

The cover of the magazine features a close-up photograph of several columbine flowers. In the foreground, there are two prominent flowers: one with deep red petals and yellow centers, and another with pale yellow petals and yellow centers. The background is filled with more green foliage and other flowers, creating a lush, natural setting. The title 'American Horticulturist' is printed in a large, white, serif font at the top left, with a small leaf icon integrated into the letter 'o' of 'Horticulturist'.

American
Horticulturist

Volume 58 Number 2 Early Spring, 1979

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American

Horticulturist

Volume 58 Number 2 April, 1979



Cover Photo: A mingling of 'Spring Song' columbine with lavender Sweet Rocket (*Hesperis*) in the shade of birch and aspen, by Guy Burgess.

Education

- 8 Nicotianas: The History, Cultivation and Uses of Tobacco—Jeanne Hawkins
- 14 Australian Wildflowers—Tovah Martin
- 22 Collecting Wild Seed—David R. Longland
- 34 Sweet Potato Tips: A Nutritious Garden Vegetable—Ruben L. Villareal and S. C. Tsou

Travelog

- 26 The Gardens of Sissinghurst Castle—Thomas A. Fretz

Gardener's Notebook

- 3 The Rites of Spring—Lorraine and Guy Burgess
- 11 A Rock Garden Plant List—Pamela J. Harper
- 19 Rhododendrons of the Southern Mountains—Martha Prince
- 31 The Magic of Water Lilies—Judith Hillstrom
- 38 Grafting Techniques: A How-to Guide—Robert F. Carlson

Departments

- 2 Editorial
- 42 Gardener's Marketplace

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Editorial

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We are searching for ways in which to make the Society's role in horticultural education more visible and we would like your help.

The Board of Directors recently authorized the establishment of a committee to examine the goals of the Society for the coming decade. Of special interest to the committee will be the ways in which these goals will further the cause of horticultural education.

I believe it is very important for the Society to take its rightful place as the national leader in this effort. During the next few months this committee will review existing programs—it will take a look at the effectiveness of our symposia, our tours, our awards program, our publications, our River Farm docent program and our test seed program. It will also look to the future—to the establishment of a research library at River Farm and to plans for creating demonstration and test gardens on the property. The creation of these gardens has just begun. By this spring, we will have established a lovely rose garden, a dahlia garden and a vegetable garden on the premises.

As a by-product of the committee's work, it is hoped that new educational programs will enable each of you to discover more ways in which to actively exercise your membership. We don't want active participation in the Society to be open only to a select few.

Most of you are already aware of the programs we do sponsor which allow you to take advantage of membership in the Society. Two of the most popular programs are our symposia and the travel tours we sponsor. The tours enable members of the Society to travel the globe and discover the horticultural diversity of each continent. This spring and fall, for example, trips are planned to England, South Africa and South America. Our annual Spring Symposium, held this year in Savannah, is another way in which horticultural

education is promoted. In Savannah members were not only given the chance to tour historic gardens, but they were also invited to hear eight lectures on many aspects of horticulture. I hope many of you will reserve time in October to attend our Fall Congress in Portland, Oregon as well. As plans for the Congress develop, we will report them to you. The dates to remember are October 3-7.

But there is certainly more we can do, more excitement we can generate as we look ahead to the next decade. Please help us reach our goal of becoming the national leader in horticultural education by sending me your suggestions and thoughts on this matter. I want to know what role you feel the Society should take in horticultural education.

An immediate way in which you can help the Society move forcefully into the 1980's is to elect the most qualified, knowledgeable and dynamic Board of Directors you can find to lead us there. We welcome your nominations for these positions. Please send them to me, along with brief biographies of your candidates, in care of River Farm. I will then send them to Rachel Snyder, editor of *Flower and Garden Magazine*, who has graciously consented to chair the nominating committee.

As this decade draws to a close, I will look forward to your comments about what the Society should envision for its future. Let me hear from you soon.

Dr. Gilbert Daniels
President

The Rites of Spring



'Luxury Lace' day lilies

*Now that spring is here, it's time to
take to the garden with new enthusiasm . . .*

Plants in the ground are like money in the bank; they increase and multiply and pay dividends every year.



Lorraine Marshall Burgess
Photos by Guy Burgess
202 Old Broadmoor Road
Colorado Springs, CO 80906

Even the smallest plot can be beautiful if it's given loving care. Yes, the soil may be too dry or too wet, and the pH factor tilted too far on the acid or alkaline side, but spring brings with its arrival glorious sunshine and fresh air from cleansing rains.

Being a gardener anywhere is an exciting challenge. There are so many mistakes to make and so many

ways to do things right. If the land is arid, try dryland prairie flowers and tall grasses in the bright sun; if it is naturally moist, attempt to grow columbines, primrose and wild strawberries in the shade.

Where water is still available for gardening at prices one can afford, try quick-growing annuals and the slower and more durable perennials. To save on weeding, cultivating and watering chores, mulch garden plants. This keeps the weeds down and holds the moisture in. Build barriers in the form of fences, walls or embankments to protect the young and growing plants from harsh

Left—Flowering Kale, *Brassica oleracea acephala* and 'Pagetes' golden marigolds
Right—'Peter Pan' scarlet zinnias

winds. In a few months, one flat of seedling marigolds or zinnias can be three feet high and in prolific bloom. Pots of Shasta daisies or golden achillea can become rooted in place to bloom timidly the first year and profusely for years to come. Plants in the ground are like money in the bank; they increase and multiply and pay dividends every year.

Non-gardeners may think the avid gardener excessive in his enthusiasm for this kind of challenge-gardening. He pursues his favorite delights in color, in line and shape and in fragrance. He uses the garden as a place for remembering, planting sunflowers he first knew in childhood places, lilacs that bloomed in the old neighborhood and lilies of the valley that he picked on the way to school. If he lives in the west, he imports and grows peonies, jasmine or magnolias he remembers from the eastern and southern gardens of his youth. Probably westerners now living in New York or Washington, D.C. attempt to grow the wild and domestic flowers of their recent past.

Through the ups and downs of gardening he remains happy. He takes pleasure in the creation of a mix of deep-blue lobelia and crisp, green parsley for its jeweled effect. He builds up a concentration of tall plants with pink astilbe and golden achillea, hardy pink Michaelmas daisies with lavender-blue veronica and a separate clump of red penstemon just for the hummingbirds.

As the season progresses, he is carried away by the creative opportunities offered each day. His garden becomes a studio where he can paint any kind of canvas. With bold strokes he sets scarlet Peter Pan zin-





nias against their pink and orange counterparts. He grows tall, spidery pink cleomes to tower over a fragrant stand of nicotiana and crimson phlox.

If he starts the season early enough, he can plant a clump of cloud-white, flowering plum trees to stand in front of a congregation of sturdy evergreens, or he can plant a container-grown rose climber which will burst into full bloom before the summer is over. And he can plant

6 a small bed of smiling pansies to serve as official greeters beside the kitchen door.

As each day's activities make his sensibilities more acute, he begins to examine more closely the textures in his garden. He considers the rightness of the pavings he lays, the mulches he puts down and the ground covers he selects. He watches each day's sunlight patterns to better determine where to locate the forsythia he expects to plant in the fall.

One day he might install a small

sculpture in a bed of rose heliotrope, another day shape a dwarf fruit tree to fan across a terrace wall. In one glorious blooming season he can be horticulturist, sculptor, painter and landscape designer.

While he is enjoying the fragrant flowers, the nutritious vegetables, the warm sunlight and the soft rain, he suddenly realizes that taste, touch, scent and sound have become as important to him as sight. And that's enough reason to garden anywhere. □



Above—'Dortmund' rose climber

Above right—*Viola tricolor hortensis*, a hybrid

Right—Pink *Astilbe* floating over a sea of golden yellow *Achillea*



NICOTIANAS

The History, Cultivation and Uses of Tobacco

Jeanne Hawkins
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The origin of the custom of tobacco smoking is lost in antiquity, although it is believed to have originated with the American Indians as early as 100 A.D. Almost all of the North American natives used tobacco, usually smoking it, but using it also as snuff. Some believe the name "tobacco" referred not to the plant but to the pipe in which the leaves were smoked, known as *habocq* in the Delaware Indian language. Other authorities have attributed the word's origin to the island of Tobago in the West Indies.

Although Cortez sent several tobacco plants to Spain from the Yucatan in 1519, it wasn't really until 1560 that the plant was introduced to Europe by Jean Nicot, a French Consul in Portugal, who sent the seed to Catherine de Medici. The generic word, *Nicotiana*, is derived from his name.

Tobacco smoking was not introduced to England until 1586 by Sir Walter Raleigh, and the controversy concerning its use began soon after that time. About the beginning of the 17th century, Pope Urban VIII prohibited the use of tobacco snuff during the church services. As early as 1625 the Sultan of Turkey prohibited its use on pain of death, and the same was true in Persia. In India the Emperor Jahangir opposed it. James I published his "Counterblaste To



N. glauca

U.S. Department of Agriculture

Tobacco" in 1604 and described it as a loathsome custom and dangerous to the lungs. It was, of course, James I who had Sir Walter Raleigh beheaded, and at least one commentator of the day believed Raleigh's smoking was a contributory cause. There were some individuals, on the other hand, who proclaimed smoking to be a cure for colds and fevers. Many a schoolboy was handed his daily pipeful to prevent plague.

The first tobacco plantations were begun in 1535 in the West Indies; the plant was not cultivated in Virginia until 1586. By 1640, there were 7,000

shops in London that sold only tobacco leaves.

The more than 70 species of nicotiana are members of the Solanaceae or Nightshade Family, of which about 45 are North American species. The tobacco of commerce, *N. tabacum*, is an erect, strong-smelling annual growing from 3 to 10 feet tall. It has ovate, heart-shaped to lanceolate leaves that are hairy and glandular. The flowers occur in a large, terminal, many-flowered panicle. It is a long, tubular flower, the corolla varying from a greenish-cream to pink or red. It is 1/2-inch to 5/8-inches long with a long, dilated throat of about 1 to 1 1/2 inches. The flower is carried well above the foliage. The anthers are often slightly exserted. The entire plant rises from a basal rosette. All of the cultivars have similar tubular flowers. The variations occur largely in the size, color, fragrance and time of opening.

Other species used as tobacco are *N. persica*, Persian tobacco; *N. fruticosa* from China; *N. quadrivalis*, once smoked by the American Indians of the Far West; and *N. repanda*, used in making Havana cigars. In Australia, *N. suaveolens*, *N. gossei* and *N. excelsior* have been used.

While the genus yields tobacco, it also includes a number of ornamental species. They are easily grown as potted plants or as borders and are used for flower arrangements. The highly fragrant ones are largely derived from *N. alata* and the hybrid *N. X sanderae*. They are generally

treated as half-hardy annuals.

N. alata, from which most of the popular cultivars have been derived, is known as Jasmine Tobacco or Flowering Tobacco. It is a greenish-white flower with purple anthers. It has a delicious fragrance as do all of its cultivars. The cultivar 'Grandiflora' has yellowish flowers about two inches across, almost double the diameter of *N. alata*, and it has a larger, more dilated throat. 'Nana' has dwarf white flowers; 'Rubella' has rose-red flowers and 'Limegreen' has pale-green flowers. Many of the early cultivars had the same drawback as the species from which they derived in that the flowers closed in full sunlight so that the best time to observe the beauty and to smell the fragrance of the nicotianas was at dusk. However, 'Daylight' is open during the day and was the first cultivar to overcome this drawback. Since then additional varieties have been developed, many in colors other than white. If you are investing for the flower, it is well to ascertain whether or not you have a cultivar of this type.

N. X sanderae has produced numerous cultivars. It has a greenish-yellow flower tinted in rose, generally described as somewhere between pink and carmine. Its cultivar, 'Suttons Scarlet,' is a large-flowered plant with a deep-red corolla. 'Crimson King' and 'Knapton Scarlet' are other popular reds.

N. sylvestris, a white, and *N. suaveolens*, a cream-colored flower with green to purple veins, are also popular. There are many *Nicotiana* species which have been grown throughout the world, usually depending on which are native to a particular region. The fragrant species are pollinated by a long-tongued moth attracted by the aroma.

N. tabacum and *N. rustica*, although grown commercially, are attractive garden plants. *N. rustica* is smaller and hardier than *N. tabacum*. It is known as Small Tobacco.

Nicotianas were used by the Indians to reach a narcotic state. It can cause severe poisoning if eaten as cooked greens. In fact, nicotianas should never be used as foods, greens or otherwise. They cause severe vomiting, diarrhea, slow pulse, dizziness, collapse and respiratory failure.

Nicotine is used, however, as an effective insecticide on vegetables. It kills plant lice and caterpillars and usually can be purchased in powder form. It was also the great old-time wormer, particularly for livestock which were fed cured tobacco for that purpose.

As a medicinal herb, it was generally used as a poultice, but was noted as a heal-all. It was described as a hallucinogen by Gerarde in 1619. He noted its use in alleviating migraine headache, toothache, gout and insomnia. It was also used for ulcers and painful tumors. However, tobacco's use as a medicinal is limited because of its severe side effects on humans who can absorb the extremely poisonous portions through the skin.

