heart-leaved Bergenia (*Bergenia cordifolia*). Not only does it reward us with full panicles of pinkish flowers, but its handsome, leathery leaves are a real asset.

Blues come in abundance. The native Virginia Bluebells (*Mertensia virginica*) are one of my favorites. One of the nice things about bluebells is that they do well in shady spots, with little or no care, and are easily naturalized. The shade of blue is bright enough to be seen from a distance. Another great plant for blue flowers that also does well in the shade is the Bethlehem Sage 'Mrs. Moon' (*Pulmonaria saccharata*). The flowers are pink when they open and then change to blue. The spotted foliage is outstanding assuring a long season of interest. Flowering may continue for as much as eight weeks. For a carpet of blue, try the Grecian Windflower (*Anemone blanda*). Where more height is needed, the Siberian Bugloss (*Brunnera macrophylla*) is as dependable as you can get. Flowering continues through the first part of June.

For a sunny dry spot, there is a real gem you ought to try and enjoy. The Pasque Flower (*Anemone pulsatilla* or *A. patens*) has fascinating blue, bell-shaped flowers with contrasting gobs of golden stamens. The special treat is the long silky hairs that grow on the flowers, the leaves and the stems. Even when the flower passes by, the seed head is a

mass of silky hairs that catch the spring sun for glistening effects. To attest to its durability, it is the state flower of South Dakota.

Good crisp accents of white can be designed into the garden with clumps of Rock Cress (*Arabis alpina*), Sweet Woodruff (*Asperula odorata*), and the ever popular Gas Plant (*Dictamnus albus*). All three of these also have good foliage to enhance the display when the flowers are gone.

By May and June, the color range is complete. In fact, with just two genera, tulips and iris, you can include every color and hue imaginable. With peonies thrown in for good measure, any gardener can create a color display to be the envy of the neighborhood. This is all before the annuals come into their own and become the dominant factor in most displays. Just think of the possible combinations. No matter what your living room color scheme is, you can carry it out to the garden with these serviceable and dependable plants. There are so many to choose from that every gardener has an opportunity to develop a unique combination. He may for instance achieve a multi-hued display of Iceland Poppies (*Papaver nudicaule*) with their fascinating crepe-paper flowers on slender stems. Although I must admit, for us they are almost an annual! Or a delicate blend of pastels can be brought to the garden with Columbine (*Aquilegia*) and Coral Bells (*Heuchera*). For those who want a predominant theme of blue, there is *Baptisia*, *Campanula*, and *Centaurea*. One special bit of blue for closer observation is the low growing *Veronica incana*. The foliage of this pretty perennial is gray and wooly. It makes a delightful background for the spikes of blue which strike unusual poses as they uncurl.

Whites come to the late spring garden with such old favorites as the Shasta Daisies (*Chrysanthemum maximum*). There are many cultivars from which to choose. One I particularly like is 'Aglaya', a frilled, double

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LONGWOOD AQUATIC CANNAS

*Robert J. Armstrong
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Cannas in the past have been popular bedding plants, particularly in the more formal Victorian style gardens planted around the turn of the century and later. These were the tall varieties useful primarily for their tropical foliage effect.

During recent years cannas have again become a popular garden plant, but the emphasis has been more on the dwarf large-flowered types, these being very useful in both formal and informal flower beds. A wide range of flower colors, except for blue and lavender, is available. The foliage can be various shades of green, red or bronze. Several forms of variegation exist in both the flowers and leaves.

Aquatic varieties have been developed and are available commercially. Most are similar in appearance to the taller of the terrestrial types. However, the cannas normally grown in the garden are not considered to be aquatic plants.

Most of the known species of *Canna* are more or less terrestrial, but *Canna glauca* L. is a species that requires or at least prefers growing with its roots submerged in water. Like many *Canna* species it has relatively small flowers, which in this case are pale yellow in color. Typical of many aquatic species, it has very erect foliage with narrow lanceolate leaves. Longwood Gardens received *C. glauca* L. in June 1969. It had been collected earlier in the State of Rio, Brazil.

Canna glauca L. is more of a curiosity than an ornamental. Its very stiff upright habit does provide a useful form for the garden pool, but then so do a number of other aquatic plants. It flowers continuously throughout the summer. There are never a great number of flowers at any one time. Since the flowers are small and pale yellow they do not present a particularly striking display.

Longwood Gardens has had a canna breeding program for many years. The natural thing to do was to attempt to cross the aquatic canna (*C. glauca* L.) with the terrestrial canna hybrids and see what would happen. This cross was easily done, and therefore repeated many times. Seedlings from these crosses were grown in pools, and from these, four cultivars (one each of red, yellow, orange and pink flowers) were selected and named. They are:

***Canna* × 'Endeavour', L. G. 73331**

Plant 180 cm. tall, glaucous; leaf blades to 55 cm. long by 14 cm. wide, elliptic, narrowly edged purple-brown, flowers bright red, RHS Fan 1, 45C, 10 cm. wide by 10 cm. deep; staminodia to 9 cm. long by 3 cm. broad; ovary and fruit purple.

***Canna* × 'Erebus', L. G. 73728**

Plant 160 cm. tall, glaucous; leaf blade to 45 cm. long by 16 cm. wide, elliptic, narrowly margined translucent whitish; flowers salmon pink, RHA Fan 1, 39 B-C, pale yellow basally and on midrib dorsally, 10 cm. wide by 8 cm. deep; staminodia to 9 cm. long by 3.5 cm. broad; ovary and fruit green.

***Canna* × 'Ra', L. G. 72478**

Plant 165 cm. tall, glaucous; leaf blades to 60 cm. long by 14.5 cm. wide, elliptic, narrowly edged whitish; flowers clear, bright yellow, RHS Fan 1, 9A-B, 10 cm. wide by 10 cm. deep; staminodia to 9.5 cm. long by 3 cm. broad; ovary and fruit yellow-green.

***Canna* × 'Taney', L. G. 73729**

Plant 188 cm. tall, glaucous; leaf blades to 60 cm. long by 16 cm. wide, elliptic, narrowly edged whitish; flowers burnt orange, RHS Fan 1, 33C-D, finely edged yellow, 10 cm. wide by 8 cm. deep; staminodia to 8 cm. long by 3 cm. broad; ovary and fruit green.

These cultivars have been grown in the display pools at Longwood Gardens during the summer for the past several years, and when given ample quantities of fertilizer, light and warmth, they are in continuous bloom until frost. Divisions are planted in large tubs or other containers filled with a very rich planting medium. Sand is placed on top to prevent the disturbing of the planting medium by the water. The surface of the planting medium should be no more than a foot below the surface of the water. These cannas are sun and heat loving. In order for them to do their best, they must be grown where full sun will reach them the entire day.

Each fall the plants are taken from the outdoor pools and the rhizomes are divided. Some of the divisions are planted in pots which are placed in tubs of water in a warm greenhouse, where they have continued to grow and even flower during the winter. Any remaining rhizomes are stored in damp peat moss in a cool well-ventilated location. The rhizomes stored in this manner will survive the winter out of water, though not particularly well. They do not produce plants with the vigor of those grown in water in a warm greenhouse during the winter, and they do not keep nearly as well using this method as do the terrestrial types. One reason for this may be the small amount of food stored in the rather small, slender rhizomes developed by these plants. This is in sharp contrast to the terrestrial cannas which produce a heavy thick rhizome.

In many respects, the hybrid aquatic cannas are, as one would expect, intermediate between *C. glauca* L. and their terrestrial parents. They will grow as terrestrials, but do better in water. Foliage is upright, but not quite as narrow as *C. glauca* L. Flowers are larger than *C. glauca* L., but not as large as their terrestrial parents. The four selected hybrids do have the bright colors typical of the terrestrials, but most of those discarded in the program did not. No attempt has been made to backcross to either parent. These hybrids have been selfed, but so far all the progeny have been inferior to the original hybrids.

Because of their limited usefulness and their relatively slow rate of propagation, these aquatic hybrids have not been widely distributed. They are being shared on an exchange basis with other gardens and nurseries which may use them for display and/or marketing purposes.

Fall Vegetable Gardening

By Tom Stevenson



For most vegetable gardeners, the season is about over with the first heavy frost. This need not be. Some of our better known vegetables can be grown so they can be enjoyed right up to the early winter months.

Hardy kinds that thrive in cool weather are the ones to plant. The cool autumn weather actually improves the flavor of many of them.

One of the most important factors in late fall and winter vegetable gardening is proper time of sowing. Most should be sown in late June, July, or August. Of course, if you live in the South or Pacific Coast areas, you can plant much later, into fall and early winter.

There are two main groups of vegetables for fall gardening—root crops and greens. According to Burpee specialists, this includes beets, carrots, parsnips, salsify, turnips, rutabagas, winter radishes, kale, collards, broccoli, cauliflower, kohlrabi, Chinese cabbage, Brussels sprouts and celeriac.

Fall and winter cabbage, both red and green, grow well from seed planted from mid-June through July. Succulent heads are ready to pick in fall for cooking, coleslaw, sauerkraut, or storage in a cool, frost-free place. They keep well and are fresh and tasty into late winter.

Do not handle cabbage heads when they are frozen. Wait for a thaw and then harvest.

For something extra delicious, try Chinese cabbage. 'Burpee Hybrid' is one of the best. This variety grows fast and needs cool weather to head well. The proper time to sow seed is early to late June. It usually yields into late November.

Served like lettuce or made into coleslaw, 'Burpee Hybrid' is a taste treat and is equally good cooked. The flavor is unusually mild and appetizing. This variety freezes well for use later on.

Other good salad crops for the fall garden include 'Loosehead' and 'Butterhead' lettuce, radishes and spinach. All grow so fast you should wait until August to plant them. They stand some frost. If protected with newspapers from the first killing frost, they can often be harvested well into winter.

Spinach is rapidly surging to the forefront as a delicious ingredient for salads. The leaves need only a cleansing shower, then a draining

on paper towels and a thorough chill before dinner and the tossing with dressing, according to the Leafy Greens Council.

'Winter Bloomsdale' spinach is so hardy it will usually live over winter (from a late August sowing) and be ready to supply fresh, tasty greens in the spring. This variety survives, even in severe cold areas, without any protection.

'Green Ice' lettuce is especially crisp and tasty in salads; 'Cherry Belle' radish adds zip and color; 'Bloomsdale' spinach gives variety and texture.

Spinach is just as good cooked for greens. So is kale and this along with Brussels sprouts really takes cold weather. These two vegetables usually taste much better after being frost-bitten, and can be picked from right under ice and snow in the winter.

Such sprouts need to be cooked within a few hours after picking or else stored temporarily in a freezer. Being partially frozen in the garden, they tend to get soft and spoil if kept very long above freezing.

Sow seeds of kale and collards about mid-July and start Brussels sprouts in peat pots or flats about June 1 and transplant to the garden when they are strong enough.

Collards and kale often make it through the winter and put on new growth in the spring. Frost im-

proves the quality of these vegetables.

Many people like a combination of turnip greens, mustard greens and kale. A mixture gives a good flavor to the greens by playing down the bitterness of mustard while enhancing the flavor of turnips and kale.

Beets, carrots, turnips and rutabagas also provide good eating all fall and well into winter. Sow them from mid-June to about the end of July.

The late plantings produce roots just right to store in a cool, dark, frost-free place for winter use. Or, store them right in your garden. Don't take them up, just cover the rows in late fall with a thick layer of straw, salt hay or evergreen boughs. Whenever the weather permits, push aside the covering and pull as many roots as you want.

'Purple Head' cauliflower is a real gourmet vegetable hardly ever available at super market produce counters. It is easy to grow, the heads don't need blanching, they stay in prime condition for a long time. Sow seed in late June.

Start parsley in early May and sow seed of Swiss chard in mid-June. Pot up a few plants of parsley for growing on the kitchen windowsill during the winter.

Celeriac (has a flavor similar to celery) is easier to grow than celery and is more cold-resistant. During most normal winters it will last until early December without protection. It can be harvested, buried in the garden, and used in the spring. Start it in a seedbed or flat in early May.

Parsnips, salsify and root parsley will withstand almost any winter weather that mother nature can stir up. All three are improved in flavor by cold weather. Root parsley and salsify should be sown in early May and parsnips up to June 15, depending on the size desired. Those sown after June 1 will usually provide the tastiest vegetables.

Leeks and chives, both from the onion family, are winter hardy. Sown in early May they usually sur-

vive without protection until the end of December, and they often last the whole winter.

There is one very important thing to remember with summer planting—keep the ground evenly moist. The weather is often hot, dry and windy so water as necessary with a fine spray to keep the soil damp until seedlings are up and growing well. This often makes the difference between success and failure. Sprouting seeds are thirsty and cannot stand complete drying out, even for a short time.

Frost control is a way of extending the gardening season. An early frost that ruins tomatoes, beans and flowers often can be followed by weeks of fine growing weather. The problem is to bring plants through that first cold spell.

Many methods of protecting plants from frost have been utilized with varying degrees of success. Plastic film covers, wind breaks, smudge pots, heat burners, wind machines, chemical foam, and sprinklings with water are some of the methods that have been tried.

For gardeners, continuous sprinkling with water probably is the most practical and promising method. In many years, one or two nights of water sprinklings in the fall may prolong the gardening season for two or three weeks.

Probably the best bet with tomatoes is to pull up the plants, roots and all, just ahead of the first frost, and hang them up in the garage to ripen.

Apparently, some chemical change must cause tomatoes to get a better color and a sweeter taste when left on the vine, even when the vine is pulled out of the ground, according to the editors of *Organic Gardening and Farming*.

The fruit should be allowed to ripen before being exposed to temperatures below 50°F. Considerable loss of quality occurs if the tomatoes are stored at temperatures below 50° before having ripened. After they have ripened, they keep best at

Continued on page 29

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A PREVIEW OF SOME PLANTS YOU WILL SEE
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The Cultivation and Propagation of Cycads

by Robert T. Buckley Jr.
213 East Ave. Ramona,
San Clemente, CA. 92672

Often the popularity of certain plants is related to their rarity. This can be said of the cycad. Collectors have discovered them. In recent years they have become as sought after as fine paintings and first editions. This is understandable. Some are quite beautiful, all are unusual, and the older specimens are extremely valuable. Mature groupings of these trees can sell for \$1,000 or more.

Unfortunately, unlike paintings, cycads are living things and neglect and unsatisfactory conditions will take their toll. To compound the problem, there is little information available to the public on the cultivation of these plants. The learning process is trial and error, which is expensive and wasteful.

This article is a mini-guidebook on cycads. If it prevents a few needless losses, then it has served its purpose.

History

Cycads are ancient plants. Their ancestors were seed ferns common during the Carboniferous Period. We burn their remains as coal. Two other lines of cycad-like plants arose during this period, but these are both extinct.

The fern-like nature of cycads can readily be seen as the new fronds appear. Some show a 'fiddlehead'. Other genera have a more advanced, erect mode of development. But even in these the furry, terminal bud pattern of growth is maintained.



Emerging crown - *Cycas revoluta*.

But toward the close of the 'Age of Dinosaurs' cycads began to be overshadowed by the emerging Angiosperms. Cooler climates and the greater sophistication of competing plants forced the *Cycadales* into a decline. They now survive in greatly restricted ranges spotted throughout the tropics.

Cycads are often mistaken for palms. The reason is simple. The palm is exploiting the environmental niche that the cycad itself once filled. Although the palm grows at the same rate as a cycad, it is able to distribute its seeds more efficiently.

There are three families within the order *Cycadales*.

The *Cycadaceae*, consisting solely of the genus *Cycas*, is a very beautiful Asian form with a range which includes Southern Japan, the coastal regions of the Far East, a small section of India, Australia, and portions of Madagascar and the East coast of Africa near Zanzibar.

The *Zamiaceae* can be found worldwide. They are extremely varied. There are 8 genera spread throughout the Caribbean area of the New World, South America, Central and Southern Africa, and Australia. This distribution was probably created while the continents were joined together into Laurasia and Gondwanaland 150 million years ago.

The final family, the *Stangeriaceae*, has had a curious past. It was mistakenly classified as a fern when first discovered. It lacks a trunk, only the fronds appear above the ground, so it wasn't until the pollen and seed bearing cones were observed that botanists correctly placed this plant in the *Cycadales* where it belongs. This curiosity is native to South Africa.

The three families are easily distinguished.

Cycas has a long, narrow leaflet with a single midrib. It lacks side veins.

The *Zamiaceae* lack the midrib. Instead, numerous smaller veins run the length of the leaflet.

Stangeria has both a prominent midrib, and smaller side veins radiating from this rib.

Basic Cultivation

Cycads can be quite hardy when the proper growing conditions are maintained. Although some can tolerate frost during the winter, all of this tribe like to be warm, with good drainage around their roots, and a lot of light, though usually not full sun. If you were to compare the cycads' growing habits with those of another plant, you might best describe them as being succulents. Usually, although their native climate may receive 50 to 60 inches of rain in the winter, the summers are

dry. Water is conserved in the trunk, and in the large tap root.

The soil mixture is probably the most important requirement for good growth in a cycad. You can skimp on light, water, and fertilizer and the plant will endure it. They're used to 'roughing it'. But stick the plant in a dense, clay-like soil with bad drainage and worse aeration and the root will begin to rot.

If the fronds are an even dark, or light green, and the trunk feels firm when you squeeze it you've got yourself a healthy plant.

Cycads are subject to root fungus. This problem can be caused by bad watering habits, or damage to the root when planting. Using sterilized soil in containers won't completely eliminate the possibility of infection, but it will improve the odds. Adding equal parts of vermiculite and agricultural perlite will further aerate the soil and permit the rapid drainage so important with cycads.

Some cycads grow in rain forest where the dense canopy allows little light to filter through. Despite this, however, cycads are really not at home indoors except where there is a lot of natural light available. And it should come from 3 or more sides or as new fronds develop the plant will take on an attenuated, lopsided appearance.

Most cycads will do best in a lath house where they receive filtered sunlight. It's also possible to keep them under large trees. But they should be kept in containers to protect them from the tree roots.

There are many advantages to planting in containers. They're portable and can be moved in case of a freeze. You can fill them with a precise soil mixture. And they allow the layout of a collection to be modified as it expands over the years.

Watering is always a tricky proposition when dealing with plants, and with cycads it's no different. A knowledge of where the cycad grows naturally will help. Simply check an atlas and note the maximum rainfall in that area. Generally, you should water heaviest, and begin adding fertilizer, when the new crown of fronds begins to appear. A crown enlarges rapidly and puts quite a strain on the plant. The crown will be stunted unless you provide enough water and food during this time. For the remainder of the year just go easy. Let the container get slightly dry between waterings (but not desiccated). Some plants prefer a hosing of the trunk and fronds instead of having their roots flooded regularly. Although a cycad may look somewhat like a



Seed cone - *Dioon edule* on grounds of Huntington Botanical Gardens.

treefern, it's much better to treat it like a cactus.

There are several pests to watch out for, although most insects ignore cycads. Snails like to eat the emerging fronds, which are very soft and liable to damage during this time. Once the fronds have enlarged and hardened, snails will lose interest.

Scale is a threat all year round. Inspect the leaf bases and the undersides of the leaflets for telltale lumps. You can pick these off by hand. Infestations of the trunk are more serious. Even after you wipe them out, dead scale can ruin the appearance of a beautiful specimen. A regular application of malathion (read the label for instructions because any insecticide is as dangerous to you as it is to the bugs) will prevent scale from establishing a foothold.

Propagation

Cycads were one of the first seed-bearing plants. They lack flowers, but there is a definite division into male and female plants. Males develop one or more pollen cones. This pollen is distributed by the wind, or sometimes by birds. Insects do not seem to play much part in the process. The pollen grain must manage to be carried to a female cone at precisely the time when the cone scales part slightly. If this happens, and there has been a rain, or heavy dew to deposit a film of moisture, the pollen grain will give rise to a motile sperm which will then combine with and fertilize the egg, or seed.