Propagation of most *Nicotiana* species is quite easy. Seeds can be sown in pots or pans of light soil in a greenhouse in late winter or early spring. Until seedlings appear, they will need shade. When hardy enough to transplant, place in a compost or loam or leafmold. The plants should be placed singly in pots when large enough. They should be hardened in early summer in a frame. If planting outdoors, place them in growing position in a well-drained, sandy soil. Most of the ornamental cultivars can be started from cuttings using perlite or sandy soil for rooting. *N. alata* 'Grandiflora' can be started by root cuttings. Although sensitive to frost, nicotianas are easy to grow both outside and as pot plants. Selected strains of *N. tabacum* and *N. rustica*, formerly tropical species, can be cultivated as far north as the Yukon Territory and Hudson Bay, and as far south as Buenos Aires, Argentina.

Tobacco seeds are exceedingly

fine; one ounce can contain as many as 300,000 seeds. The plants like a soil without high concentrations of nitrogen, but one which is well-drained and high in potash and potassium. A light sandy soil and high humidity with subsequent feedings will usually grow successful plants.

The nicotianas used for tobacco are rarely fragrant. Often they have an unpleasant odor which may be a partial reason for adding flavorings. While all nicotianas have attractive flowers, you will need to determine your purpose before you pick which of the species or cultivars you want to grow.

Nicotianas are *the* tobacco plant, but there is another genus of Solanaceae known as an ornamental tobacco. This is *lochroma*, a shrub or small tree of the western, tropical South American area. *Lochroma* is Greek, meaning "violet-colored." It is cultivated and propagated in the same manner as the nicotianas and the species are extremely showy plants. While there are about 20 species of *lochroma*, the most commonly grown in the United States is *I. lanceolatum*, originally from Ecuador. Usually this has purple, trumpet-shaped flowers that hang in pairs or in large tubular clusters; or, they may be white, blue, scarlet or yellow. Other species are from Peru and Colombia. Most are herbaceous annuals here.

I. tubulosum has a very long, pendulous, purple tube-flower and is ideal as a summer patio plant. It is sometimes called "Violet Bush."

I. fuschioides, a scarlet species, is suspected of being narcotic. Several *lochroma* species are used locally in South American hallucinogenic drinks. Many arboreta and botanic gardens include *lochroma* in their collections.

Nicotiana and *lochroma* species do not seem to be insect prone, but they are subject to fusarium wilt, tobacco mosaic and nematodes. For effective control use sterile soils for potted plants and treat the soil in garden plots with fumigants. □



A ROCK GARDEN PLANT LIST

Pamela J. Harper
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Rock gardening is a challenge, but the enthusiast rises to that challenge, skillfully building a miniature mountain in a suburban setting, a woodland corner in a tiny city lot, a bog in a desert (and vice versa), or whatever setting ingenuity can contrive to cajole the plant of one's heart's desire into growing perhaps thousands of miles from its natural habitat.

If you cannot, or will not, strive to please alpine primadonnas, plenty of unexacting plants remain. Nor do you need a rock garden; a raised bed or the front of a border will do. None of the plants described here are intractable, nor are they commonplace. They are suitable for beginners yet are also the backbone of the collector's garden.

There are plants listed here for sun, for shade, for moist soil and dry. Unless otherwise indicated, they are hardy in New England. To list hardiness zones for these low growing plants would be misleading because a plant succumbing to a



Left—*Iris pumila*

Right—*Geranium dalmaticum*

snowless Zone 7 winter might yet survive under a foot of snow in Zone 5, or perish during the "summer mugs" of Zone 9. Nor can generalized statements substitute for individual discretion in selecting the best site. A plant which grows well in full sun where summer is short and the temperature is rarely over 80° might well be the better for partial shade where summers are tropical or lacking in moisture. The best way to find out which rock garden plants grow best in your region is to join the American Rock Garden Society (Secretary, Box 183, Hales Corners, WI 53130) and visit the gardens of local members. Recommended books: *Rock Gardening* by H. Lincoln Foster (out of print but available from most libraries and from specialists in horticultural books), *Collins Guide to Alpines* by Anne N. Griffith, and *Rock Gardens* by George Schenk (Sunset).

Ajuga

Most bugles are too ebullient for the rock garden. 'Burgundy Glow' ('Rainbow,' 'Multicolor') also spreads but it looks refined, roots shallowly and is not hard to restrain. The leaf rosettes are green and cream, liberally stained with beet-juice red; the flowers are blue. 'Metallica Crispa' does not run. Its burnished mahogany leaves are blistered and puckered.^{3,4,6,*}

Aquilegia flabellata 'Nana Alba'

A chunky columbine about eight inches high, this plant's fan-shaped, scalloped leaflets are blue-green. Spurred flowers are sparkling white and cup-and-saucer shaped with five green-tipped sepals surrounding the petal cup. The plant is tap-rooted and needs deep soil. It prefers partial shade or sun if set in moist and well-drained soil. Leaves are sometimes marred by leaf miner.^{3,6.}

Arenaria montana

This plant is a low heap of small-

leaved, semi-sprawling stems coming from a central root, not a spreader. It is whitewashed in spring with upfacing, three-quarter-inch snowy-white flowers. Light soil is preferred but the plant is adaptable. It likes the sun and is easily raised from seed sown in March. Protect it from slugs when newly set out.^{2,5,6,7.}

*The plants
described here are
suitable for beginners
yet are also the
backbone of the
collector's garden.*

Aster alpinus

A gold-disked Michaelmas-daisy, its rays are usually mauve but can be violet, pink or white. It blooms singly on stiff 6- to 12-inch stems in late spring or early summer. Flat rosettes of dark green, spatulate leaves quickly form dividable clumps. It likes sun and well-drained, but not dry, soil.^{3,6,8.}

Cyclamen

Cyclamen look fragile but are remarkably sturdy. There are species for all seasons, the two described here being the hardiest (Zone 5) and easiest to grow. These varieties are miniature versions of the florist's cyclamen but have prettier leaves. They are content with dry shade where few other plants thrive. The soft pink flowers of *C. hederifolium* (*neapolitanum*) pop up in autumn before the leaves appear. The leaves emerge in late autumn and last until spring. They are arrow-shaped and a dark green color intricately and variously overlaid with silver. There is a white-flowered form as well. *C. purpurascens* (*europaeum*) has fragrant shuttlecock flowers of a slightly

deeper pink concurrently with the rounded, marbled leaves in summer and early autumn. Plant cyclamen corms with their convex side down, barely beneath the surface of the soil. Fertilizer is neither needed nor desirable but an occasional top-dressing of sifted leafmold is helpful. Plant them in a shady or half-shady area.¹⁰

Dianthus deltooides

These plants have dark green, tiny-leaved mats sheeted in late spring and summer with tiny magenta "pinks." They are not always long-lived but usually replace themselves with self-sown seedlings. A white form comes true from seed. There are also named kinds, among them the crimson 'Brilliant.' The plants like sun and well-drained soil.^{2,3,6.}

Erodium chamaedryoides 'Roseum'

This is a good-tempered little hummock of dark green, spoon-shaped and scalloped leaves, dotted through the summer with pink, red-veined flowers. The species, white with pale pink veining, is just as pretty but less often seen. In the northwest, plant them in well-drained soil and full sunlight. In the southeast, plant them in a shadier area. They are not reliably hardy below Zone 7.^{5,7.}

Gentiana septemfida

(*G. lagodechiana* is similar)

All who have seen them yearn for the incomparable blue of gentians. Many are temperamental; few like hot, humid summers. This is the most adaptable species and is not difficult to grow in any humus-rich soil which does not dry out. If the soil does dry, add peat or leafmold. A raised bed or slope is best for these plants. Plant them in a north or east position facing south. In cooler regions, full sun is acceptable. Trailing stems are tipped in late summer with clustered trumpets which have green and speckled throats. The seed may produce poor purplish

blues; nursery stock is usually propagated by cuttings from selected bright blue forms.^{3,7.}

Geranium dalmaticum

In late spring and early summer, pink butterflies seem to hover over cushions of rounded, deeply incised leaves with several delicate flowers per seven-inch stem, each 1½ inches across. The clumps spread steadily and can be divided. A white form is equally lovely. Plant them in full sun or in a partially shaded area in deep, well-drained soil.^{1,2,3,4,6,7,8.}

Geranium sanguineum 'Lancastrense'

Flat-faced, satiny, pale-pink flowers veined deeper pink sit atop low domes of rounded, narrow-lobed leaves through much of summer. This plant is easy to grow and reliable in full sun or partial shade. Plant them in rock gardens, a raised bed, the front of a border or grow them vertically in a wall crevice.^{2,3,5,8.}

Hedera helix 'Conglomerata'

This plant looks like a twisted, congested ivy with a bonsai look. Crimped dark green leaves crowd on stiff stems. There seem to be two forms, the one most often seen (sometimes listed as 'Conglomerata Minima') making a gnarled six-inch bushlet in as many years. It grows best in a partially shaded area in soil which is neither wet nor bone dry.^{11.}

Hosta venusta

This plant is one of the more vigorous dwarf forms of the Plaintain Lily. It is about four inches high with

slender leaves and one-foot spires of mauve flowers in June and July. In moist soil and partial shade it steadily grows in width and is readily divided. Late to emerge in spring, it can occupy the same front-of-the-border bed as early anemones (*A. blanda*, *A. appenina*) which die away about the time the *Hosta* spears through the ground.^{7.}

Iris pumila

This is a six-inch version of the tall, bearded iris. It likes the same growing conditions as its cousin (sun, well-drained soil), multiplies as rapidly and is available in almost as many colors.^{3,5,6.}

Ophiopogon planiscapus 'Nigrescens' ('Arabicus')

This dwarf Mondo Grass, or Lily-turf, seems to be hardier than the green-leaved *O. japonicus*. The leaves, in grassy tufts, are a dark purple approaching black and show to best effect against the gray of paving stone or rock. Pink flowers may bloom in late summer or in autumn. The plant spreads by stolons fairly rapidly once it is established in deep, sandy soil. It grows more slowly in clay. The new plantlets are quite widely spaced but look more effective replanted closer together. It likes sun or partial shade.^{1.}

Potentilla X tonguei

This plant has a long flowering season—from early summer well into autumn. It is best grown atop a sunny wall or tumbling over a boulder. Primrose-shaped flowers, a pri-

cot with dark orange eyes, trail out on branching, wiry stems as much as two feet long. Plant these hybrids in sun or partial shade in deep, not-too-dry soil.^{4,7.}

Thalictrum kiusianum

This is an exquisite Japanese miniature Meadow Rue barely five inches high, bearing pinkish lavender flower tassels through much of summer. It steadily spreads by stolon in moist, dappled shade. Mark where it grows since it is slow to reappear in spring.^{3,7,8.} □

Source List

1. The Wild Garden, Box 487, Bothell, Washington 98011. Catalogue \$1.00.
2. Alpines West, Rte. 2, Box 259, Spokane, Washington 99207. Catalogue 50¢.
3. Sheppard's Gardens, Burlington Road, Harwinton, Connecticut 06790. List 28¢ postage.
4. Rakestraw's, G3094 S. Term Street, Burton, Michigan 48529. Catalogue 50¢.
5. Alpenglow Gardens, 13328 King George Hwy, Surrey, B.C. V3T 2T6, Canada. Catalogue \$1.00.
6. Alpenflora Gardens, 17985 40th Avenue, Surrey, B.C. Canada V35 4N8. List.
7. Siskiyou Rare Plant Nursery, 522 Franquette Street, Medford, Oregon 97501. Catalogue \$1.00.
8. Lamb Nurseries, E. 101 Sharp Ave., Spokane, Washington 99202. Catalogue \$1.00.
9. Jamieson Valley Gardens, Jamieson Road, Rte. 3, Spokane, Washington. Catalogue 50¢.
10. Edgar L. Kline, 17495 S.W. Bryant Road, Lake Grove, Oregon 97034.
11. The Alestake, Elkwood, Virginia 22718 (specialists in ivy).



Australian Wildflowers

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Australian wildflowers are rarely found in our homes and greenhouses. Yet who could browse through a pictorial guide to Australian wildflowers and not yearn to cultivate them? Australia's isolation has given birth to a flora different from that of any other continent. The vegetation has evolved to cope with extreme heat, drought and extraordinary fluctuations in temperature. Are not these the very same conditions found in most homes?

The flora of Australia is confined to approximately one-third of the country. Lack of rainfall renders the rest arid desert land with skeletal soil. This the Australians lovingly refer to as the 'out-back.' Along the eastern and western coastlines sufficient rainfall supports the majority of Australia's flora. Here most of the small bushes and wildflowers appear in the open forest country where the plants are partially shaded by tall eucalyptus trees and receive a rainfall of as little as ten inches per year; many of Australia's most unusual exotics grow along the river banks.

When Captain Cook made his first expeditions to Australia in the 1770's, he noted that this was a land unlike any country he had ever seen. He found the climate dry and hot, noting few rivers. The soil appeared to be of poor quality, characterized by either sand or clay. Along the coast, in the heaths, he discovered the common *Leptospermum scoparium*, a plant particularly well adapted to its environment. *Leptospermum scoparium* var. *rubrum* has tiny rose-like flowers with pink and red petals surrounding a shiny black center. It was identified as a member of the Myrtaceae, a family which also contains the famous eucalyptus. Finding the land devoid of plants for sustenance, the crew attempted to brew a concoction of the leaves, thus dubbing the *Leptospermum* as the Tea Tree.