Cycad pollen does not retain its vigor when frozen, so to ensure that a female plant will be pollinated as the cone begins to form it's a good idea to scout around and discover who else has mature cycads in your neighborhood if you yourself don't have a male. And if you have a male, but no female, you can always start a 'stud' service for other gardeners.

A cycad usually achieves sexual maturity after 25 to 30 years of growth. You can estimate the age of

a plant by counting the number of crowns it has produced. These will be marked by persistent leaf bases that appear as scales on the trunk. Count from the bottom up remembering that one crown a year is the rule. Some cycads, such as a *Zamia*, never form a true trunk. Estimating the age of these plants is practically impossible. Since they never grow

very large, a plant four feet across might be 50 years old.

Hybrids are possible between species, and possibly between some genera according to Chamberlain. This means that you might still be able to achieve a breeding population even if you have only a small collection of mature plants.

The appearance and sophistica-

Cycads Commonly Offered by Mail Order Nurseries

Genus/Species	Native Range	Type of Habitat	Rate of Growth
<i>Cycas revoluta</i>	Southern Japan	Moist, sunny, coastal hillsides. Frost hardy.	average
<i>Cycas circinalis</i>	India and Nepal	Warm, moist pinewoods, Frost tender.	fast
<i>Cycas media</i>	Northeast Australia	Moist Eucalyptus or rain forest. Frost tender.	slow
<i>Macrozamia moorea</i>	Northeast Australia	Eucalyptus forest and grasslands. Frost tender.	fast
<i>Bowenia spectabilis</i>	Northeast Australia	Warm rain forest. Frost tender, and difficult to grow. A dwarf. The only cycad with double leaflets on its fronds.	slow
<i>Encephalartos leboemoensis</i>	Southeast Africa	Warm, well-watered sunny cliffs and hillsides. Semi-hardy.	fast
<i>Encephalartos woodii</i>	Southeast Africa	Warm, well-watered forests. This species is technically extinct since no females exist. Propagation is entirely from offshoots. Frost tender.	very fast
<i>Stangeria eriopus</i>	Southeast Africa	Warm, well-watered forest. Frost tender. A dwarf plant.	slow
<i>Ceratozamia mexicana</i>	Eastern Mexico	Warm, densely shaded rain forest. Likes hillsides. Frost tender.	slow
<i>Dioon edule</i>	Eastern Mexico	Hot, arid forests. Frost hardy.	slow
<i>Dioon spinulosum</i>	Eastern Mexico	Warm, densely shaded rain forest. Frost tender.	slow
<i>Zamia floridana</i>	Southern Florida	Warm, sandy forest and scrublands. A dwarf plant. Frost tender.	slow
<i>Zamia furfuracea</i>	Eastern Mexico	Warm, somewhat swampy rain forest. A dwarf, but will form a trunk after many years. Frost tender.	average
<i>Zamia fischeri</i>	Eastern Mexico	Warm rain forest. A dwarf. Frost tender.	very fast

tion of the female cones differ greatly among the genera. In *Cycas revoluta* the ovulate, or seed-bearing cone is very primitive and resembles that of the seed-ferns. The cone is really nothing more than an immature and reduced crown of leaves with seeds nestled among the leaflets. In the more advanced cycads (*Zamia* is probably the summit of the evolutionary history of the family) the cone has become hard, very simple in structure, and resembles a pine cone.

Cycads may also be propagated by offshoots and by cuttings. Some will consider this to be the easier route.

Offshoots are merely buds generated by the root or lower trunk as a response to damage which eventually turn into small plants. Once they send out a frond the connection to the parent plant may be severed and the offshoot potted up. A dusting of the root, and wound, with a powdered rooting hormone and fungicide will help the new plant on the road to survival.

If you chop the trunk of a cycad into sections and pot these, each section will generate one or more new plants. This, understandably, is a rather drastic method of reproduction. But it does work.

It is also possible to generate new plants from cuttings of the petiole, or frond base. The process is a lengthy one, and it requires the use of a heated Wardian case, sterile soil, and dusting of the cutting with rooting hormone, but when no other method is available it can be attempted.

Sometimes, even the leaflets will put out roots.

If you have been lucky enough to have discovered some fertile seeds, prepare some pots of soil and place the seeds on top. Don't bury them, just press them down about half-way. It takes a while, but eventually a root will poke from one end (the seeds should always be resting on their sides) and bury itself in the soil. A month or so later a single

Continued on page 29

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Malesian Rhododendrons

by

F. Alice Jack (LeDuc)
Lecturer in Horticulture
Texas A & M University
College Station, TX 77843

To most people in this country who have even a passing interest in horticulture, the rhododendron is a familiar and often used plant. Yet, until very recently, almost one third of the 900 species which compose the genus was totally unknown to civilization. The present situation, at least as far as public familiarity and use is concerned, remains the same.

Hidden away in remote areas of New Guinea and other generally inhospitable tropical sections of the world, these 300 or so unexploited species are collectively and popularly known as "Malesian" Rhododendrons¹ (taking their name from a contraction of Malaya and Micronesia, the geographic home of a majority of the plants). And, in spite of the fact that so large a portion of the total rhododendron population consists of the "Malesians", until the past 15 years, little work was done to take advantage of them as either horticultural plants, or as a new gene pool for hybridizing. Part of the reason for this neglect is attributable to the remoteness of their origin, and the difficulty in obtaining specimen plants. However, there are other reasons: historical accident, faulty assumptions as to culture requirements, and the vagaries of popular taste.

Some of the "Malesians" were initially discovered in the early 1800's, and by mid-century several attempts were underway to develop commercial applications. For example, between the 1850's and 1880's,

Veitch & Sons Nursery of Chelsea, England, developed 200 named hybrids which were used extensively in exhibitions. Unfortunately for the future of the plants, their tropical origins caused them to be considered (apparently without any testing) as "hot-house" beauties that required considerable pampering. This belief, combined with increased costs of maintaining "hot-houses" in the post World War I era, and the shift in public interest to the many newly introduced hardy rhododendrons, caused the "Malesians" to decline in popularity. As a result, most of Veitch's hybrids (today known as Victorian Hybrids) have been lost, although a few have survived at the Royal Botanic Gardens, Kew, and in private collections.

Interest was revived following World War II when reports of several species from New Guinea reached horticultural circles in this country and Europe. In 1960, in conjunction with the revision of the "Flora Malesiana", Dr. H. Sleumer of the Netherlands went on a plant collecting trip to Indonesia which concluded with several weeks in New Guinea and the discovery of over 200 new rhododendron species.² Other plant expeditions have followed, including one sponsored by Longwood Gardens and the United States Department of Agriculture in 1970-1971.

The cultural emphasis is shifting because it has been found that the plants are not as tender as was be-

lieved during the development of the Victorian Hybrids. In their native habitats, "Malesian" Rhododendrons are found everywhere, from the coastal rain forests on up to altitudes of 10,000 feet in alpine grassland conditions. The plants themselves, with their fragrant flowers of pure, intense color and waxy texture, vary from small compact shrubs at the higher elevations to rather large rambling plants in the coastal river areas. Depending upon environmental conditions, the same species may be either a terrestrial plant, or an epiphytic one, growing on host plants or even on patches of floating peat.

Based upon the species' ability to naturally survive in a wide variety of environmental conditions, it appears that there may be an unexplored potential in this country for the plants as outdoor ornamentals in the milder areas, and as tubbed display specimens in others. Additionally, because of the highly attractive flowers, their possible use in floriculture should be considered as well.

Work to develop desirable ornamental cultivars is being carried on in several countries, including Australia, England, and Holland. In the United States, Strybing Arboretum has had a breeding and testing program in operation for ten years with the object of developing a compact, well shaped pot-plant that retains the highly desirable floral characteristics of the species, and which is hardy in the San Francisco Bay

area.³ Their hardiness tests appear quite promising, several species having been able to survive temperatures that remained in the 20's for over a week. At Longwood Gardens, Pennsylvania, several crosses have been made, and these hybrids, along with some original Victorian Hybrids are being used successfully as potted display plants.

While no results have yet been made available to the general public, it is hoped that these research



Rhododendron laetum - dwarf growing

programs will produce some very fine ornamental cultivars.

For those interested in growing or experimenting with the "Malesian" Rhododendrons, the following information and observations are passed on:

Culture

The growing medium varies considerably with the grower. However, all seem to agree that it should be a porous, well drained mixture adapted to the natural habit of the plants. One fact seems certain: the plants perform much better in soil-less or almost soil-less mixes. One of the early reported media⁴ which I have found successful consists of 40% fine fir bark, 40% peat, and 20% loamy soil. I have also had good results when screened leaf mold was substituted for the peat. Basically, it seems that any of the soil-less Cor-

nell mixes amended with fir bark, Terface, grit, and/or Mexfern provide an adequate media.

As a group the "Malesian" Rhododendrons prefer to be kept evenly moist, although they can tolerate occasional drying of the soil. On bright sunny days they may experience temporary wilt if the soil becomes too dry. On the other hand, only a few species (those which occur naturally in swamp or bog areas) can survive a waterlogged condition of the soil.

A requirement for warm temperatures, once thought to be the most significant limiting factor in growing the early hybrids, has been shown to be exaggerated. Although they thrive in a warm environment, they will grow well in temperatures as low as 45°F. and will survive 27°F. Because of their habitat in the equatorial zone, the "Malesian" Rhododendrons must make an adjustment to the varying day lengths of the temperate zone. They seem readily capable of this adjustment especially if care is taken to ensure good exposure to light during the winter months. During the summer they will need lath or high shade to reduce the intensity of light. When



Rhododendron macgregoriae X lochae

used in landscape plantings, protection from harsh winds (and salt spray if near the ocean) is required in addition to the high shade.



Rhododendron aurigeranum

From the foregoing, it appears that the "Malesian" Rhododendron will be best suited for container culture. Growers have consistently found that the plants grow quite well with lots of healthy foliage, but few or no flowers when planted out in beds in a conservatory. However, when potted and allowed to become pot-bound, they not only retained their good foliage, but flowered profusely as well. The best example I have is a plant of *Rhododendron* 'Princess Alexandra' which is about 18 inches high and 26 inches across growing in a 5-inch pot. The last time it bloomed, it had 20 flower buds, each bud producing an umbel of about 10 to 12 flowers. It has also been found that yearly pruning is necessary to insure well shaped, compact plants, and that this pruning must be started with the very first flushes of growth of the rooted cutting or seedling.⁵

Diseases and Pests

There is very little in the literature about diseases or pests of the "Malesian" Rhododendrons, but the following has been noted:

Rhizoctonia: The sudden wilting of the plant which is not caused by a lack of moisture. It is controlled by sterilization of all media used, good sanitation, and destruction of the infested plants.

Powdery Mildew: A gray powdery mold on leaves. It is controlled by lowering the

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humidity, and spraying the plants or drenching the soil with Benlate. Elemental sulfur volatilized in a greenhouse is also effective.

Spider Mites: Symptoms are chlorotic speckling or stippling of the leaves and webbing on and between the leaves. They are controlled by spraying with Kelthane, usually 2 applications, ten days apart.

Mealy bug: These white cottony-like pests are usually found in the apex of the plant, and their sticky "honeydew" can become the breeding ground for sooty mold. Spray the plant with Sevin or Diazinon as needed.

Lace Bug: The first symptoms of this pest are the upper surfaces of the leaves becoming stippled with minute white spots. Later, the presence of black, resinous fecal spots on the under surface of the leaves can be noticed. They are controlled by spraying the plant, especially the under sides of the leaves with Diazinon, Cygon, or Isotox.

Propagation

The "Malesian" Rhododendrons are much easier to propagate by cuttings than the hardy types. I have had the best results in a propagating bench without mist, but covered with heavyweight translucent polyethylene and green Saran (shading cloth) supported over the bench on a wire frame. The green Saran

was used only when needed to cut light intensity. The bench was watered daily or as necessary. Mist propagation is also successful if the temperature and light are high enough so that the cuttings may retain moisture, but are not so wet as to encourage rot. This is a particular problem during the winter when there are many dark overcast days.

For a propagating medium, I have had good success with a variety of different mixtures, including sand and Perlite, sand and peat, and pure sand. Since the plants have no true dormant period, being of uninterrupted growth, they can be propagated at any time of the year. Choose tip cuttings of new growth which have just become firm to the touch. I would advise using a mild rooting compound such as Hormodin #1⁶ which has been mixed with a fungicide, such as Benlate (benamyl) or Fermate (ferbam). The period required for rooting varies with the species, with some rooting in as little as four weeks, while others (especially the Victorian Hybrids) take as long as 2½ to 3 months.

While "Malesian" Rhododendrons can be grown from seed, the seed is viable for only about 6 weeks. This period can be extended to about nine months by refrigeration. The seedlings when emerging are very small, being less than 1 mm across, and their rate of growth in the initial stages is very slow, being only 1 to 2 mm across after several months. The rate of growth can be accelerated by exposing the seedling to extended photoperiods. Also, once the plants have reached a height of ½ inch and have formed their first true leaves, a tip cutting may be taken. This cutting when placed in screened milled sphagnum moss, will outgrow the seedling.⁷

Actual germination of the seed when fresh is quite easy. Seed may be sown on screened milled sphagnum, or osmunda-Terface (mixed 1:1), or on fern fiber and crushed brick. With constant moisture and

temperatures of between 70°F. and 75°F. the seeds should germinate in 20 to 45 days.

Once propagated, the time to flower varies considerably. They will frequently flower in the rooted cutting stage; for example, I have had one plant bear seven flower umbels only 15 months after the cutting was taken. From seed, the time to flower appears to be between 18 months and 2½ years.

In conclusion, time may reveal that the "Malesian" Rhododendrons suffered from neglect for good cause in that there was no real use for the plant in the United States other than as an exotic specimen plant for collectors, or in limited horticultural applications in certain small areas of the country. However, it may also be that the "Malesian" Rhododendron is a horticultural event waiting to happen. Only time and continued research and development can tell. In the interim, it appears that here is an excellent opportunity for the amateur as well as the professional plant breeder to explore new, heretofore unmanipulated plant material.

Footnotes

1. Although popularly called "Malesian" rhododendrons, they are more correctly named *Vireya* rhododendrons as they all belong to the *Vireya* section of the genus *Rhododendron*.
2. Sleumer, H. 1966. An account of Rhododendrons in Malesia. *Flora Malesiana*. Ser. I, vol. 6, part 4. Pp. 473-674.
3. Sullivan, Peter. 1973. Ten Years of *Vireya* Rhododendrons at Strybing Arboretum. *Australian Rhododendron Society Quarterly*. 12(3):2-7.
4. Brydon, P. H. 1971. Rhododendrons from Malaysia. *Brooklyn Botanic Garden Handbook. Rhododendrons and Their Relatives*. 27(2):36-40.
5. Osborn, Hadley. 1969. *Vireya* Section Rhododendrons in California: A Preliminary Report. *American Rhododendron Society Quarterly*. 23(4):216-221.
6. Hormodin #1 contains 0.1% indolebutyric acid.
7. Brydon, *ibid*.

Continued from page 25

Cycads

frond will unfurl.

Juvenile cycads seldom resemble the adult plant. The shape of the leaflets will usually be slightly different. The most extreme variation can be found in *Zamia furfuracea* where the leaflets look like large squares of thick, green cardboard.

Seedlings, and new plants grown from cuttings, are tender and must be protected from full sun and extremes of temperature. They cannot store water as well as the adults, so don't let the soil medium dry out.

Cycads are trees, and like trees they tend to grow slowly. However, even a five year old seedling can be a handsome specimen if well cared for. Cycads live for hundreds of years, like a Bonsai. A collection can be passed along from generation to generation.

When starting a collection it is tempting to buy large plants imported directly from the wild. This is risky. Pests can be imported accidentally, and the native range itself may be harmed if the collecting of the plants is done indiscriminately. It's my opinion that commercially propagated plants are a better buy. Under the Endangered Species Act, all cycads now require a special license for import or export. As a living fossil, and because it is stately and beautiful, the cycad is deserving of protection. It would certainly be a tragedy if those individuals who appreciate these plants the most were to contribute to their extinction.

All cycads are toxic due to the presence of a glucoside (Cycasin) in their tissues. Children and animals should not be allowed to chew on the leaves, or eat the seeds as they may cause paralysis or even death. The fleshy covering of the seed is harmless, however.

Although it deals mainly with the African cycads, *The Cycads of South Africa*, by Cynthia Giddy, is a recent and informative work with detailed instructions for care and propagation.

Continued from page 21

Fall Vegetable Gardening



temperatures between 45° and 50°.

Here are two methods suggested by North Carolina State University horticulturists:

First, you pull up the plants and hang them upside down in the basement or some other well protected place. Pull off the tomatoes as they become ready to use.

The second method that may result in your having fresh, home-grown tomatoes for Christmas dinner is wrapping the fruit individually with paper. Keep only those tomatoes that are free of diseases and insects. You should check particularly around the base of the stem. Fruit worms often burrow into the tomato at that point.

Grade the fruit according to the degree of ripeness. Those that are red-ripe won't hold too long.

It is best not to pack the fruit too deeply into a container because those on the bottom may be damaged. The best idea may be to lay the tomatoes out in a single layer on a flat surface. Check them from time to time for degree of soundness.

To get the best production of fruit during the last two or three weeks the plants are in the ground, specialists suggest pinching out the tips and flowers some weeks before

the end of the growing season is expected. This permits all of the strength to go into the fruit already on the vine.

Late potatoes can be stored at 40°F and 85 to 90% humidity. If the temperature is lower than this, the starch is converted to sugar and the potatoes become undesirably sweet. However, if sweetening occurs, one to three weeks holding at ordinary room temperature restores the natural flavor.

Potatoes stored at 50° to 60° have a much better texture, color and flavor when cooked, but would sprout if not used before too long. The freezing point of potatoes is 29° and there is complete break-down when thawed.

Potatoes should always be stored in a dark place to prevent greening. This green color is the result of the buildup of solanine in the presence of light. This imparts a bitter taste to the tuber.

Mild or Bermuda type onions cannot be stored very long but the more pungent types can be stored all winter. Only onions that are well cured and free from disease should be stored. The temperature should be 32° and relative humidity 70 to 75%. If the humidity is above this level, the bulbs may sprout or gray mold may set in.

Research at the University of Minnesota has shown that onions can survive rather severe freezing (*News & Views*, March, 1977). Frost on the onions does not penetrate to the living internal tissues because of the waxy, dry, surface. The bulbs can therefore remain supercooled for hours at sub-freezing temperatures.

Dutch Valley recommends planting onion sets in one manner for scallion-type green onions and in another for large, dry ones. Large white sets, for instance, actually result in the fastest slender green onions. Often, a larger white bulb will send up 2 or 3 tangy scallion stems. The smaller sets, on the other hand, produce better large cooking onions.

Dwarf and Slow-Growing Conifers

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The gardener's world is getting smaller. It always seems that as your interest in growing a wide variety of plants increases, the space in which to grow them decreases. Obviously, greater care must be taken in the choice of plants.

Will they perform well in my soil and climate? Will the new additions to my garden grow in harmony with the existing plants or will they over-

power them with brightly-colored foliage and flowers? Will they stay small enough so overcrowding will not become a limiting factor? The serious gardener must ask these questions before planting new varieties and cultivars.

Wouldn't it be nice to find a group of plants which answers these questions for you—a group of plants whose constituents grow well in al-

most any situation, won't overpower your *Campanulas* or *Scillas* with flashy leaves and blossoms and still stay small enough for use in your cramped garden space. The dwarf conifers fit these requirements with ease!

Pliny, in the first century A.D., made reference to the savin juniper, *Juniperus sabina* 'Tamariscifolia'. The Japanese have long used the

Dwarf conifers - Strybing Arboretum



dwarf forms of pine in their refined gardens. Although known for centuries, the dwarf and slow-growing conifers are just now coming into extensive use in America.

The following sixteen plants are admittedly some of my favorites. But more than just being my personal preferences, these plants are some of the best, most serviceable, miniature plants grown in this country today. All of them are available from commercial sources.