Along the eastern and western coastlines sufficient rainfall supports the majority of Australia's flora.

In the scrubland, *Leptospermum* is constantly subject to drying winds and high temperatures. To conserve moisture it has adapted tough, tiny leaves crowded along woody stems to minimize exposure to the sun's rays. Seeds are encased in a hard, dry capsule which can only be split by one of the frequent brush fires. When the mother plant is killed, the charred ground is covered with her tiny seedlings. So adaptable is *Leptospermum* that it is found surviving in poorly- and well-drained soils, even along the coast where it is constantly exposed to sea spray.

Leptospermum scoparium is equally adaptable as a houseplant. Above all it requires a sunny position and a well-drained, sandy soil to reward the grower with its abundant nectar-filled flowers. The Tea Tree begins to flower in late fall and continues blossoming throughout the winter. During this time *Leptospermum* prefers to be well watered. When grown in the home, the plant must never be allowed to dry out. However, in a greenhouse environment, watering need not be so frequent. A fertilizing program of one-half-strength 20-20-20 is advisable once a week in the greenhouse, once every two weeks in the home. If the root growth necessitates repotting, graduate the plant one pot size at a time.

After flowering, *Leptospermum* may be pruned. In early summer 'heel cuttings' of the new shoots, approximately three inches long, should be taken. Do not prune the old wood, as mature two- to three-year wood initiates next year's flowers. *Leptospermum*s become stunning specimens; even the foliage is eye-pleasing. Putting your larger specimens in the ground outdoors during the summer will bring a beautiful red tinge to the foliage and produce a more compact plant.

Another common myrtaceous plant of Australian heaths is *Chamelaucium uncinatum* or Geraldton Wax flower. *Chamelaucium* grows along three hundred miles of coastal limestone formations as a four- to eight-foot shrub, but it reaches a lofty twenty feet along the river. During September through December it lends color and fragrance to the heaths with its delicate pink flowers.

Chamelaucium will perform admirably in any cool greenhouse. If afforded ample sun during the winter months, the larger plants will blossom freely, releasing a sweet aroma well worth the waiting. Cuttings may be obtained after the plant has blossomed and new growth has hardened. Removal of the older wood will sacrifice next year's flower display. These cuttings should be dipped in hardwood hormone and placed in clean sand and left undisturbed for one to two months while a callus is formed. Only when a brittle taproot develops should the cutting be carefully removed from the sand and

potted in a well-drained, friable soil. Staking is required for even the youngest plants to aid in the formation of a stem strong enough to support the bush. As the root system develops, graduate the plant slowly into larger pots with heavy but well-drained soil. Whereas the small plants require frequent watering, larger specimens may require watering only once a week depending upon growing conditions. The fertilizing program should be similar to that of *Leptospermum*.

Also collected on Captain Cook's expedition was *Pittosporum undulatum*, a member of the Pittosporaceae. Not only has this bush proved to be a significant frost-free evergreen in milder climates, but it has proved valuable in commerce as well. The close-grained wood is used in the manufacture of golf clubs and the ever popular European croquet mallets. A perfume reminiscent of the combined aroma of jonquil and jasmine is extracted from the sweet-scented blossoms.

Pittosporum undulatum, or "Native Laurel," forms hedges in the mountain forests of the coastal regions of Australia. Here the climate is more stable. The rainfall is evenly distributed throughout the year, not subjecting *Pittosporum* to any periods of moisture stress. The temperature does not fluctuate as greatly as in the grasslands. The soil is deep and humusy, also supporting the Australian Mountain Ash, a tree comparable in height to our giant Pacific redwoods.

Pittosporum is easily grown, requiring little bother. Even on young plants, clusters of small, off-white bells appear in midwinter. *Pittosporum* prefers full sun but will also grow in filtered sunlight. It is fast growing and should be repotted frequently in a humusy soil. Fertilize often in the summer during the growing stage.

Following Captain Cook's expedition, a French explorer, Bruny D'Extrecasteaux, sailed to Australia in the 1790's with his botanist Jacques-Julien LaBillardière. In woodlands similar to those where *Pittosporum* was found he discovered another member of the Pittosporaceae, later named *Sollya fusiformis* or 'Australian Blue Bell.' *Sollya* is a vine attaining a height of eight feet. If kept very cool and afforded full sun in midwinter, it will produce drooping cymes of bright blue, bell-shaped flowers. *Sollya* can withstand extreme heat, even drought. Although the plant can survive in a small pot, to produce blossoms it is best to keep the plant repotted and fertilized. The best results have been obtained from planting older specimens in a greenhouse bed.

Also discovered by botanist LaBillardière on the same expedition was *Chorizema cordatum*, or 'Holly-leaf Flame Pea.' Nearly perishing from thirst, the botanist and crew finally came upon a water hole and this merry little

legume with brick-red and bright orange flowers. They danced in their jubilation and the plant was aptly named *Chorizema*, 'choros,' meaning 'to dance in a circle' and 'zema,' meaning 'drink.'

Chorizema, if properly pruned, becomes a small, three-foot-high bush with brittle holly-like leaves. In late fall and throughout the winter it will burst into an irresistible display of color. At this time, *Chorizema* can tolerate temperatures as low as 50° F. but full sun must be provided. Cuttings can only be successfully rooted after blooming in the spring when the new growth is soft. *Chorizema* can tolerate neither drought nor drenching. Like most legumes, it needs ample root room, therefore repot often in a porous soil.

Another legume appearing along the waterways in the drier country of Australia is the *Swainsona galegifolia* or Darling River Pea. Growing four feet high, the lacy vetch-like foliage is crowned by snow-white 'Albiflora' or rose-pink 'Violacea' flowers. *Swainsona* will grace any cool greenhouse or home with its abundant bloom from early winter through early spring. *Swainsona* requires the same growing conditions as *Chorizema* in all aspects except watering. If watering is neglected poor *Swainsona* wilts quickly, drooping its tiny buds and flowerlets pitifully. Sensitive to bright sunlight, *Swainsona* should be shielded from direct rays, especially after a period of dark weather.

Next to explore Australian flora was Robert Brown, a young Scottish botanist on Matthew Flinder's expedition in 1801. Brown collected and described 4,000 species of plants, the majority new to botany. Along the shaded watercourses in the mountainous regions of the coast he found *Prostanthera rotundifolia* or Mint Bush, a member of the Labiatae. True to its name, *Prostanthera* is as pleasing to the nose as it is to the eyes. When crushed the tiny leaves emit a delightful aroma less pungent than mint. These leaves yield an essential oil used medicinally as a carminative. In late winter and in the spring, the small bush is bedecked with tiny purplish-blue flowers.

Prostanthera is not accustomed to extreme heat; therefore shield it from direct sunlight during the summer months. Similarly, the Mint Bush requires abundant water to aid in cooling the root system. Although *Prostanthera* grows rapidly, severe pruning can be the plant's downfall. The best method of growth control is to pinch out the soft growing tips. If taken sparingly, cuttings can be rooted in the springtime.

Australia is the homeland of one of the most beautiful hibiscus species, *Hibiscus huegelii*, or the Lilac Hibiscus. Baron Karl von Hugel, an Austrian botanist, first discovered this hibiscus in an intensive study of the Swan River Colony of southwestern Australia in 1833. Not only unique for the light lavender color of the blossoms, *Hibiscus huegelii* has deeply cut foliage which closely resembles a rose-scented geranium. *Hibiscus huegelii* grows around lakes in the warmer regions of northern and southern

Continued on page 29



Above—*Hibiscus huegelii*

Below—*Swainsona galegifolia*



Rhododendrons of the Southern Mountains

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Miles upon miles of jumbled blue peaks form that lovely part of our country, the Southern Appalachians. At lower elevations, waterfalls tumble over gray rocks in mighty roars or little trickles, headed eventually for either the Gulf of Mexico or the Atlantic. At five or six thousand feet, the clouds settle, cap-like, on the mountain tops or drift erratically among the spruces and through the gaps. These southern mountains are, as a whole, the Blue Ridge, formed of many distinct ranges—the Great Smokies, the Nantahalas, the Blacks, the Balsams, the Craggies and others. They are old mountains, more softened in form by the millennia than are those of the West. I grew up there, among those mountains, loving them. From my Georgia home we could see four states—our own, South Carolina, North Carolina and a few high peaks of the Smokies in Tennessee. One almost *had* to feel the Biblical words, “I will lift up mine eyes unto the hills.” They say the seacoast children have the ocean in their blood; I know I have mountain air in mine.

Spring in the mountains means the coming of wildflowers. Tiny treasures on the forest floor precede the shrubs and trees. By April the azaleas (genus *Rhododendron*, too, of course) begin, and the first trees open their delicate blossoms. Have you ever seen the soft pink and white touches of Redbud (*Cercis*



Above—*R. maximum*

Left—Masses of *R. catawbiense* cover a North Carolina hillside.

canadensis) and Serviceberry (*Amelanchier laevis*) mixed with the pale green of new leaves? A French Impressionist would have loved to paint such a hillside. In late May the first of the two lower-elevation mountain rhododendrons, and the only one close to my home, comes into blossom. This is *R. minus*. I remember walking from our house, past a long-gone pasture fence, crossing “The Cascades,” and climbing the long steep hill covered with pale-pink, lavender-pink and white flowers. These rhododendrons of my childhood grew at two thousand feet and less, but it was a short and easy drive to the more northerly or higher homes of the other three species.

The genus *Rhododendron* (in the

Heath family, and therefore cousin to such lovely and diverse plants as *Oxydendrum* and *Kalmia*) is divided into two distinct groups. One, the Lepidote, has scales on the underside of the leaves. These are quite visible under a x8 hand lens. On new leaves, the scales are really very pretty, looking like dew drops or clear glass beads; older leaves have rusty scales. The other group is the Elepidote (no scales). There is some hairiness instead, ranging from that invisible to the naked eye to real “fur” (called indumentum). Alas, no American species has this very attractive characteristic, only some Asian ones do. Our southern mountains have four rhododendrons—two representatives of each group. The further division of the genus is

into Series. Our two Lepidotes are both in the Carolinianum Series (*R. minus* and *R. carolinianum*), and our two Elepidotes are in the Ponticum Series (*R. catawbiense* and *R. maximum*).

When all four grow in the same place, say a Long Island garden, the floral procession goes like this: first *R. carolinianum*, then *R. catawbiense*, followed by *R. minus* and *R. maximum* at about the same time. This makes a bloom period of mid-to-late May through early July. In the southern mountains the timing pattern is not the same because of differences in elevation. If you want a flower tour, go in May for both Lepidotes; *R. minus* will be blooming at lower elevations when *R. carolinianum* is still coloring the higher mountains. For the fantastic display which *R. catawbiense* produces, visit the high mountains in mid-to-late June. There are stands of *R. maximum* all the way into New England, but if you want to include them on your June trip you will find them in bloom along the streams at levels of two thousand feet or so. This species extends to the mountain tops, though its bloom there is belated.

I will describe each rhododendron in the bloom sequence "at home" in my mountains.

First, *R. carolinianum*. This beauty has almost every virtue one could ask for. There is a neat and polished look to the leaves (which average a bit less than three inches in length), and happy plants are profuse in their blossoming. Although there is often a lavender tinge to the pink, I find this perfectly acceptable in the wild or in a woodland garden. Deep clear pinks are not at all uncommon. A white form, var. *album*, is very beautiful, and there is an occasional rare double to be found. *R. carolinianum* is usually a woodland plant, but there are many growing on open mountainsides in North Carolina. (I would suggest good sunlight for best garden bloom.) Mature plants are six feet or so in height. The natural range is higher and more northerly

than that of *R. minus*, which it closely resembles.

I said, "almost every virtue": *R. carolinianum*, though definitely evergreen, holds only one year's leaves at a time and sheds last year's leaves in the fall. Often, however, these turn a deep, winey red and make for an attractive few weeks.

We grow our own from cuttings (this year, only white ones), and they are as hardy as can be. Good companion plants for the garden are Mountain Laurel and tufts of fern,

*Maurice Brooks
was once directed by a
country woman to a
rhododendron she said
was "yaller as a cow
punkin."*

with perhaps some *Galax urceolata* as a ground cover. Our garden plants must have known of my love for the species: long ago, when we first timidly dared enter a truss (of anything) in an American Rhododendron Society show, we brought *R. carolinianum*. It won "Best of Show."

Rhododendron minus covers innumerable hillsides in the lower Georgia mountains, typically above streams, climbing up and up into the deciduous woodland. You find it listed as "tall" (despite its name)—even 30 feet—but in all these years I have yet to find such giants. I would say an eight-foot plant is mature. Here in my Long Island garden I have two specimens, now about 20 years old. They are fine, healthy rhododendrons—but are six feet wide and only four feet tall.

R. minus is completely hardy, surviving New York's worst winters unscathed. Bud-set is prolific, but there is a major flaw. As the buds do not open until about July first, and the sun is hot then, the flowers of

this southern mountaineer cannot withstand the temperature. (Neither can the owner. People have the mistaken idea that "South is synonymous with "hot." Not so. On Long Island, I retreat into an air-conditioned house and wish I could bring the unhappy *R. minus* in with me.) The pale pink blossoms open, yes, but by ten o'clock in the morning the poor plants seem hung with drooping bits of colored Kleenex. As the flowers are every bit as attractive as those of *R. carolinianum*, this is a shame. Never once in my garden has a bee been able to pollinate a flower, and no seed has ever set. As most of the Lepidotes are quite early bloomers, the lateness of *R. minus* could be a northern hybridizer's dream for extending the season; he would, however, have to find something with more "substance" to the flower for the other parent. A virtue of *R. minus* is that it blooms well in complete deciduous shade. Mine in the garden are under dogwood and maple (taboo!).