One of the most important genera of conifers is *Picea*, the spruces. Within this genus are many dwarf and slow-growing variants. *Picea abies*, the Norway spruce, has approximately 125 different forms. While not all are dwarf, many of them are in the dwarf category. Among the most common are 'Clanbrassiliana', 'Gregoryana', 'Maxwellii', 'Nana', 'Nidiformis', 'Ohlen-dorffii', and 'Procumbens'. *Picea abies* 'Mucronata', known since around 1835, is in my opinion the best. As a young plant, 'Mucronata' ranges from nearly globose to pyramidal in shape, and its rate of growth is relatively slow, although after about 15 years it begins to grow more vigorously. The leaves are dark green, thick and stiff, and the buds are large and very conspicuous. The branchlets are often clustered on the branches with their tips curved away from the point of attachment. Because of its eventual larger size, 'Mucronata' is best used in the background of a border planting.

The white spruce, *Picea glauca*, has two excellent cultivars worthy of mention here. Probably the most commonly used small conifer, the dwarf Alberta spruce, *Picea glauca* 'Conica', is definitely worthy of its widespread popularity. Conical to pyramidal in shape, 'Conica' has very densely arranged branchlets clothed with tiny, light green needles. Because its foliage is so dense and its form so regular the dwarf Alberta spruce always appears to have been freshly sheared. Completely hardy, *Picea glauca* 'Conica' has a

place in almost anyone's landscape. It can be used effectively as a specimen plant or in the background of the shrub border. Its ultimate height is around 6 feet.

Another excellent cultivar of white spruce is 'Echiniformis'. Its leaves are the only feature that is similar to *Picea glauca* 'Conica'. Growing to an eventual height of perhaps 12-18", 'Echiniformis' forms a low, dense, globe-shaped or cushion-shaped plant. Since its rate of growth is so slow (up to $\frac{3}{4}$ " per year), 'Echiniformis' will never outgrow your garden. It is definitely a foreground specimen.

The Serbian spruce, *Picea omorika*, is noted for being one of the few spruces whose needles are flat in cross section—most spruce needles are distinctly four-sided. The dwarf Serbian spruce, *Picea omorika* 'Nana' grows to about 4½ feet tall and is generally rounded, usually somewhat broader than high. The broad stomatal lines on the under-surface of the leaves give the plant an overall bluish appearance, making it a useful specimen for color contrast in the landscape.

Noted for its spectacular large blue forms, the Colorado spruce, *Picea pungens*, has several dwarf cultivars. The best is the cultivar 'Montgomery'. Flat-topped and broader than high, 'Montgomery' has excellent bluish-green, stiff foliage. Its slow rate of growth and compact habit make it highly desirable for specimen use as well as suitable for the foundation or border planting.

Japanese cedar or *Cryptomeria* is an unusual genus that is not too well known in this country. Native to Japan and southern China, *Cryptomeria* is perhaps on the hardiness borderline in our northern states. However, with proper site selection it will do quite well in the North. *Cryptomeria japonica* 'Vilmoriniana' is a very slow-growing globe-shaped cultivar. The foliage is quite small and densely arranged on short, stiff branchlets. Although the leaves are a good bright green color

during the growing season, they take on a brownish cast during winter. This cultivar should have a growing site that is protected from harsh winter winds and too much drying sunshine. It should do well in the same site where evergreen azaleas come through the winter in good shape. Growing to a height of around 30 inches after several years, 'Vilmoriniana' is suitable for the foreground of a border planting.

Similar in shape to the white spruce cultivar of the same name, *Juniperus communis* 'Echiniformis' is a very dwarf mound-shaped shrub. Sometimes called the hedgehog juniper, 'Echiniformis' is covered with tiny, bluish-green, sharp-pointed leaves. An extremely dense plant, the hedgehog juniper grows to only about 10 inches in height. This is one of the tiniest conifers available.

Another procumbent juniper with spiny, bluish-green needles is *Juniperus procumbens* 'Nana'. This plant spreads along the ground forming a compact mat of branches and foliage. The leaves become slightly purplish in winter. Although there seems to be some variation in the foliage between one plant and another, the spreading habit is always retained. A very similar but slightly more bluish plant is *Juniperus squamata* 'Prostrata'.

The pines have many variants of shape, ultimate size, rate of growth, and foliage color. One of the most interesting of these is the dragon-eye pine, *Pinus densiflora* 'Oculus-draconis'. This striking plant has variegated leaves of alternating yellow and green bands. When viewed from the end of a branch, the yellow and green bands form concentric rings around the dark reddish-brown buds giving the appearance of a large eye, hence the name dragon-eye pine. This is a larger plant and should be used as a specimen plant.

Arbor-vitae is a commonly used and overused shrub. Most forms are large and vigorous with dark green

foliage. An interesting alternative is *Thuja plicata* 'Cuprea'. This dwarf conical shrub reaches at most 3 feet in height and has golden yellow to bronze-colored foliage on the tips of the branchlets. The distinctive color of this plant contrasts markedly with most other plants. It is best used as a foreground plant.

The Douglas-fir is known for its very tall, graceful habit. One of the most economically important conifers, Douglas-fir is native to the western portion of the United States. *Pseudotsuga menziesii* 'Densa' is a very dense, flat-topped, slow-growing shrub. Discovered in the pinetum of Highland Park in Rochester, New York, 'Densa' is not too well known yet. However, this beautiful conifer is well worth the effort of finding it. Its ultimate height is around 3 feet.

The dwarf Hinoki falsecypress, *Chamaecyparis obtusa* 'Nana', is probably the most sought after slow-growing conifer. The problem is not finding a plant with the cultivar name 'Nana'; the problem lies in finding the true 'Nana'. Unfortunately most plants sold as 'Nana' are really 'Nana Gracilis' which is much more robust than the former. The true 'Nana' is somewhat globe-shaped and dense, reaching a height of 3 feet in extremely old specimens. The sculptured effect of the branchlets is quite attractive. Use this one in the foreground.

Another falsecypress with excellent characteristics is *Chamaecyparis pisifera* 'Boulevard'. This conifer with soft, bluish-green plummy foliage is often sold incorrectly as the cultivar 'Cyanoviridis'. Its formal conical shape and colored foliage make it an excellent specimen plant. Winter wind and sun can cause browning of the leaves. Give 'Boulevard' a protected site.

The hemlocks seem to have a propensity for producing dwarf forms. Among the many dozens of variants are the cultivars 'Bennett', 'Cole', and 'Pendula'. Bennett's hemlock is a spreading shrub, somewhat broader than high, with

horizontally displayed branches. The tips of the branchlets are slightly pendulous and give the plant an overall pleasing appearance.

Sometimes listed as 'Cole's Prostrate' hemlock, *Tsuga canadensis* 'Cole' is a prostrate spreading dwarf conifer with pendulous branches that become devoid of leaves in the center. The bareness of the larger central branches gives the plant an old, gnarled look. The ultimate height is perhaps 12 inches at most.

The Sargent weeping hemlock *Tsuga canadensis* 'Pendula', resembles a graceful waterfall with its tiered pendulous branches flowing down to the ground. Although in time it becomes a large plant, 'Pendula' is a useful slow-growing plant. It is probably best used as a specimen. Give it plenty of room to develop.

Using dwarf conifers effectively in the landscape is not especially difficult if you follow a few basic recommendations. Because they are small, dwarf conifers have a difficult time competing with weeds for water and light. The use of a mulch around the plant can take care of these problems. Fertility is no more

of a problem than with full-sized specimens except that a little fertilizer goes much farther with dwarfs.

Insects are normally not a serious problem except that an infestation of a destructive pest can cause relatively more severe damage on a little plant. Be on the watch for signs of insect feeding.

Pruning usually consists of removing an occasional reverting, vigorous branch. Failure to remove reversions can cost the loss of a fine specimen.

Displaying the miniatures is best accomplished by arranging them according to height and spread in a prepared planting bed covered with a mulch of pine needles, shredded bark, or small pebbles. They can be used in conjunction with flowering shrubs as well as with perennials and alpiners. Remember to keep the companion plants in scale with the dwarf conifers.

The dwarf and slow-growing conifers can fill a real need in your garden. Besides the occasional thrill of finding a rare specimen after a long search, you will continue to enjoy the unique contribution that they make for many years to come.

Tsuga canadensis pendula



Continued from Page 4

Container Growing

mix in which green algae and molds may grow. The mulch should be only deep enough to cover the surface and should not be placed within 3 inches of the base of the plant.

Cultivation: Container grown plants should never be cultivated. It may be necessary, however, to scrape off a surface layer of green algae. The presence of algae says that the growing mix is being held too moist or with restricted air movement.



Fertilizers: Growing in containers requires a continuous supply of nutrients throughout the life of the plant. The growing mix contains sufficient fertilizer to sustain growth for 3 or 4 weeks. I suggest that you begin to add fertilizer at the beginning of the third week following planting—with dry fertilizer make a semi-circle application of 5-10-5 or 10-6-4, about 1 teaspoon per plant. It should be applied just prior to watering for prompt penetration into the mix. Make additional applications at monthly intervals. Slow release fertilizers can also be used. Each time you water, some of the nutrients are leached into the mix. Follow the recommended rate of application on the label, the standard doses are designed for a 3-month release period. Liquid or water-soluble house plant fertilizers may also be used. Again, read the label and follow directions.

Pest Control: Container grown plants are more susceptible to pest problems than those grown in the terrestrial garden. If you have prepared and grown the plants properly—they will be more lush and succulent than their neighbors in the ground. Pest management may

not be necessary. I have grown many of the plants listed in Tables I, II, and III, without any need for a pesticide. I give my plants plenty of room, maintain adequate but not luxury levels of nutrients, I keep the foliage dry and have good air movement through the space. I also continually check for problems. When a pest appears, I spot spray with a broad spectrum pesticide. I use the EC (Emulsifiable Concentrate), diluted into a glass container, and applied as an attachment to the watering hose. A compressed air sprayer may be more useful for a large garden area. For a few plants, an aerosol can with a non-polluting propellant (listed in fine print on the label) may be the way to do it. Cover yourself up by wearing protective clothing. Read the label of the pesticide to determine if the chemical can be safely used on the particular plant. Read and learn what you can do safely.