R. catawbiense is the King (or Queen?) of our American rhododendrons, not only for its regal flowers, but also because it is the ancestor of so many much-used garden hybrids. A royal dynasty, as it were. It is a large-leaved, high-mountain plant, growing from Georgia to Virginia. In many places it covers the well-known Heath Balds of the Appalachians, but it thrives also in company with the Red Spruce (*Picea rubens*). As *R. catawbiense* blooms at the same time as the Flame Azalea (*R. calendulaceum*) and Mountain Laurel (*Kalmia latifolia*); some of the most spectacular flower gardens in the world are naturally there in the mountains in mid-to-late June. (See my article on Eastern Native Azaleas in the April, 1978 issue of *American Horticulturist*.)

The blossoms of *R. catawbiense* range in color from a pale lavender-pink, through deep pinks and magenta shades, to a deep purple. Good reds have been found, and there is an occasional white. Areas of

massive bloom include Roan Mountain, on the North Carolina-Tennessee border, and Craggy Gardens on the Blue Ridge Parkway. Someone from California wrote me that he thought Roan Mountain, to which I had directed him, rivaled the Himalayas! (Not having been to Asia, I can't say.) I was on Roan last summer, camera in hand as usual, but bloom dates vary and it was about a week too early. A compensation was to photograph a surprising ground cover for rhododendrons . . . the whole mountaintop was carpeted in bluets (*Houstonia caerulea*).

In many places of sheer rock cliff—not at all resembling the nice rich garden soil we use for cultivated rhododendrons—one finds bouquets of *R. catawbiense* holding fast onto some tiny and invisible crack in the gray rock. *R. catawbiense* scarcely needs to prove its hardiness.

Rhododendron maximum, the other large-leaved Elepidote, is the last of our southern mountain rhododendrons to bloom. The plants mix with *R. catawbiense* in some of the spruce areas at high elevations (though not on the Heath Balds). A somewhat more usual habitat is practically anywhere along a stream. It grows at two thousand feet in hemlock forests, along with *Ilex opaca* and *Leucothöe fontanesiana*, perhaps by a trout pool below a waterfall. The *R. maximum* bloom is usually whitish pink with trusses not really large enough for the leaves, and blooms after new foliage partially conceals the flowers. That may not sound very spectacular, but there are some large-flowered whites, and many pretty ones with the “apple-blossom” effect of pink buds and white blossoms. David Leach has written of red ones in North Carolina which I have yet to see. Maurice Brooks was once directed by a country woman to a rhododendron she said was “yaller (yellow) as a cow punkin.” One joy of woods-wandering is that a rarity just *may* turn up around the next ridge.

I find the downgrading of *R. maximum* pointless. For show trusses, yes, but it is a fine screening plant. A group of six shields our terrace from our driveway, and does its job perfectly. In the wild, huge old plants form mazes of twisted trunks—a really formidable forest—but used in the open *R. maximum* will keep a mounded shape.

If you have never seen wild rhododendrons, you have something special awaiting you. You are probably growing some hybrids

Someone from California wrote me that he thought Roan Mountain rivaled the Himalayas!

using our natives in your garden already without realizing it. When you find their ancestors on a southern mountain top, you will catch your breath in delighted surprise, nonetheless. The blue distance or the stream-filled ravine enhances rhododendrons as few gardens can.

Hybrids from our Natives

Hybridizing is the crossing of species (and the further recrossing and back-crossing). Hybridizing our *R. catawbiense*, both between forms (intraspecific) and with Asian species, began in Europe. Hardy hybrids from the Waterer nursery in England were produced early in the 19th century, and became the rhododendrons in American gardens by 1900. Hybridizers in our own country did not begin much serious work until the twenties. Many fine hybrids are being registered every year. The *R. catawbiense* is still being used; *R. maximum* is also, but less often as there are more flower faults. *Rhododendron carolinianum* has pro-

duced some marvelous hybrids, almost all American. *R. minus*, rather inexplicably, has not been used very frequently.

I can only suggest, in alphabetical order under the species, a very few of the hybrids of at least partially American descent which are much used today. We must thank our southern mountains for them.

Rhododendron carolinianum

‘Conestoga’ (pink)
‘Conewago’ (rose-magenta)
‘Dora Amateis’ (white)
‘P.J.M.’ (rosy purple)
‘Purple Gem’ (violet-purple)
‘Ramapo’ (strong violet)
‘Windbeam’ (lovely pink)

Rhododendron minus

‘Codorus’ (pink)
‘Myrtifolium’ (lilac pink)
(Note: Dr. Henry Skinner has a ‘Bowie’ which I don’t know. We are growing an un-named white, *R. minus* x *R. carolinianum*, crossed by Dr. August Kehr. Hybridizers, get busy!)

Rhododendron catawbiense

‘Album Elegans’ (mauve, fading white)
‘America’ (dark red)
‘Atrosanguineum’ (red)
‘Atroflo’ (rose)
‘Belle Heller’ (white, yellow blotch)
‘Boule de Neige’ (white)
‘Cheer’ (pink, red blotch)
‘Cynthia’ (rosy crimson)
‘David Gable’ (pink, red throat)
‘Duet’ (yellow, edged pink)
‘Lee’s Dark Purple’ (purple)
‘Madame Masson’ (white, yellow blotch)
‘Mrs. C.S. Sargent’ (carmine, greenish-yellow blotch)
‘Pinnacle’ (lovely pink)
‘Pink Twins’ (pink, hose-in-hose)
‘Pink Cameo’ (clear pink)
‘Roseum Elegans’ (lavender pink)
‘Roslyn’ (light lavender)
‘Sefton’ (maroon)

Rhododendron maximum

‘Bonbon’ (cream)
‘Lady Clementine Mitford’ (peach, darker edge)
‘Lady Eleanor Cathcart’ (pale pink, purplish blotch)
‘Marchioness of Landsdowne’ (pale rose-violet)
‘Van Nes Sensation’ (pale lilac edges on white)

Collecting Wild Seed



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Propagation of native wild flowers has assumed a role of increasing importance over the past several years, especially since a large number of North American plants have been recognized as endangered species. Native plant enthusiasts must be advised not to collect whole plants from the wild unless they are directly threatened by real estate development or other significant land changes. All too frequently collected plants perish shortly after transplanting despite careful handling. Many populations of native plant species have been diminished or decimated by such practices.

The most constructive alternative to removing whole plants from their natural habitats is to collect and sow their seeds, thereby greatly improving chances of germination and survival. Of course, some seeds should be left behind for continued natural rejuvenation and genetic exchange of their respective populations.

Probably the most commonly asked questions about collecting wild seed concern when to collect or how to know when seed fruits are "ripe enough" for harvesting. Many fruits will split open or dehisce very suddenly, scattering their seeds before the collector can return to his prospective harvest. And certainly, seeds from fruits harvested too soon may not germinate. The faded flowers of "sudden-seed-release" plants like Trailing Arbutus (*Epigaea repens*) or Great Trillium (*Trillium grandiflorum*) can be bagged with a sack of fine mesh material such as from a nylon stocking. These bags are removed with their valuable catch

after the fruit dehisces with no loss to the collector.

An understanding of the more common fruit types encountered in our native flora is helpful to the potential seed collector in determining timing and techniques of procuring seed. A fruit may be defined as the plant organ which, having developed from the flower, bears the seeds within it. Fruits may be dehiscent (splitting open at maturity) or indehiscent (nonsplitting). Three basic fruit types are usually recognized: SIMPLE, AGGREGATE and MULTIPLE.

SIMPLE FRUITS—grow from a single pistil (female, ovary bearing part) of a single flower. The pistil may have one (simple) or more (compound) seed compartments inside. Simple fruits may contain one to many seeds depending on species and may be classified as either dry or fleshy. The following are different kinds of simple, dry fruits:

(1) Achene—indehiscent; the single seed within not fused with the surrounding fruit tissue. *Anemone*, *Aster*, *Hepatica*, *Ranunculus*, *Solidago*.

(2) Capsule—dehiscent; pistils frequently compound. Upon maturity of the fruit, each compartment splits open along one seam and exposes the seeds within for dispersal. *Dodecatheon*, *Iris*, *Lilium*, *Uvularia*, *Viola*.

(3) Follicle—dehiscent; has only one compartment, splits open along one seam. *Asclepias*, *Cimicifuga*, *Sanguinaria*.

(4) Grain—indehiscent; the single seed within fused with the surrounding fruit tissue. Grasses.

(5) Legume—dehiscent; grows from a simple pistil, dehisces along two seams. *Baptisia*, *Cassia*, *Cercis*, *Thermopsis*.

(6) Nut—indehiscent; a large, one-seeded, woody fruit. *Corylus*, *Quercus*. Nutlet—a diminutive nut.

(7) Samara—indehiscent; winged fruit. *Acer*, *Tilia*, *Ulmus*.

In simple fleshy fruits, part or all

of the fruit surrounding the seeds is fleshy, often juicy. Two kinds of simple fleshy fruits frequently encountered are:

(1) Berry—usually many seeded. Tomatoes, grapes, cucumbers and peppers are actually berries, as are the fruits of *Actaea*, *Podophyllum* and *Trillium*.

(2) Drupe—usually one-seeded. The seed is commonly enclosed by a hard, stony pit as in plums or peaches, and further enclosed within the fleshy tissue. *Caulophyllum*, *Lindera*, *Nyssa*, *Sassafras*.

AGGREGATE FRUITS—develop from flowers having more than one pistil, or to paraphrase, an aggregate fruit consists of several or many simple fruits (be they achenes, follicles, berries, etc.) all fused into one body as in the raspberry. Golden Seal (*Hydrastis canadensis*) has an aggregate of berries, the Barren Strawberry (*Waldsteinia fragarioides*) an aggregate of achenes, and Wild Columbine (*Aquilegia canadensis*) an aggregate of usually five follicles.

MULTIPLE FRUITS—are often confused with aggregate fruits since both occur in clusters. However, multiple fruits arise from a group of *individual* flowers whereas aggregates arise from a group of pistils within the *same* flower. A mulberry has a multiple fruit, as do Bunchberry (*Cornus canadensis*)—multiple of berries, and Aster, Anemone and Coneflower (*Rudbeckia*)—multiples of achenes.

The chart and graph on the following pages list pertinent seed collecting information for some of the more ornamental species native to the eastern United States and an approximate seed collecting schedule, the dates of which have been recorded at the Will C. Curtis Garden in the Woods in Framingham, Massachusetts. Collecting dates are subject to variations of one to two weeks depending on climatic conditions during the growing season.

Smilacina racemosa or 'False
Solomon's Seal'

Continued on page 44 23

PLANT NAME



FRUIT TYPE

HABITAT

| Soil Moisture | | | Light Exposure | | | Soil Acidity* | | |
|---------------|-------|-----|----------------|-------------|-------|---------------|---------|---------|
| Wet | Moist | Dry | Deep Shade | Light Shade | Sunny | Acid | Subacid | Neutral |