Grooming: Table III suggests some of the things that you can do to maintain the appearance and productivity of the plants. A few minutes at the proper time will help to insure a long display period.

Fall Bonus: All of your container gardens are portable. Even before the first frost—you may wish to move them to a protected area. You can cover a screened porch with polyethylene—this prolongs the display time. Some areas often have one early severe cold period, which damages many of the tender plants, followed by several weeks of warm weather. If the plants could be protected for a few nights—you often may have a display for another six weeks. Also share your plants in the fall with friends—let them borrow one or several for many weeks of enjoyment in a sunny cool spot in the home. I gladly give the plants away, but I always request the return of growing mix and container. When the plants freeze—I remove all stubble and stack the filled containers in an area which is well-drained. I cover them over with clear plastic for use the following growing season.



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Deciduous Shrubs for the Great Plains

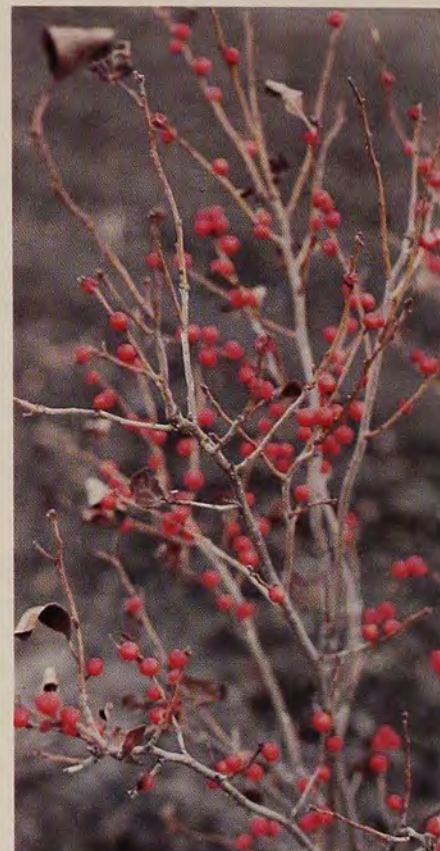
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The climatic conditions of the Northern Great Plains Region present a real challenge for growing certain woody ornamentals. With homeowners showing an increased interest in home and public beautification, the importance of selecting woody ornamentals for growth rate and habit, winter hardiness, foliage appearance, duration of flower, fruit color and size has become significant. Demand is great for shrubs which are low in height and fairly maintenance free.

Modern homeowners desire additional ornamental features such as attractive flowers or fruits.

At South Dakota State University research has been conducted by the Horticulture-Forestry Department over a period of years in McCrory Gardens, evaluating deciduous ornamental shrubs for adaptability to the area and for various ornamental characteristics. Numerous deciduous shrubs have proven from these trials to be outstanding for this area.

Several shrubs in our research



Ilex verticillata



Lonicera tatarica 'Valencia'



Potentilla fruticosa 'Coronation Triumph'



Rosa rubrifolia

plots have emerged as outstanding because of their smaller growth habit. Plants which fall into this category include *Cotoneaster congesta* (Pyrenees Cotoneaster), *Caragana brevifolia* (Shortleaf Peashrub), *Caragana frutex* 'Globosa' (Globe Caragana), *Lonicera xylosteum* 'Emerald Mound' (Emerald Mound Honeysuckle) and for a corner planting *Rhamnus frangula* 'Columnaris' (Columnar Buckthorn).

Cotoneaster congesta grows less than one foot and has a dense compact nature. It has small dark glossy green leaves with wavy margins. The small flowers are inconspicuous but the abundant red fruits are effective into the fall. It is definitely the most superior cotoneaster in our trials for uniform growth habit and good fruit characteristics. It fits well into foundation plantings where a ground cover effect is desired.

Peashrubs are deciduous shrubs generally grown for their yellow flower and growth habit. This genus is quite hardy and various species are planted throughout the Great Plains Region. Two species have emerged from our trials as having superior growth habit. *Caragana frutex* 'Globosa' has a pronounced globe-rounded shape which is maintained to maturity. The plant needs very little pruning to maintain this globe shape. It has no attractive flowers or fruit, but it does have good dark green foliage which generally holds late into the fall. It is ideal for a foundation planting and can be planted as a low-maintenance hedge plant. *Caragana brevifolia* is another superior peashrub with a very fine textured arching growth habit. It is also extremely hardy though it has no ornamental flower or fruit, but it does have good dark green foliage. The arching growth habit adds character to the shrub. It fits nicely in any contemporary foundation planting.

Lonicera xylosteum 'Emerald Mound' is a cultivar of the European Fly Honeysuckle which has a compact-mounted growth habit. It has dark green leaves throughout the

summer which turn yellow-purple in autumn. It has been in our trials since 1971 and is superior to the cultivar 'Claveyi' in growth habit. It is suitable for a low hedge and for foundation plantings.

A plant with a narrow upright growth habit which may be used nicely as a corner plant in a foundation planting is *Rhamnus frangula* 'Columnaris'. It fares well through the winters of the Great Plains Region, though minor dieback has been observed in some springs. The leaves are dark glossy green during the summer changing to greenish-yellow in the fall. The flowers are unimportant, but the fruit changes from red to purple-black during the maturation process through September. The plant should be grown in full sun to maintain its dense form.

Besides outstanding growth habit and generally carefree maintenance practices most homeowners desire additional ornamental characteristics of flower or fruit, or both, on deciduous shrubs planted around their homes. Various shrubs in our trials have continually shown these outstanding ornamental characteristics but still maintain growth habits suitable for foundation plantings. *Abeliophyllum distichum* (Korean Abelialeaf) and *Potentilla fruticosa* 'Coronation Triumph' (Coronation Triumph Cinquefoil) have outstanding flowers; whereas *Ilex verticillata* (Winterberry) and *Lonicera tatarica* 'Valencia' (Valencia Honeysuckle) have good fruit characteristics. *Viburnum opulus* 'Compactum' (Compact European Cranberrybush) and *Cornus alternifolia* (Pagoda Dogwood) have outstanding flower and fruit characteristics.

Since most species of the genus *Forsythia* are not dependably hardy in the Northern Great Plains, *Abeliophyllum distichum* can be planted as a substitute for its early flowering. It has been in our trials since 1967, and has bloomed early each spring with numerous white flowers. The leaves are dark green throughout the summer turning to a

purplish fall color. The growth habit is a little more open than desired, but the early white flowers announcing the coming of spring make it desirable for planting in the Great Plains.

A genus of small and often scraggly appearing shrubs are the Potentillas. They are adapted to adverse conditions and perform well in droughty areas and do best in full sun. *Potentilla fruticosa* 'Coronation Triumph' has been outstanding over the past years due to its prolific golden yellow flowering from summer to fall. This cultivar has a more upright growth habit and matures at about 3-4 feet. The leaves are of fine texture and have a better green color than most cultivars. The fruits are small dry hairy capsules which are persistent but have no ornamental value. The plant can be used in foundation plantings for its attractive flower and small growth habit.

Ilex verticillata is a species of *Ilex* which is adapted to the more rigorous growing climate of the Plains, but occasional chlorosis on the leaves occurs due to the alkaline soil of most of the Great Plains. This shrub has been planted in our trials since 1970 and has never shown any winter damage. It is a slow grower having an oval shape with fine twiggy branches. The fruit, which is shiny bright red, is generally effective from September to January. It is excellent for mass effect. Male and female plants are required for fruit set.

Most honeysuckles become quite large with age and are not suitable for foundation plantings. *Lonicera tatarica* 'Valencia' is a cultivar which is more compact in growth habit than most cultivars of Tatarian Honeysuckle. It has the upright-arching growth habit of the species but it is more compact. The foliage is bluish-green in summer and bears pink to white flowers in June. The fruits are numerous, orange, and persist into the winter. It fruits a little later than most honeysuckles, but the fruit is of high quality. Due to its more compact growth habit it could

be used effectively in larger foundation plantings.

Several shrubs in our trials which have proven to be outstanding in both flower and fruit characteristics include *Viburnum opulus* 'Compactum' and *Cornus alternifolia*. *Viburnum opulus* 'Compactum' has been in our trials for ten years and has maintained an excellent rounded globe growth habit of four or five feet without any maintenance. The compact European Cranberry has white flowers borne in flat-type cymes in late May and June. The flowers are of interest because the sterile and fertile flowers in the inflorescence create a pin-wheel effect. The fruit is a deep red color which starts in July and persists into the winter. The fruit on this shrub has been abundant ever since its original planting.

Where horizontal accents are needed in a landscape the somewhat larger shrub *Cornus alternifolia* can be utilized. This plant has been in our trials since 1969 and appears

adapted to the Great Plains Region if a northern seed source is planted. The yellowish-white flowers borne in flat-topped upright cymes are effective for about two weeks in early June. The non-persistent fruit is bluish-black in color in August but the persistent fruit stalk does turn to a pinkish-red. *Cornus alternifolia* could be the Great Plains Region substitute for *Cornus florida*.

Numerous deciduous shrubs have shown outstanding summer or winter texture characteristics in our trials. *Cornus stolonifera* 'Isanti' (Isanti Redosier Dogwood) is a hardy shrub with outstanding red to purplish-red twig color which is very handsome and eye appealing in a winter setting against snow. This cultivar has been planted in our trials since 1970 and has a dwarf-mounded growth habit. The flowers are a dull white borne in a flat-topped cyme in early June. The fruit is white colored and is borne in late August-September. The foliage is fairly clean and is more disease and

insect resistant than the species. Another shrub with an outstanding ornamental characteristic is *Rosa rubrifolia* (Redleaf Rose). This shrub, which is mostly non-suckering, has attractive red-blue foliage throughout the growing season. The flower is single, rather small, and bright pink in color. The fruit is maroon in color and persists into the winter adding some winter color. Foliage diseases are not common, making it desirable for contemporary residential foundation plantings.

These thirteen plants are examples of deciduous shrubs which have proven to be outstanding in our research plots over the past ten years. Each shrub has one or more outstanding ornamental characteristics which are well suited for planting in most contemporary foundation plantings. If homeowners plant these shrubs, I'm sure they would be doing less maintenance work with foundation plantings and enjoying their overall ornamental effect much more.

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Continued from page 17

Color Throughout the Year



flowered sort that has a long blooming period. 'Thomas Killin', a large flowered single or semi-double is also an excellent choice and is more prolific in bloom. Candytuft (*Iberis sempervirens*) provides low mounds of white flowers for accents. A white that really turns heads is the Desert Candle (*Eremurus himalaicus*). This species is one of the earliest eremurus to flower with stalks that reach head high or better. The flower clusters themselves are from 18-30" long. The flowers begin opening at the base of the inflorescence and work their way up the spike. The color is a waxy white and very lovely.

For the remainder of the summer, the color of a perennial garden can remain bright and vivid or cool and blue. Different species continue to favor us with their flowering speciality and sustain our interest. For the most complete range of color the Phlox (*Phlox paniculata*) becomes the backbone of the garden. Of course day lilies (*Hemerocallis*) and the true lilies (*Lilium*) are full of possibilities for garden color and accents.

Fortunately, many of the summer flowering perennials are extremely durable and do their thing without a lot of care and attention. Yarrows (*Achillea*), *Coreopsis*, and *Gaillardia* provide the garden with warm yellows and reds from early summer till frost, and are almost indestructible. In shady spots, two natives that take care of themselves and provide good patches of color are the Bugbane (*Cimicifuga*) and the Cardinal Flower

(*Lobelia cardinalis*). Also good for the shade are the host of *Hostas* with their handsome leaves and stalks of white or lavender flowers.

The Wonder of Staffa (*Aster frikarti*) begins to flower early in summer and continues to produce its lavender blue flowers until frost. Most of the perennial asters come into flower in September giving the garden its autumnal trappings along with the *Chrysanthemums*. Mums are certainly the most popular of all fall flowers with a range of color that includes pure whites, yellows, pinks and reds, and magnificent bronzes.

Another outstanding flower for late summer and fall is the Japanese Anemone (*Anemone hupehensis japonica*). Since the flowers are held 2-3' above the garden bed, they can be used as background plants where their white or pink blooms are especially appreciated late in the season. This is also the time of Goldenrods (*Solidago*). There are many good, garden forms of this familiar native such as 'Peter Pan', 'Golden Mosa' and 'Cloth of Gold'.

Back in February or early March, perennials brought color to the garden in a subtle way. They can also bring the flowering year to a close in a subtle fashion. One of the last plants to come to perfection is the Hardy Cyclamen (*Cyclamen europeum* and *C. neapolitanum*). Although the Neapolitan is more publicized, mainly due to its exceptionally fine foliage, I like the European equally well if not better because the foliage is present longer. Both species have diminutive rose colored flowers that look like exquisite miniatures of their big cousins, the Florist's Cyclamen.

Adding color to your garden throughout the year with perennials can be a fascinating labor of love. The selection is so immense and challenging that you will become a more sophisticated gardener just by indulging in the exercise. The rewards are equally large. Perennial gardening is an adventure—get involved!



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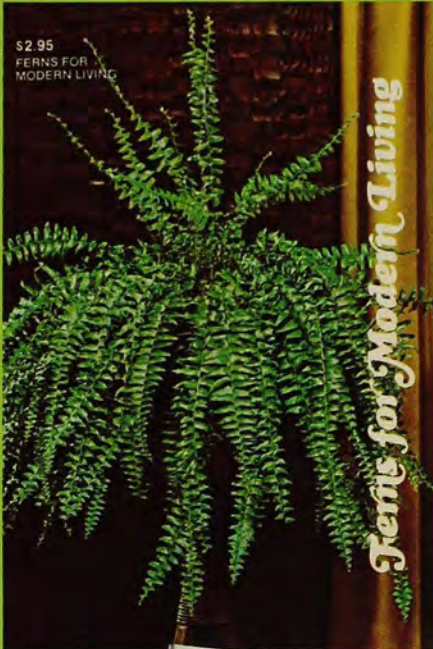
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Fertilize: Every 2 months from spring until fall. Place in water.
Soil: A mixture of equal parts coarse sand and general houseplant soil.
Additional Growing Information:
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Gymnocalycium mihanovichii
Plethichia
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Light: Bright to moderate light.
Watering: Let soil approach dryness between waterings in spring and summer. Keep quite dry in fall and winter.
Fertilize: Monthly from spring through fall.
Soil: A mixture of equal parts coarse sand and general house plant soil.
Additional Growing Information:
Chin Cacti are among the easiest cacti to grow under house conditions, plants very plump. They are propagated here and in by separating individual plants from larger clusters.

DWARF CHIN CACTI
Gymnocalycium parviflorum and *Gymnocalycium baddianum*
Curious, protruding "beak" under each radiating set of spines on the neck of *Gymnocalycium* cacti.

Chin Cacti
BRIGHTS CHIN CACTUS
Gymnocalycium brucei
Delicate appearing, charming plant with tiny beige spines.

Gardeners' Questions & Answers

By Tom Stevenson

Q: I have a lilac bush that has been growing in one place for seven years and it has never bloomed. I've had suggestions about liming it heavy in the fall, but that didn't work. I've had suggestions about manuring it heavy in the fall, but that didn't work either. Is there anything I can do to encourage it to bloom?

A: So far as known, there is no such thing as a lilac that cannot bloom provided the environment is satisfactory. First of all, it must be old enough. If a rooted sucker is taken from an old-fashioned purple lilac and planted elsewhere, it probably will not bloom for 10 years or even longer. The suckers taken from some of the newer varieties may not bloom for a long time either, depending on the root-stock.

Fairly nice lilac plants can be produced from seed but they may not bloom for 10 to 12 years. On the other hand, plants produced from cuttings or by budding (grafting) usually bloom in a year or two.

The lilac may not bloom in the shade. It needs full sun.

An application of lime will take care of soil acidity but it may take a long time for it to do so. Lime applied to the soil surface (scattered on top of the ground) may not penetrate to the root zone for three to five years.

On the other hand, an overdose of lime reaching the root zone may be as bad as none at all. A single application of two or three cups of ground limestone every four years should be adequate.

Lilacs can be seen blooming beautifully around old farm houses despite years of neglect. When everything else fails to make a plant bloom, try neglecting it.

Q: In February I trim my rose bushes to 1½ to 2 feet tall. They bloom nicely but by fall they are 6 to 8 feet tall. Am I doing something wrong? I've never seen rose bushes, other than climbers, get so tall.

A: Most hybrid tea roses that have plenty of room with full sunlight grow 6 to 8 feet tall and even taller. This is good because they produce more flowers throughout the season. If they are crowded they may get even taller but they don't have the room to spread out and there are fewer blooms. They can be kept lower by pruning them repeatedly throughout the growing season. Some naturally grow taller than others. Floribundas do not grow nearly as tall as hybrid teas and grandifloras.

Q: Should tulip bulbs be taken up every year and separated? When is the best time to dig them?

A: Many gardeners dig their tulip bulbs every two or three years and separate them. For exhibition quality flowers, they should be dug every year and only the largest bulbs replanted.

In naturalized plantings, especially if the bulbs were planted 8 to 10 inches deep, they may be left undisturbed for many years before they stop blooming altogether. The flowers may be smaller after three or four years but still quite attractive.

The time to dig the bulbs is after the foliage turns yellow but before it dries up and drops off. If you wait too long, you may not be able to find the bulbs.

There is a difference of opinion about the best time to replant the bulbs. The traditional method has been to dig, dry them off for about a week in a shady place, clean and separate, store until October or

November and then replant them.

Recent research indicates that it may be better to replant them immediately after separating them. The main reason is that the best place for the bulbs is in the ground, unless there is a cool, dry, dark place where they can be stored at between 55 and 65 degrees.

According to Dr. August De Hertogh, Michigan State University horticulturist and researcher, prolonged storage of tulip bulbs above 65 degrees can cause physiological injury to the flower bud and cause abortion of the bud resulting in blind plants.

In the deep south where soil temperatures do not go low enough to satisfy the chill requirements of tulips, Dr. Hertogh says, the bulbs should be lifted, after they finish blooming, given a cold treatment of four to five weeks at 35 to 40 degrees and then replanted. Otherwise they won't do much.

Q: Several days ago I sprayed my vegetable and flower gardens with Black Leaf 40. The next day almost everything was wilting. I know I followed the directions exactly. So what did I do wrong? Last summer I used the sprayer to kill a lot of poison ivy, but since then I have rinsed it out three or four times.

A: It is dangerous to use a sprayer for garden plants after it has been used for spraying with a weed-killing chemical. It is difficult, very difficult, to clean it out sufficiently to make it safe.

For this reason it is highly advisable to have one sprayer specifically for use only with weed-killers. To avoid confusion, this sprayer should be clearly marked "For Use Only With Weed-Killers."

If the sprayer must be used for

other purposes after having been used to apply a weed-killer, it should first be thoroughly cleaned with a solution of ammonia (one pint of household ammonia per 10 gallons of hot water).

Then try it experimentally on one or two plants to find out if it is safe to use generally.

Q: We have a beautiful zoysia lawn which seems to have choked out most all weeds except wild onions. Each year we use the wax bar but they still remain. Can you recommend a solution?

A: A combination of mowing and timely use of 2,4-D (a weed-killing chemical) should get rid of wild onions and wild garlic but it will take about three or four years. They start growing in the fall, survive the winter and flourish in the spring for a peak period of food production (photosynthesis).

Preventing the tops from growing limits the production of food and eventually results in death of the bulbs underground.

In the fall when they first come up, treat the tops with 2,4-D. Follow directions on the label for mix and application. Do not apply when the wind is blowing because many kinds of broadleaf plants are sensitive.

In the spring keep the tops cut off with the mower or treat them with 2,4-D. If you skip a period and the tops are permitted to produce food, you are right back where you started.

It is difficult if not impossible to dig all the bulbs out. If just one is left, it will grow and quickly multiply.

Q: I have some radish and lettuce seeds left over from this spring. Can they be saved to use next year?