| | | | | | | | | |
|---|------------------------------------|---|---|---|---|---|---|---|
| <i>Actaea pachypoda</i> , Doll's-eyes | Berry (white) | | ● | | ● | ● | | |
| <i>Actaea rubra</i> , Baneberry | Berry (red) | | ● | | ● | ● | | |
| <i>Anemone canadensis</i> , Windflower | Aggregate (achens in a head) | | ● | ● | | ● | ● | |
| <i>Aquilegia canadensis</i> , Wild Columbine | Aggregate (5 follicles) | | ● | ● | | | ● | |
| <i>Arisaema triphyllum</i> , Jack-in-the-Pulpit | Multiple (cluster of red berries) | ● | ● | | ● | ● | | |
| <i>Asarum canadense</i> , Wild Ginger | Capsule | | ● | ● | | | ● | ● |
| <i>Asclepias tuberosa</i> , Butterfly Weed | Follicle | | | ● | | ● | ● | |
| <i>Baptisia australis</i> , Blue False Indigo | Legume | | ● | | | ● | ● | |
| <i>Calla palustris</i> , Wild Calla | Multiple (cluster of red berries) | ● | | | ● | ● | | |
| <i>Caltha palustris</i> , Marsh Marigold | Aggregate (5-10 follicles) | ● | | | ● | ● | | |
| <i>Caulophyllum thalictroides</i> , Blue Cohosh | Drupe (blue) | | ● | ● | | | ● | |
| <i>Chelone glabra</i> , Turtlehead | Capsule | ● | ● | | ● | ● | | |
| <i>Chelone lyoni</i> , Turtlehead | Capsule | ● | ● | | ● | ● | | |
| <i>Chrysopsis falcata</i> , Sickle-leaved Aster | Multiple (achens in a head) | | | ● | | ● | | ● |
| <i>Chrysopsis mariana</i> , Maryland Golden Aster | Multiple (achens in a head) | | ● | ● | | ● | ● | |
| <i>Cimicifuga racemosa</i> , Black Cohosh | Follicle | | ● | | ● | ● | ● | |
| <i>Dicentra eximia</i> , Wild Bleeding Heart | Capsule | | ● | | ● | ● | ● | |
| <i>Disporum lanuginosum</i> , Yellow Mandarin | Berry (orange) | | ● | | ● | ● | ● | |
| <i>Dodecatheon meadia</i> , Shooting Star | Capsule | | ● | | ● | ● | | |
| <i>Epigaea repens</i> , Trailing Arbutus | Capsule | | ● | ● | ● | ● | | |
| <i>Gentiana andrewsii</i> , Bottle Gentian | Capsule | ● | ● | | ● | ● | ● | |
| <i>Geranium maculatum</i> , Wild Geranium | Capsule | | ● | ● | | ● | ● | |
| <i>Hydrastis canadensis</i> , Golden Seal | Aggregate (cluster of red berries) | | ● | | ● | ● | | ● |
| <i>Iris cristata</i> , Crested Dwarf Iris | Capsule | | ● | | ● | ● | | |
| <i>Ilex verticillata</i> , Winterberry | Drupe (red) | ● | ● | | ● | ● | | |
| <i>Jeffersonia diphylla</i> , Twinleaf | Capsule | | ● | | ● | ● | | ● |
| <i>Liatris spicata</i> , Blazing Star | Multiple (achens in a head) | | ● | | ● | ● | ● | |
| <i>Lilium superbum</i> , Turk's Cap Lily | Capsule | | ● | | ● | ● | ● | |
| <i>Lindera benzoin</i> , Spicebush | Drupe (red) | ● | ● | | ● | ● | | |
| <i>Lobelia cardinalis</i> , Cardinal Flower | Capsule | ● | ● | | ● | ● | ● | |
| <i>Lobelia siphilitica</i> , Great Lobelia | Capsule | ● | ● | | ● | ● | ● | |
| <i>Mertensia virginica</i> , Virginia Bluebells | Nutlet | | ● | | ● | ● | | ● |
| <i>Mitchella repens</i> , Partridgeberry | Berry (red) | | ● | | ● | ● | | |
| <i>Mitella diphylla</i> , Bishop's Cap | Capsule | | ● | | ● | ● | ● | |
| <i>Polygonatum canaliculatum</i> , Giant Solomon's Seal | Berry (blue) | | ● | | ● | ● | ● | |
| <i>Pyrus arbutifolius</i> , Red Chokeberry | Berry (red) | ● | ● | | ● | ● | | |
| <i>Rudbeckia triloba</i> , Coneflower | Multiple (achens in a head) | | ● | | ● | ● | ● | |
| <i>Sanguinaria canadensis</i> , Bloodroot | Follicle | | ● | | ● | ● | | ● |
| <i>Sarracenia purpurea</i> , Pitcher Plant | Capsule | ● | | | ● | ● | | |
| <i>Smilacina racemosa</i> , False Solomon's Seal | Berry (red) | | ● | | ● | ● | | |
| <i>Smilacina stellata</i> , Starry Solomon's Seal | Berry (red) | | ● | | ● | ● | ● | |
| <i>Staphylea trifolia</i> , Bladdernut | Capsule | | ● | | ● | ● | ● | |
| <i>Stokeasia laevis</i> , Stoke's Blue Aster | Multiple (nutlets in a head) | | ● | ● | ● | ● | | |
| <i>Streptopus roseus</i> , Twisted Stalk | Berry (red) | | ● | | ● | ● | ● | |
| <i>Stylophorum diphyllum</i> , Celandine Poppy | Capsule | | ● | | ● | ● | | ● |
| <i>Trillium cernuum</i> , Nodding Trillium | Berry (dehiscent capsule like) | | ● | | ● | ● | | |
| <i>Trillium erectum</i> , Wake-Robin | Berry (dehiscent capsule like) | | ● | | ● | ● | | |
| <i>Trillium grandiflorum</i> , Great Trillium | Berry (dehiscent capsule like) | | ● | | ● | ● | | ● |
| <i>Trollius laxus</i> , Globeflower | Aggregate (follicles) | ● | ● | | ● | ● | | ● |
| <i>Uvularia grandiflora</i> , Bellwort | Capsule | | ● | | ● | ● | | ● |
| <i>Viburnum alnifolium</i> , Hobblebush | Drupe (red) | | ● | | ● | ● | | |
| <i>Viola canadensis</i> , Canada Violet | Capsule | | ● | | ● | ● | | ● |
| <i>Viola rostrata</i> , Long-spurred Violet | Capsule | | ● | | ● | ● | | ● |
| <i>Xerophyllum asphodeloides</i> , Turkeybeard | Capsule | | | ● | ● | ● | | |

*HABITAT Soil Acidity: Acid = pH 4.0 to 5.0, Subacid = pH 5.0 to 6.0, Neutral = pH 6.0 to 7.0

SEED TEXTURE

COLLECTING DATES

Very Fine

Fine

Fine Medium

Medium

Medium Coarse

Coarse

Very Coarse

May 14

May 21

June 1

June 7

June 14

June 21

July 1

July 7

July 14

July 21

August 1

August 7

August 14

August 21

September 1

September 7

September 14

September 21

October 1

October 7

October 14

October 21

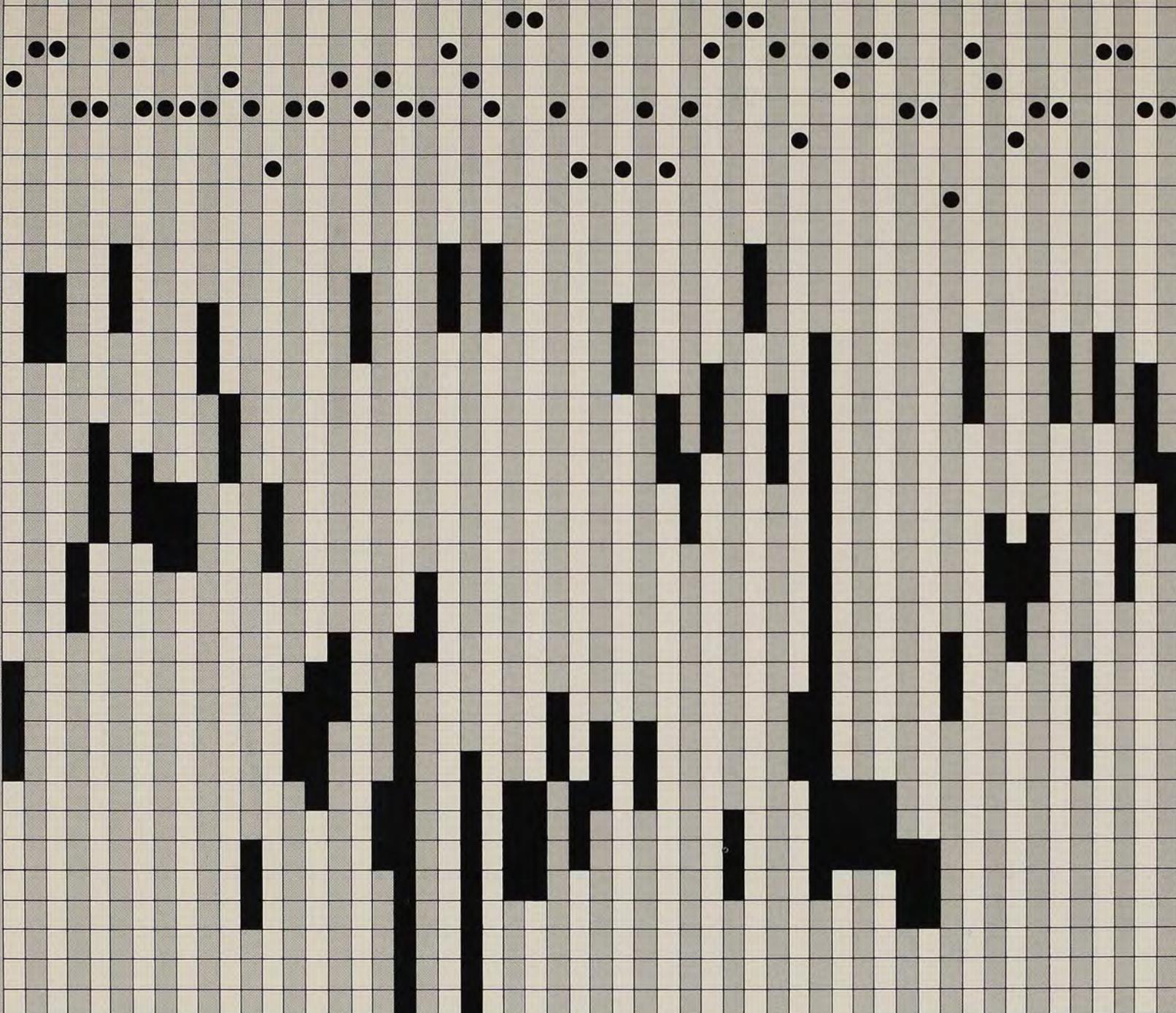
November 1

November 7

November 14

November 21

December 1





The Gardens of Sissinghurst Castle

*Thomas A. Fretz
Associate Professor of Horticulture
The Ohio State University
Columbus, OH 43210*

Without a doubt, the gardens of Sissinghurst Castle, located just northeast of the Village of Sissinghurst in Kent, are among Britain's finest. These magnificent gardens were created barely 50 years ago by two outstanding amateur gardeners, Sir Harold Nicolson and his wife Victoria Sackville-West.

Sissinghurst Castle, or more precisely, its remains, dates from early in the reign of King Henry VIII and has

had a varied and unusual history. Described as a picturesque Tudor Castle in 1752, only eight years later it was used as a prison for French prisoners-of-war. Not long after, the castle became a ruin; only a few walls and the dominating towers survived.

The Nicolsons bought the property and castle in 1930 and immediately set about creating the garden one sees today. They transformed the ruined castle into an outstanding garden of immense interest by building a series of small gardens enclosed by the old rosy-red brick walls. Today these walls, along with the help of hedges that appear to have been at Sissinghurst since the time of the Tudors, make the gardens seem older than they really are. Each of the small, enclosed gardens is a garden of



'surprise,' easily glimpsed from one of its neighbors. Each has its own special charm, and every herbaceous border presents a distinctive color scheme.

In retrospect, Sissinghurst's gardens might never have happened had it not been for an American, Lawrence Johnston, who had settled near Stratford-on-Avon in Gloucestershire. An avid gardener and creator of Hidcote Manor Garden, Johnson helped the Nicolson's develop the central theme of the garden, that of expectation and surprise. He suggested the addition of hedges to emphasize the already partially enclosed gardens formed from the old castle walls.

One enters the Tower Garden through the double-towered gateway from the Tower Courtyard. The walls are covered with roses, honeysuckle and clematis. To one side of the Tower Garden lies the White Garden, described by many as . . . "the most beautiful garden at Sissinghurst and indeed of all England." This clustered garden is said to be at its peak in June, "when the white roses grow through almond trees and the air is laden with the scent of white regal lilies." Everything which flowers in this garden is white: Regal lilies, white Veronicas, white Delphiniums, grey Artemisias, silvery Cineraria and spectacular *Pyrus salicifolia pendula*, its weeping branches gracefully suspended over the statue of a virgin by Toma Rosandic.

The Rose Garden, flowering throughout the summer

and fall, contains a collection of old-fashioned roses. At the center of the Rose Garden is a rondel, a Kentish word for the round floor found in oast-houses, formed of circular yew hedges. Supplementing the roses is a collection of superb summer-flowering shrubs including *Acanthus spinosus*, *Caryopteris X clandonensis*, *Kolkwitzia amabilis* and *Hydrangea villosa*, the lace-cap hydrangea.

The remarkable Cottage Garden, with a mixed collection of shrubs, herbaceous and bulbous plants, faces the south cottage. Its controlled untidiness is developed in a manner attributed to Gertrude Jekyll, an English horticulturist who died soon after the Nicolson's began work on Sissinghurst. From the Cottage Garden the visitor can pass into the Nuttery which contains a mass planting of hazelnuts, *Corylus avellana*. At the far end of the Nuttery is a low wall enclosed by yew hedges forming a formal, paved Herb Garden, an excellent place in which to find pleasant scents on a warm summer day.

At Sissinghurst Castle it is possible to discover and enjoy one of the finest of English Gardens. Sissinghurst is the result of a shared effort; its design was for the most part Sir Harold Nicolson's and its contents, the result of choices made by his wife, Victoria Sackville-West.

If the opportunity to travel in England presents itself, Sissinghurst Castle is a must to see. Once visited, one will always dream of returning. □

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Australian Wildflowers

Continued from page 17

Australia; thus it will require a warm and sunny location to flourish. It reaches a stately and, if lightly pruned, bushy eight feet in height. All cuttings and pruning should be done in the spring and summer, for in mid-winter, blossoms will appear atop the older wood. Although frequent water is helpful in establishing a new plant, water older specimens sparingly. Flowering is stimulated by a dry period in early winter.

Perhaps Australia's best known wildflowers are the *Grevilleas*, commonly called Spider Flowers. *Grevillea wilsonii* is one of the most spidery members of the genus. Its elongated pinkish-red stigmas terminate in a cream-colored hook. Although other *Grevilleas* can reach one hundred feet in height, *G. wilsonii* is best suited for the house, rarely exceeding four feet with feathery, light green foliage. It is found growing on poor, gravelly soils where little water is available. If planted in a heavy soil *Grevillea* fails to form good lateral roots, causing the plant to fall over. A lighter soil mix will preclude staking. Prune *Grevillea* in the spring, taking cuttings at that time. *Grevillea wilsonii* prefers full sun and water only when very dry. It cannot tolerate fertilizer. In September your plant will be bushy, each tip unfolding many of the exotic blossoms.

By far the most adaptable of Australia's wildflowers for houseplant culture is *Viola hederacea*. In Australia it can be found inhabiting damp, swampy places at sea level or mountain dells in the sub-alps of Tasmania. Tufts of small kidney-shaped leaves emerge from creeping stolons making it an excellent basket subject. The tiny flowers rise above the foliage, each proudly displaying its white and purple 'face.' Although *Viola hederacea* presents its loveliest show in the winter, it also blooms during the summer. *Viola* can grow in most locations; it will flourish in both full sun and heavy shade. Frequent water and fertilizer will maintain the deep green in the foliage. Propagation of *Viola hederacea* is possible in any season. Simply remove the runners and root them, misting often.

All Australian plants are plagued by the common pests, especially red spider mites. *Viola hederacea* is one of the mite's prime targets. Regular spraying with a pesticide is advisable.

Unfortunately, there are not many of Australia's botanical wonders yet available in this country. But as more are introduced, I am confident they will be found to be worthy of houseplant cultivation. Even the most heavily snowbound soul cannot help but be moved by the bright optimism of a gaily clad Australian wildflower, a cheerful reminder that somewhere it is summer. □



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The Magic of Water Lilies

Judith Hillstrom
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Recycling is a popular concept today, but the word does not adequately describe the metamorphosis that turns a common galvanized tub into a water garden. This is magic, indeed. And yet, this transformation is inexpensive or virtually cost-free, utilizing supplies about the home. Aquatics are the only costly items.

A galvanized washtub is available in three standard sizes: round, 22" in diameter; square, 22"; oblong, 43" x 23". It is durable—puncture-proof and almost permanently rust-resistant. (There are circumstances, however, when rusting may appear. If this happens, repair spots with a manufactured waterproof paint seal or a galvanized metal paint rust inhibitor. Or as a do-it-yourself home remedy, stop hairline leaks in the tub's bottom by brushing fine sand into crevices and applying a thin coat of tar. When the tar has hardened, camouflage it with gray paint. These repaired patches go unnoticed beneath the plant boxes.)

Color the inside of the tub aquamarine if you like, or let the metal age naturally. As the filled pool of water ages, as plants are nurtured into growth, and as stimulated



micro-organisms produce algae, a patina spreads across the walls until the sides of the tub are invisible.

Select the location of a garden pool according to the needs of the water lilies you will grow there. Hardy varieties and tropicals require a minimum of six hours of sunlight to bud.

Set the tub upon the ground and press down on it, indenting its mark in the earth, or define its boundaries using a pointed instrument. Perform this operation with the washtub resting in an inverted position, since the top circumference slightly out-measures the base dimension.

Next, remove the soil from this outlined area with a straight-backed, straight-edged shovel. Dig the hole several inches wider than the imprint, allowing space for tub adjustment. Make the cavity two inches deeper also, covering the bottom with a layer of firmly packed sand to make leveling easier.

Lower the galvanized container into the hole. Place a carpenter's level across the rim (or support it on a plank over the tub's edges) to find the correct horizontal plane. The tub rim and surrounding ground-surface should also be on an equal plane. With the tub satisfactorily

aligned, pour and tamp sand between the outside of the tub and the earth-wall using a short plank or other workable tool. Use the surplus mound of soil for a filler, or use sand for this purpose to prevent the shifting action of winter thaws if that may be a problem in your area. An alternative use for the unused soil would be to distribute it over the landscape and create miniature, rolling mounds around the garden pool.

Where the soil and the tub's galvanized rim meet, tamp the soil firm and, aided by the straight-edged spade, cut wedges of earth away from the perpendicular sides of the tub. A two-inch deep furrow, slanted in this manner, will encircle the rim to discourage worms that have surfaced during rainstorms from slipping over the edge and into the pool.

Now lay a decorative border around the tub's side. Use quarry flagstone, brick patio block, redwood and white cedar cuts, or another similar material. Arrange the framing material to fit closely together and lay it in dry, lodged firmly in the ground. Extend the edging material beyond the tub's rim to conceal the rim from view.

Your water garden of enchantment is nearly complete. All that remains to be done is to plant the water lilies.



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Water Lily Culture

Nymphaeaceae, the botanical family of water lilies, contains forty species and many hybrids. There are two classifications—the tropical (or tender) water lily and the hardy variety of temperate climates.

Once planted, a fresh-water lily is nearly self-sustaining. In the pool-garden environment it only requires water and an occasional pruning of marred foliage. It is a plant worthy of the initial expense: prices range from moderate to high for fancy hybrids.

For the novice, the hardy water lily is the easiest of plants to grow, and for the economical, the most practical. However, a study of nymphaeas would be incomplete without a brief portrait of tropical varieties.

The tender water lily, with its day- and night-blooming species, is treated as an annual. Only within a controlled greenhouse can tropical nymphaeas be grown continuously. New and growing plants are obtained from the specialist each spring. They are planted in containers, the crown positioned slightly above the soil line, and set into the pool when temperatures have stabilized at 70°F. Tender lilies, albeit a higher investment, are prized for flowers of larger size which hold themselves well above the water. They lend themselves to being arranged since they have a long life when cut and a fragrant blossom. Tender lilies are available in many shadings of blue, violet, purple, pink, red and luminescent white.

The stalwart hardy water lily is the backbone of a water garden, the very reason to construct a pool. Blossoms usually float on the water's surface among heavy green pads. Their colors are white, yellow, apricot or pink through coppery-red. The hardiest of commercial water lilies are the Marliac types, producing white, pink and yellow flowers with a four-inch diameter. For a red, the 'Gloriosa' is long-lived. Pygmy varieties have been especially developed for tub growing. Blooms of this



type are no larger than an inch-and-a-half across. A colorful collection of pygmy lilies can be planted in one miniature garden pool.

Cultured plants are best purchased from aquatic growers, as wilding species do not survive confinement. Roots of the hardy water lily arrive in early spring and look rather lobster-like. The gnarled, tuberous black rootstock will measure an inch to several inches in length with a proportionate diameter. Beneath them are bristle rows of pale succulent feeder roots. The feeder roots are clipped for shipping. The crown (the growth point) rises at one end; a cluster of rolled leaves shows in anticipation of planting.

Before the lilies arrive, fill the pool with water and build a planting box.

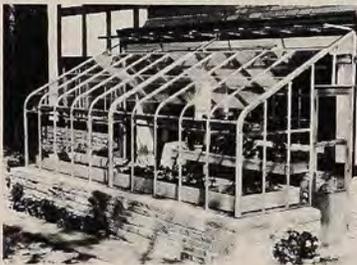
Use recycled lumber for the box. Do not use redwood; it bleeds and discolors the water. Like the galvanized tub, wood also has great durability. A proper planting box measures seven inches deep and 12 inches square. Plastic containers of correct dimensions also suffice. Make openings in the sides and bottom prior to planting to allow air bubbles to escape and to keep the container in place.

A square or round tub holds one lily box with space to fit in a few potted bog plants; the oblong tub accommodates two boxes. Pygmy varieties are perfect in eight-inch clay pots.

Water lilies will grow in good garden soil. Clay soil is also suitable;

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however, do not use peat, sand, woodland soil or the mud of swamps. To prepare the soil for planting, add well-aged cow manure to one-fourth of the garden soil or use the packaged cow manure that is commercially dried and pulverized. Most catalogues supplying aquatic plants offer a special fertilizer. Nymphaeas prefer a rich soil and this fertilizer contains nutrients specifically needed for water gardening.

Upon delivery, remove the dormant water lily from its plastic bag and plant it as soon as possible. The water lily's correct position in the planting box is with its tuberous rootstock set atop a small mound of earth. The succulent feeder roots should straddle either side of the elongated mound, and the crown should tilt upward. When the lily is in place, use a reserved portion of soil to cover and firm around the dormant roots. Bring the soil level to within an inch of the top of the planting box. Smooth the soil up to, but not over, the crown. Leave the back ridge of dark rootstock just visible beneath a thin soil covering. To prevent the water from muddying, scatter a layer of sand or fine pebbles over the entire planting except the crown.

Plant hardy water lilies in early spring. In the north, this is usually during the later weeks of April, with the date moved back a week or two the farther south one lives. However, wait to plant until days are in the mid-60's, when shallow water is warmed by the sun, stimulating the plant into immediate growth.

In natural ponds the native water lily winters with no help, but the cultured nymphaeas need protection. In temperate climates south of latitude 39° (Chicago), hardy water lilies are wintered where they grow. Drain the pool and pack leaves around and over the planting box until the tub is overflowing, then secure with a weighted waterproof cover to keep out moisture.

Farther north, another technique must be used to ensure that the water

lily will be alive the following spring. Lift the planting box in October. Set it aside for a few hours, allowing excess water to drain away before carrying the box off to winter storage. Storage in a root cellar is ideal; the coolest basement corner, where temperatures remain below 50° and above freezing, is also suitable. Do not water through the winter months since this encourages rot. Cover the lilies with burlap or leaves to keep the soil moist. By mid-March, when the dormant rootstock pushes forth rolls of new, yellow leaf-tips, it is time to uncover the lilies and water them sparingly.

At replanting time, shake the water lily roots from the box. Carefully free the feeder roots of last year's soil. The succulent roots may be trimmed to fit into the container if they are excessively long. Replant the cleaned water lily root as previously directed.

Suckers form at the sides of the rootstock near the crown on exceptionally hardy varieties. These suckers rob the water lily of this season's bloom and must be removed. Remove each sucker with a sharp paring knife. The slicing cut exposes the rootstock's inner yellow tissues; this cut is not injurious when a smooth surgery is done and will promptly seal itself.

When suckers have developed to a larger size, as occasionally they will under favorable growing conditions, they become plantlets. This growth assures simple and successful propagation. The plantlets, complete with miniature lily pads, are cut from the parent rootstock leaving a few fine roots attached. Plant each separately in a clay pot. Plantlets require from one to three growing seasons to mature into flowering water lilies.

Black aphids are the usual pests; although rarely seen, they are eradicated with a jet stream from the hose. Concern is often expressed over hatching mosquito larvae, a problem expertly solved by a resident green frog or a gleam of goldfish darting between lily pad and blossom. □

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Sweet Potato Tips

A Nutritious Garden Vegetable



Ruben L. Villareal
S. C. Tsou
AVRDC, P.O. Box 42
Shanhua, Tainan 741
Taiwan, Republic of China

If you grow sweet potatoes and eat only the roots, you are wasting a highly nutritious and tasty green, leafy vegetable.

The leaves and stem tips of the sweet potato, prepared in a variety of ways, are a popular dish on tables in the Philippines, some parts of Indonesia, Thailand, Malaysia, and many rural areas of the Kwangtung and Fukien Provinces in China.

That portion of the sweet potato top used for human consumption is known as the tip. The term "top" is used to denote the entire above-ground part of the plant. The usefulness of tips in the Asian countries becomes more noticeable during the wet season when it is difficult to grow conventional vegetables like cabbage and lettuce.

Not all sweet potato cultivars possess tips that are acceptable for human consumption. Scientists at the Asian Vegetable Research and Development Center (AVRDC) conducted a series of yield trials and evaluations of tenderness, flavor and other eating qualities that are normally undertaken for the more important vegetables. The panel members had strong preference for tender (more young leaves at the tip), glabrous (non-hairy), dark green tips.

Usually only the 10-cm tips are used as greens in countries where tips are eaten as vegetables, the reason being that more new tender leaves are concentrated at the 10-cm tip. However, the study indicates that leaves with more than a 1-cm petiole (leaf stalk) are older and generally tougher than those with less than a 1-cm petiole. Thus, tips with

most leaves having less than a 1-cm petiole are desirable.

Tips can be hairy, medium hairy, light hairy or even glabrous. At least 90% of the scores for hairiness, however, were contributed by "slightly hairy" and "glabrous," which indicates a distinct preference for glabrous tips.

Sweet potato leaves, in various shapes, may be fine, medium or broad. Any leaf type and shape seems desirable provided the eating qualities mentioned earlier are present.

Purplish and light green stems appear to be the more desirable types. For leaf color, dark green is preferred, except in the Philippines, where a separate evaluation was made. There, purplish tips are preferred over dark green tips because they add color to the meal. It is common to see bundles of sweet potato tips with a tinge of purple for sale in the Filipino markets.

The study indicates that this leafy vegetable would be an ideal food

source in other tropical and temperate countries as well. It is inexpensive, easy to grow, nutritious and many recipes can be prepared from it.

Since little capital is involved in growing a sweet potato, its tips are relatively inexpensive. It is considered a "poor man's salad" in the Philippines because it is one of the cheapest leafy vegetables residents can buy (2 cents/kg vs. 8 cents for cabbage and 22 cents for lettuce). The same price trend has been observed in a Malaysian market.

Unlike the more popular leafy vegetables, sweet potato is not readily attacked by pests and diseases. Thus, five to eight well established plants can provide a continuous supply of greens all year round, particularly in the tropics.

Sweet potato may be grown from slips or vine cuttings. Slips are usually used in the temperate countries, whereas terminal or secondary vine cuttings are more popularly used in the tropical zones.