A: If they are stored properly, they should be all right. A good place to store them is in a mason jar with a new lid. Storage temperature should be no higher than 75 degrees. A good place is a cool cellar.

The two most important factors shortening seed life are high seed moisture and high temperature.

Books

By Tom Stevenson

A HERITAGE OF HERBS

History, Early Gardening, and Old Recipes

By

Bertha P. Reppert

Stackpole Books

Harrisburg, Pa.—1976

190 pages, well illustrated, \$8.95

Shunned by many for the greater part of the 1900s, herbs have come out of the past into the present, says the author, becoming part of the space age, to take their place side by side with instant everything, miracle drugs, and better living through chemistry.

In her book, the author includes step-by-step instructions on herb gardening, over 75 modernized antique recipes, a how-to list of 50 useful herbs, and summaries of over 230 native herbs. It makes herb gardening possible for everyone, she says.

Cooking, medicinal and cosmetic recipes are exciting and varied (who would have thought roses have so many uses) and will no doubt cause some delighted surprises, she says.

For example, gathering rose hips is one of the more satisfying joys of the fall season. It is a bonus one receives for growing old-fashioned roses. The round red seedpods of rosebushes, large or small, new hybrids or old-fashioned are entirely edible, says she, a desirable addition to the year's harvest.

"Since rose hips have more vitamin C than oranges, tomatoes, and lemons combined—a cup of rose hips being equal to fifty oranges—why not cultivate a closer friendship with this delicious available fruit?"

THE TOMATO BOOK

*Everything You Need To Know
About Growing And Preserving*

By

Yvonne Young Tarr

Vantage Books

New York, N.Y.—1977

230 pages, illustrated, \$5.95, paperback

For the vast cult of tomato aficionados there are four periods of sublime pleasure, says the author, digging, planting and maturing, harvesting, preparing and consuming the fruits of our labors.

This book is concerned with all four processes, but while as much in-depth planting information as you could need is included, the emphasis is on eating, says she.

The recipes given are not ordinary dishes with tomatoes arbitrarily plunked into ingredient lists, but are rather a collection of tested recipes where tomatoes in some way change and/or enhance the ultimate finished product.

INDOOR TREES

By

Jack Kramer

Hawthorn Books, Inc.

New York, N.Y.—1976

162 pages, well illustrated, \$4.95
a paperback reprint

Indoor trees add drama to modern interiors and many times substitute for furniture, the author says. In kitchens, living rooms—all rooms—greenery can sprout. A treelike palm in the living room transforms the area from ordinary to extraordinary.

Indoor trees need specific care, he says. All in all, a whole new set of cultural rules is necessary to make trees really flourish in the home. So take this book in hand and have love in your heart and grow a tree in your living room.

GARDENING IN CONTAINERS

By

Editors of *Sunset Books*

and *Sunset Magazine*

Lane Publishing Co.

Menlo Park, Calif.—1976

80 pages, illustrated, \$2.45 paperback

Once you've tried growing plants in containers, the authors say, you will very likely become a devotee of this versatile way of gardening. Whether you tend a few pots of herbs at the kitchen door or landscape your deck completely with tubbed plants, you'll discover that containers make gardening flexible and fun.

Specific suggestions are given for using container plants, what you need to know about planting and caring for the plants, and descriptions of individual plants especially suited to container life in various situations.

The book can be ordered direct from the publisher.



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The American Yellow- wood

by David R. Hershey
504 Snyder Hall
University Park, PA 16802



Flower of *Cladrastis lutea*

In the deep, rich soils along streams of the southeastern United States grows one of North America's rarest trees, the American yellowwood (*Cladrastis lutea*). The great French botanist, André Michaux, first discovered the yellowwood near the Cumberland River in what is now Tennessee. Returning to his nursery at Charleston from his final American plant hunting expedition during March of 1796, Michaux paused to examine an unusual tree. He stopped at a nearby fort where a soldier volunteered to cut down several so that Michaux could gather seeds to send back to France. Michaux noticed that the freshly cut wood was a bright yellow and wrote to the territorial governor suggesting that this new tree may yield a valuable dye. On his way back to France later that year, Michaux's ship was wrecked, but his herbarium of American trees was saved. Disheartened by the new



government's lack of interest in plants and by the few survivors of the more than 60,000 trees he had sent back, Michaux set about to publish descriptions of his discoveries. However, before he could describe the yellowwood, he was off on a plant exploration to Madagascar where he died of a fever in 1803. Fortunately, his son François brought seeds to Europe and published a description of yellowwood under the scientific name *Virgilia lutea* in 1812. It was later reclassified with the genus *Cladrastis* by a German taxonomist, Karl Henrick Koch, in 1869. Koch recognized that the American yellowwood was the only New World member of this unusual genus which contains three other species, two in China and one in Japan.

The American yellowwood has one of the most restricted natural ranges of any North American tree. It is found in western North Carolina, central Tennessee and Kentucky, northern Alabama and Georgia, northeastern Arkansas, and southern Missouri. Despite this limited range, the yellowwood has proven to be tolerant of extremes of heat and cold. It grows as far north as New England and Ontario (USDA hardiness zone 3), so will thrive in nearly the entire United States.

Yellowwood characteristically forms a short trunk which branches into two or three large, ascending limbs to form a spreading dome-shaped crown. Open grown trees are usually from 30 to 50 feet tall with a nearly equal spread. The smooth, silvery-gray bark closely resembles that of the beech. The bright green, compound leaves consist of 5 to 11 leaflets and are from 8 to 12 inches long. In autumn the foliage turns a bright, clear yellow before falling. Foot-long, pendulous clusters of white, wisteria-like blossoms appear in early June with the new leaves. Although yellowwood tends to flower abundantly only every two to three years, the few flowers that appear every season still perfume the area with their delightful fragr-

ance. Clusters of 2 to 4 inch flattened pods form soon after flowering; at first green, they ripen to a medium brown in September and soon drop.

Early settlers did obtain a yellow dye from the heartwood, as Michaux proposed, and used it to color their homespun fabrics. They also found that the hard, close-grained wood made a beautiful and durable gunstock. The wood would be excellent for fine furniture, but the short-trunked trees do not yield boards of sufficient length to be used in this manner. Since it is not an important lumber tree and synthetic dyes have made it unnecessary to extract the natural coloring from its heartwood, the yellowwood's main value is its ornamental use.

Yellowwood is most often used as a shade or specimen tree and, occasionally, as a street tree. Although the crown is dense, the yellowwood casts a medium shade which, with its deep root system, allows other plants to grow beneath its canopy. Underplanting with low shrubs or groundcovers makes the smooth gray bark even more attractive by providing a contrasting background. For use as a street tree, a long trunk is obtained through careful training of young plants. The yellowwood's modest size allows it to fit into today's smaller yards and narrow streets better than many shade trees, while its clean foliage, beautiful flowers, smooth bark, clear fall color, and attractive winter silhouette offer year-round interest.

Yellowwood prefers deep, moist soil; but will thrive in almost any well-drained garden soil, even alkaline ones. The deep, spreading root system makes the tree drought-resistant; and as a member of the Pea family, yellowwood's roots fix nitrogen, allowing it to thrive in infertile soils.

Trees are easily transplanted when young, but should be dug with a ball of soil and moved only in spring. A 6 to 8 foot tree will reach 15 to 20 feet within ten years and will first begin to flower after it reaches

this size.

Yellowwood is virtually free of insects and diseases, so control measures are rarely necessary.

Pruning must be done only during summer, for yellowwood bleeds severely if pruned at other times of the year. Low side branches on young trees may be removed if a larger trunk is desired. Young trees must have any weak crotches removed and their crowns thinned. Older trees will need little pruning if they are properly trained while young. The generic name, *Cladrastis*, is Greek for fragile branch, referring to the brittle twigs. Despite this name, yellowwood's branches are no more easily broken than most other trees. Multi-branched specimens which were improperly pruned when young do, however, tend to split at the crotches during severe wind or ice storms.

There is at least one cultivar, 'Rosea', with light pink flowers. Ironically, the original tree of this clone grows at the Perkins Institute for the Blind in Massachusetts.

Strangely enough, yellowwood is most popular in Europe, where it seldom blooms because of the cooler summers. Its desirable ornamental qualities—bright green foliage, smooth bark, fragrant flowers, and fall color—combined with its hardiness, drought resistance, and freedom from pests and diseases make the yellowwood one of our finest landscape plants. Like many native plants, however, the yellowwood has not really been discovered by Americans. Most of the beautiful trees that André Michaux found in America's wilderness are not often used in our landscapes; yet the Ginkgo, Crape Myrtle (*Lagerstroemia indica*), and the Silk Tree or Mimosa (*Albizia julibrissin*), all introduced by Michaux from China, are tremendously popular. More gardeners need to discover that native plants, like the American yellowwood, may be as good or better than the countless foreign species that are often the mainstay of American gardens.

Dwarf Fruit Trees

the tree and its leaves, the other, to protect the fruit.

Rapid leaf development and wet weather in the spring will require a regular spray application of fungicide at intervals no longer than two weeks. For a suggested total spray schedule, you can consult your local agricultural extension office.

By choosing the correct spraying equipment which gives complete coverage, and by closely following the directions that come with the chemical, good control of insects and pests can be maintained without upsetting the ecology of the surrounding area.

Fruit production can be expected to start the second or third year after planting. First-year blossoms should be picked off to allow the young tree to develop without putting energy into fruit.

In later years, if the tree produces more fruit than it can support, the excess fruit should be thinned. This should be done in June before the larger fruit reaches an inch in diameter. Pick off the smallest first, leaving a minimum space of 4 to 6 inches between the remaining fruit. Because the remaining fruit is still relatively small, the tree may look like almost nothing is left. But, remember, it is better to end up with a smaller crop of good-sized apples than a large crop of tiny apples. Thinning the tree also insures annual bearing because, when a heavy crop is left on the tree, it often bears only every other year.

You'll find that growing your own dwarf fruit trees is interesting, fun and rewarding in both beauty and bounty. And nothing can match the satisfaction of eating and sharing delicious tree-ripened fruit you have picked right in your own yard.

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