Left—An assortment of sweet potato leaves displayed in a basket

Right—Sweet potato plants growing in a field

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Plant an eight-node slip or cutting with at least two nodes buried in moist garden soil. In a week, when the plants are established, irrigate lightly. Fertilizer may not be necessary if the garden soil is fertile; otherwise, a side dressing of one to two grams of nitrogen per plant will encourage more vegetative growth. The first harvest of tender tips should be ready about a month after planting. Harvesting can be done twice a week thereafter. To lengthen the growing season, another side dressing of an equal amount of nitrogen per plant may be necessary.

If planting in a container is desired, a 30-cm pot is ideal for a moderately large sweet potato plant. The soil, however, must always be kept moist to stimulate more vine and leaf development.

In general, sweet potato tips are more nutritious than spinach and cabbage (Table 1). They have twice as much calcium, four times more phosphorus, seven times more iron, ten times more vitamins A and B₂, and three times more vitamin B₁ and niacin than cabbage. Spinach has more vitamin A than sweet potato

tips. However, sweet potato tips have more phosphorus, iron and vitamins B₁ and B₂ than spinach. In addition, sweet potato tips have much lower oxalate content than spinach (0.37% vs. 0.76% on a fresh-weight basis) and other tropical greens (malabar spinach, *Basella rubra*, has 2.32%; spineless amaranth, *Amaranthus gracilis*, has 1.5%). Their cyanogenetic glucosides content is also low (0.4 mg CN/100-g). This figure is comparable to that of Chinese cabbage.

The high proportion of minerals and vitamins in the tips, especially vitamins A and B₂, are important in developing countries, particularly for Asian rice diets which are deficient in these vitamins.

Tips may be prepared in a number of dishes the way spinach is cooked in the temperate countries. In the Philippines, tips are so popular as a leafy vegetable that they are used in several dishes. They may be blanched, boiled with fish and meat, sautéed or fried with sesame oil or butter. Blended tips may also be served as baby foods. The following are popular tip recipes selected not

Table 1
Nutritive values of 100-gram edible portion of sweet potato tips, spinach and cabbage^a.

| Nutrient | Sweet potato tips | Spinach | Common cabbage |
|-----------------------------|-------------------|---------|----------------|
| Calories (cal) | 21 | 16 | 17 |
| Water (g) | 86 ^b | 92 | 94 |
| Protein (g) | 2.72 ^b | 2.30 | 1.90 |
| Fat (g) | 0.70 | 0.20 | 0.10 |
| Carbohydrate (g) | 2.30 | 2.40 | 3.10 |
| Fiber (g) | 1.90 ^b | 0.80 | 1.00 |
| Ash (g) | 1.70 ^b | 1.70 | 0.50 |
| Calcium (mg) | 74 ^b | 70 | 49 |
| Phosphorus(mg) | 81 | 36 | 22 |
| Iron (mg) | 3.90 ^b | 2.50 | 0.50 |
| Vitamin A (IU) | 5580 ^b | 10500 | 500 |
| Vitamin B ₁ (mg) | 0.14 | 0.04 | 0.05 |
| Vitamin B ₂ (mg) | 0.35 ^b | 0.18 | 0.03 |
| Niacin (mg) | 0.60 | 0.60 | 0.20 |
| Vitamin C (mg) | 41 ^b | 60 | 40 |

^aTung, T.C., P.C. Huang, H.C. Lee, and C.L. Chen. 1961. Nutrition composition of food in Taiwan. *J. Formosan Medical Asso.* 60(11):973-1005.

^bAnalyzed by AVRDC, average value of 10 cultivars.

only for their taste but also for their nutritional value.



Sweet Potato Tip Salad*

600 grams of sweet potato tips
8 cloves of garlic
2 tablespoons of salad oil
2 tablespoons of soy sauce
½ teaspoon of monosodium glutamate (MSG)
1 tablespoon of sesame oil
½ teaspoon of sugar
1 teaspoon of salt
Boil washed sweet potato tips (10-cm tips) for two minutes. Place on a platter. Heat salad oil, sauté minced garlic for one minute, mix with the seasonings, then pour over the sweet potato tips. Mix well before eating (AVRDC Vegetable Preparation Manual).

Stir-Fried Sweet Potato Tips

3 cloves garlic, crushed
6 cups sweet potato tips
Salt and MSG to season
Dash of sesame oil
Parboil the tips in boiling water. Remove and drain. Meanwhile, sauté the garlic in a small amount of oil until browned. Add the tips and cook. Season with salt, MSG and a dash of sesame oil.

Ensalada

6 cups sweet potato tips
2 tomatoes cut into wedges
Calamansi, lemon juice or cider vinegar.
Salt and pepper

Cook the sweet potato tips in boiling water with salt added. Don't overcook. Remove and cool with tap water. Drain. Put the tips in a bowl with the tomatoes and toss with calamansi, lemon juice or vinegar. Season with salt and pepper.

Pinakbet

2 small ampalaya (bitter gourd), quartered
2 medium eggplants, quartered
2 cups sweet potato tips
3 tomatoes, sliced
5 pieces okra
2 tablespoons onion, sliced
1 tablespoon ginger, sliced or coarsely chopped
1 clove garlic, minced
2 tablespoons diced pork
Bagoong (anchovies) or salt to taste
MSG
¼ cup meat broth or water
Fry the pork in a little oil until browned. Add the minced garlic and onion; Sauté. Add the tomatoes, ginger and bagoong (anchovies). Set aside. Meanwhile, place the prepared vegetables in a saucepan, add the broth or water and tips to the pork mixture. Cook on a slow fire until the vegetables are tender, but not overcooked. Season with MSG.

Sinigang

½-1 kilogram cheaper cuts of beef with bones, or pork spareribs
6 cups water from washing rice (second washing)
3 tomatoes, sliced
1 medium-sized onion, sliced
Calamansi or lemon juice to make the dish sour enough
2 taro, cut into 1½-inch cubes
3 cups sweet potato tips
1 cup string beans, cut into 2-inch lengths
1 radish, cut at an angle into ⅓-inch slices
Salt and MSG to taste
Simmer beef or pork in rice washing. Add sliced onion and tomatoes. Cook until the meat is tender. Add salt and MSG to broth. Then add the taro, string beans, radishes and cook. Put in the tips. Make the broth sour enough with calamansi or lemon juice. Season with salt.

*The authors acknowledge Mrs. Corazon P. Villareal for the listing of popular sweet potato tip recipes.

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GRAFTING TECHNIQUES A HOW-TO GUIDE

Robert F. Carlson
Department of Horticulture
Michigan State University
East Lansing, MI 48824

Plants are reproduced in several ways. Some are reproduced from seed; some from shoot and root cuttings; some from tissue culture, and still others by budding or grafting, depending on the season and the stage of plant growth. The grafting process is unique because it can be used on both woody and herbaceous plants. Hence, gardeners, nurserymen, vegetable men and pomologists all employ grafting in their work.

Defined simply, grafting is a method of combining two or more plant parts into one plant. Selecting the best grafting approach depends upon timing and the type of plant material to be grafted, but whatever the approach, plants to be grafted should be healthy. Often a specimen may be carrying a complex of latent viruses. If that is the case, the result is either no graft-take or poor growth of the grafted combination. Both plants should also be in good nutritional shape for the best graft-take and subsequent growth.

Plant species vary greatly in the ease with which they can be grafted. Some that are easy to graft are the cultivars in the genus *Malus*, such as the many apple and crab apple species. The species in the genus *Prunus*, such as the peach and cherry, do not graft as easily.

Woody plants which have a cambium in their anatomical make-up usually graft successfully. The cambium is a thin layer of tissue beneath the bark from which new wood and bark originate. An easy-to-graft type is the apple stem; a more difficult type is the walnut. The cambiums of both the stock and the scion must be in contact or close proximity for the graft to properly unite.

With herbaceous plants like the tomato, which has no true cambium, successful grafting depends upon matching stem diameters. Each stem must make contact with several of the fibro-vascular bundles scattered throughout the other.

Basically, grafting is a matter of matching up stem tissues so that the active anatomical parts will unite and establish a circulatory continuity between the stock and the scion. The test of a successful graft is the harmonious growth of the two plant parts into a normal plant.

Many types of grafts are used by nurserymen and horticulturists. Some of these methods are described here; however, techniques may vary according to the person making the graft. For more information about these and other grafting methods, consult textbooks and extension bulletins.

The Whip-and-Tongue Graft

The whip-and-tongue graft is the most commonly used graft, especially for small-diameter shoots or stems like the apple. This graft is done in late winter when plants are dormant.

To fashion a whip-and-tongue graft, make a one-inch cut on a slant on both the stock and the scion with a very sharp knife. The stock and the scion should be of nearly the same diameter for best contact of the cut surfaces. The cambium layers of the two pieces must be in close contact. The scion, cut from one-year-old wood, should be about four inches long with three or four buds.

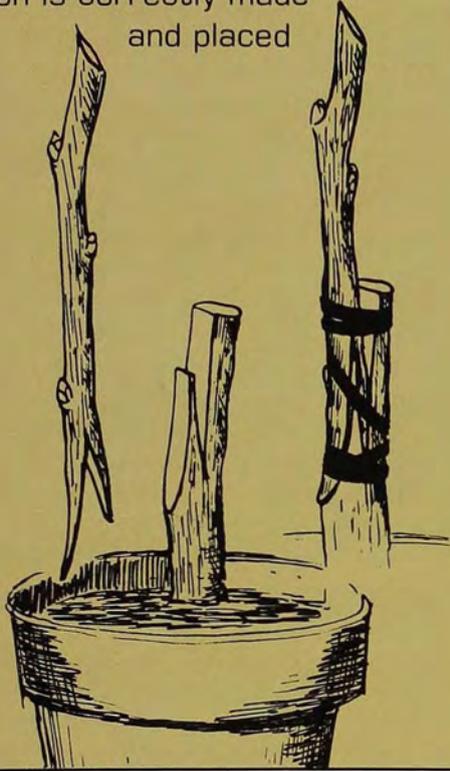
After the slanting cuts have been made, make a parallel cut on the stem, starting one-third the distance from the tip of the slanting cut. This cut need not be more than one-half-inch deep and should be made on both the stock and scion. Unite these cut surfaces of the stock and scion by pushing them together. This process is often called dove-tailing. If cuts are properly made, these two parts hold together very tightly. Next, wrap the graft with plastic material or rubber bands to hold the parts together until the graft is healed.

Store the grafted plants in a box of moist peat moss or sawdust at 45°F for about one month. New cortical cells (calluses) are formed in storage. After the storage period, the plants are ready to be put out in the nursery. Unless the tying material is self-decomposing, cut it off before the grafts are planted.

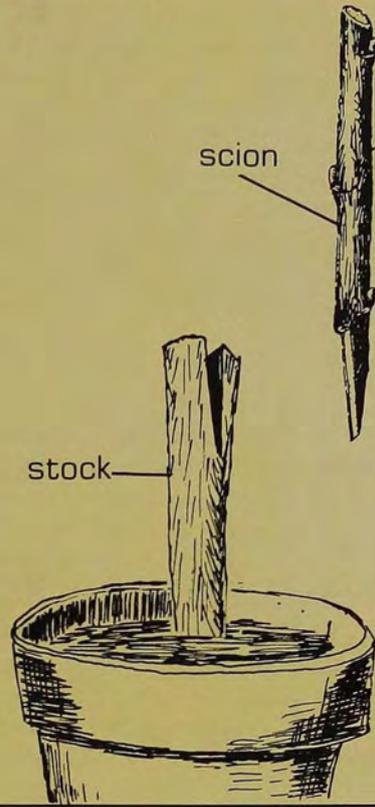
A modification of the whip-and-tongue graft is the splice graft, the only difference being that with a splice graft, the scion and the stock are not split. The slanting cuts of the two parts are matched and firmly wrapped, forming a perfect union.

Whip-and-Tongue Graft

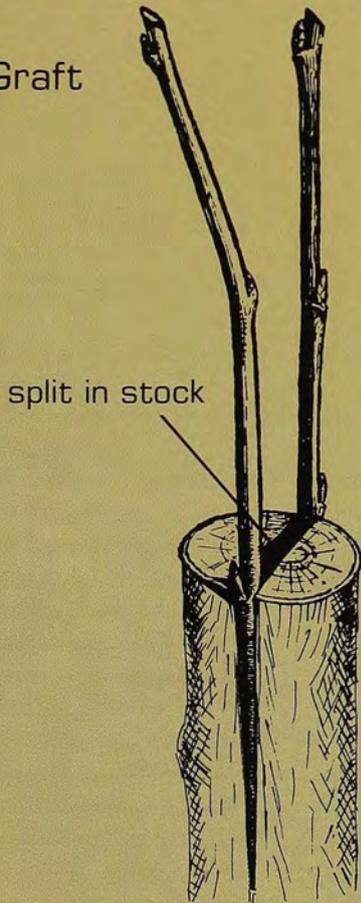
scion is correctly made
and placed



Splice Graft



Cleft Graft



Cut-off Bark Graft



The Cleft Graft

This graft is used for grafting one or more cultivars on top of another well established tree. This technique is called "top working," the aim being to change the tree to another new or different cultivar. The cleft graft, nourished by mature, starch-rich tissues, will grow rapidly and will form a new tree within four to eight years. Often growth is even faster. A five-year-old 'McIntosh' can be changed by cleft graft into an 'Empire' apple and may bear fruit in three years or less.

In order to keep the tree low (dwarfish), choose branches near the ground for cleft grafting. The best time to use this procedure is in early spring when the sap starts to flow.

Select smooth, straight branches and cut them with a saw about six to 12 inches from the trunk. Split the cut end with a grafting tool or a wood chisel to a one-fourth-inch cleft, or one wide enough in which to insert the prepared scion without using great force. Set the grafting chisel in the center of the cut to hold the split open so a prepared scion can be set on each side.

Cut dormant, one-season's-growth scions in January or February and store them under refrigeration until grafting time. At grafting time, prepare two scions by making a slanting cut on each side to form a keel on each one. The back side of the keel should match the bark of the stock when placed in the split. Each scion should have three or four buds. Insert the scions slightly inside the bark of the stock to compensate for the differences in bark thickness of the scion and the stock. After the two scions are in place, remove the grafting wedge to put pressure on the scions and hold them firmly in place.

Seal the entire cleft graft with grafting compound to prevent the grafted parts from drying. Three weeks later, cover the grafts again with the same material.

The Cut-off Bark Graft

The cut-off bark graft is similar to

the cleft graft but differs in that the stock is not split (clefted) and the scions with slanting cuts are placed at the side of the stock in slots under the bark. This graft is also done in the spring. It is best to cut the branch where the bark is smooth so the scion can easily be placed in the slit of the bark.

Prepare the scion by making one slanting cut at the base. After inserting the four-inch scions, either nail each one to the stock with a small, slender nail or wrap each scion with grafting tape to hold it firmly in place. Two or more scions can be placed on each cut of stock depending on the stock's diameter. This graft must also be sealed with grafting compound to prevent drying. In arid climates, it is best to place a plastic bag over each graft.

Although two or more scions are used in each cleft, allow only one to grow. Grafting several scions simply increases the chances that one will survive.

The Side Graft

The side graft is a rather simple method, but a very effective one for grafting woody plants with stems of small diameter. The technique is often used in the fruit tree propagation nursery in the spring to give bud-grafted rootstocks a second chance after failing to take in the fall. Side-grafting can also be used for top working young fruit trees to another cultivar. Branches up to one-half-inch in diameter can be side-grafted.

Make a side graft by bending the rootstock or the branch to one side. Then make a slanting cut (about one-inch deep) downward through the bark and into the wood. Insert a four-inch scion (last year's growth), with a one-inch slanting wedge cut at the base, into the cut of the branch or stock. When the bent branch is released, pressure is exerted at the union to firmly hold the scion in place. Wrap the graft with plastic tape or cover it with grafting compound. When growth begins, cut off the stock or branch above the graft to allow only the side graft to grow.

The Bridge Graft

As the name implies, the bridge graft is made to overcome—or bridge—an injury on a trunk or on a branch. Such injuries may range from mechanical damage to damage caused by rodents eating the bark. The latter injury is especially destructive if the bark is removed for a few inches around the entire trunk. The bridge graft is also effective in saving trees whose rootstocks are affected by disease, or whose roots have been chewed by mice.

To make a bridge graft, follow these simple procedures:

1. Use plants or shoots suitable to bridge the injured area. Likely candidates are dormant scions of appropriate length; rooted plants established next to the trunk for grafting purposes; and suckers found growing at the trunk's base.

2. Clean the trunk or branch above and below the injured area to make grafting easier and healing swifter.

3. If scions are used, cut them while they are dormant (in January or February) and store them in a cool place (a refrigerator is good) until they are used in early spring, usually March and April depending on location.

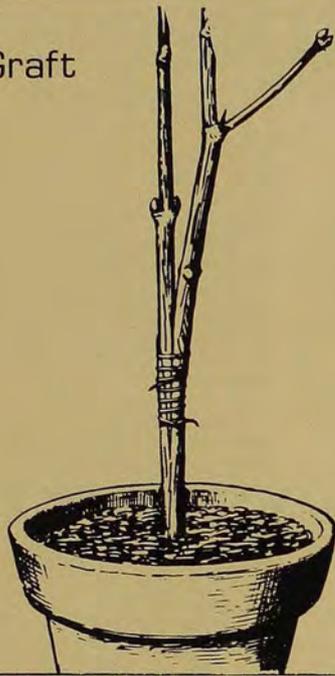
Injuries of this type occur frequently on apple trees. Apple cultivars of any kind are appropriate for scion wood in bridge grafting. After the area has been cleaned, leaving clean bark at the top and bottom of the injury for inserting the scion, prepare the scion as follows:

1. Cut the scion about two inches longer than the area to be bridged. This will permit it to be placed under the bark above and below the damaged area.

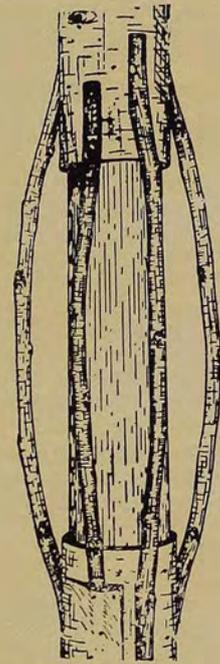
2. Make long, slanting cuts on the same side of both ends of the scion.

3. Make a slit in the bark above and below the cleaned area and open up the bark to insert the scion. If only one side of the trunk is injured, two scions may be enough, but if the entire trunk is girdled, insert three or more scions depending on trunk size.

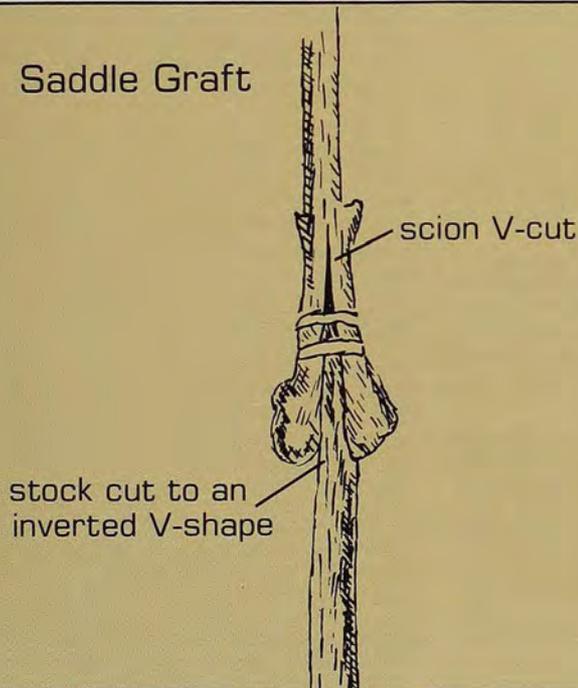
Side Graft



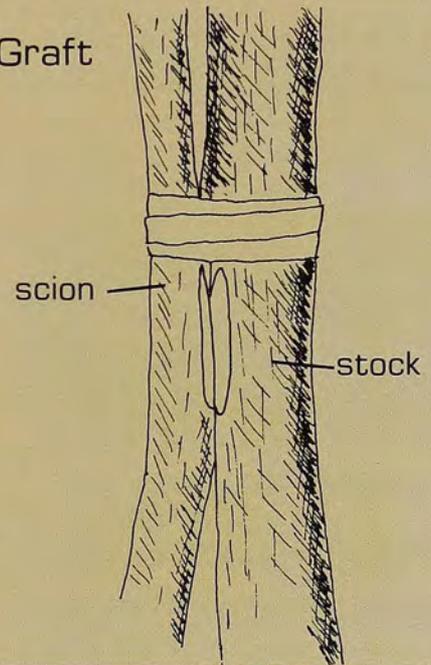
Bridge Graft



Saddle Graft



Approach Graft



4. Allow the scions to arch to hold tension at the grafted points. Hold them in place by nailing them at each end with a fine, short nail.

5. Seal the entire area with grafting compound once the scions are in place.

Grafting Vegetable Plants

Vegetable plants, such as tomatoes, eggplants and cucumbers, can also be grafted. Grafting is sometimes used with these plants to bypass the lack of resistance in their

root systems to soil-borne diseases. There are three grafting methods commonly used for this purpose: the splice graft (already described), the saddle graft and the side, or approach, graft.

Make a saddle graft by cutting the rootstock stem into an inverted V-shape. Make the same V-cut on the scion, being sure each cut is of the same length so the saddle and wedge pieces will fit snugly together. Wrap the stems with thin

plastic to hold them together until the graft takes.

Make a side, or approach, graft by putting two plants (or in the case of woody plants, two branches) close together. Cut a one-inch-long, thin section from the stem of each plant at the same height on each stem. Unite the stems at their cut surfaces and tie them together with string or plastic material. Once the graft heals, cut one of the stems below the graft, leaving the grafted plant to grow. □

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Collecting Wild Seed

Continued from page 23

Seed collectors should keep several implements nearby at all times. Small paper bags, pruning shears (for clipping woody or wiry seed stems), and several pencils (for marking plant names and collecting sites on seed bags) are useful. Storing these items in your car will often prove worthwhile, especially during roadside botanizing ventures. Judgments of when to collect seeds will improve with time.

Fleshy fruits typically assume bright colors upon maturity. This is the best time for harvesting, since any time thereafter fruits may suddenly drop or be eaten by wildlife. Dry, dehiscent fruits (follicles, legumes and capsules) frequently turn tan or brown before splitting open. Mature seeds of various species will rattle inside their dry cases as in the legumes of Blue False Indigo (*Baptisia australis*). It is a good practise to examine one or two "sample" fruits for seed development before harvesting a large batch. The general rule of thumb here: Seeds of differing species will assume various colors upon maturation; however, most mature seeds will be dry (as opposed to moist or sticky) and difficult or impossible to crush between fingernails. Of course, there will always be exceptions. For instance, the seeds of Turk's Cap Lily (*Lilium superbum*) are crushable because they are paper-thin. Again, direct and continued exposure to the species will refine the collector's judgments of when to harvest.

After collecting, seeds should be separated from their fruit tissue, whether fleshy or dry. If seeds are sown "fruit and all," their germinations may be long delayed by chemical or mechanical inhibitors in the surrounding fruit tissue. Certain fruit enzymes may cause the fruit to lie dormant for extended periods, or impervious, dry fruit tissue may prevent water absorption by the seeds until such tissue has rotted

away or otherwise broken down. Dry fruits should be laid out in a low-humidity place until crinkly dry or until they dehisce, whichever happens first. Seeds may then be shaken or teased from their cases and sown or stored. Some dry fruits are indehiscent. Note that composites (plants of the Aster family) produce a head of many tiny, dry fruits (achenes or nutlets) often mistaken for seeds. Not so. The actual seeds are born *inside* these small hard fruits, one seed per fruit. Such tiny,

*Successful
germination is
usually obtained
when seeds are sown
soon after ripening.*

dry fruits should be sown or stored as they are. Most other fruits, if left uncleaned, may provide an ideal substrate for moldy growth which can render seeds nonviable. This applies particularly to fleshy types. Though seed cleaning may be painstaking and tedious, it is important in maintaining viability, which further serves as a practice in conservation.

Highest percentage germination is usually obtained when seeds are sown as soon as possible after ripening. The longer they remain exposed to atmospheric conditions, the greater will be their loss of viability. When storing seed, three factors play a key role in maintaining viability (which varies according to species). Ranked in order of importance, these factors are (1) low atmospheric humidity, (2) low temperature and (3) low light intensity. Seeds are best stored in air tight vessels (household jars do nicely) at a temperature around 40°F in a dark room or refrigerator. The jar should contain a dessicant such as one ta-

blespoon of dry, powdered milk packaged in a Kleenex tissue. The dessicant should be changed every three to six months depending on how frequently the storage vessel is opened. Many wetland or bog plants which produce fleshy fruits (*Calla*, *Peltandra*, *Symplocarpus*) are best stored in distilled water or moistened peat moss, with light and temperature conditions being similar to the aforementioned types.

Plants have evolved numerous ways of spreading their progeny. Many seeds are modified with feathery appendages which aid in dispersal by wind. When these appendages become obvious, the seeds have ripened sufficiently. Milkweeds (*Asclepias*), Asters, Goldenrods (*Solidago*), and Blazing Stars (*Liatris*) fall into this category. The light-weight, papery-thin seeds so characteristic of the genus *Lilium* are born in capsules which split from the top downward. Stacked like so many columns of wafers in their capsular rooms, the seeds become exposed to fall and winter winds as the capsule splits. They are flushed out and away like reams of pages before a fan.

Birds and mammals often serve as seed dispersers by ingesting fruits at one site and excreting the seeds at another. Blueberries (*Vaccinium*), Pokeweeds (*Phytolacca*), Winterberry (*Ilex*) and wild roses (*Rosa*) are but a few examples of seed dispersal through plant-animal "co-survival."

Some seeds, like Bloodroot (*Sanguinaria*) and Trillium, for lack of apparent appendages or mechanisms to aid in dispersal, seem best adapted for falling straight to the ground below. Presumably the advantage here is that conditions good enough for mother's growth are good enough for her babies.

Exploring our local fields, forests and roadsides in search of seeds will do more than provide the seed collector with pleasure and heightened awareness of wild flora; it will serve as a substantial means of conserving and increasing our native American flora. □

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