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# The National Horticultural Magazine

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Original papers increasing the historical, varietal, and cultural knowledges of plant materials of economic and aesthetic importance are most welcomed and will be published as promptly as possible. Material of lasting interest appearing in related journals will be reprinted as available. Publications received for the Library will be reviewed and made available to members after publication of the reviews. These books are designated "Library" following the prices in the book reviews. Reviews of private collections will also be accepted and published. These books, however, are not available for loan to members of the Society.

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Lester Rowntree

*Berzelia linguinosa*

"In January the decorative light green knobs that cap my *Berzelia linguinosa* bushes are among the most alluring growing things that cover my ocean-facing slope," writes Author Rowntree on Page 179, of the plants in her garden at Carmel, California.



# Running Bamboos for Hedges

W. H. HODGE AND DAVID A. BISSET<sup>1</sup>

On the basis of habit of growth, two general types of bamboos, clump-forming and running, are known to horticulture in this country. The former are preferred as permanent hedge subjects. Clump-forming species like *Bambusa multiplex* and its varieties are much planted for this purpose along the Gulf and southern Atlantic coasts as well as in southern California, or wherever winter temperatures do not fall below 17° Fahrenheit. Where minimum temperatures range between 5° and 17° Fahrenheit, the hardier running species are the only ones available for use as hedge plants or for screening purposes where a bamboo is desired.

Despite the obvious disadvantage of having to restrain a running bamboo to a hedge form, it can be done with some success. In 1935, an experimental hedge of the Meyer bamboo (*Phyllostachys meyeri*) was planted at Savannah, Georgia, at the Barbour Lathrop Plant Introduction Garden of the United States Department of Agriculture. After nearly twenty years this hedge is still serviceable and attractive, but it has of course received proper care during all this period.

The success of the Meyer bamboo as a hedge plant suggested that certain other running types be similarly tested. Four other species, including the Narihira bamboo (*Semiarundinaria fastuosa*), the well-known Metake (*Pseudosasa japonica*), the Black bamboo (*Phyllostachys nigra*), and *Phyllostachys puberata*, were planted in hedge form at Savannah in 1940. Since their establishment, the bamboo hedges at Savannah have evoked considerable

interest from visitors to the Garden and it is felt that some information concerning their culture is desirable. This is especially true since the majority of the species not only are established in this country but are also available from commercial sources.

On the basis of the results obtained with the five species mentioned, it may be said that any hardy running bamboo of size and habit similar to those already tested would probably give like success. What are some of the running bamboos with hedge possibilities and where can they be grown? The species of *Phyllostachys*, the important genus mentioned above, are representative of a number of medium-sized bamboos that are potential hedge subjects. Other species that should be tried include the Fishpole bamboo (*Phyllostachys aurea*) and the Yellowgroove bamboo (*P. aureosulcata*). Nearly all species of *Phyllostachys* normally form groves when their growth is unrestrained and eventually produce culms up to 25 to 30 feet high. Their growth is more rapid than that of the Narihira bamboo or Metake. This may be an advantage in the quicker establishment of a hedge. On the other hand, the slower spreading species mentioned may require less control.

These hardy bamboos of the genera *Semiarundinaria*, *Phyllostachys*, and *Pseudosasa* grow to best advantage where normal minimum winter temperatures range between 5° and 17° Fahrenheit and where there is a good supply of moisture during the growing season. In warmer or colder climates running bamboos do not thrive. Thus they do best in the Southern and Middle Atlantic States, especially in the coastal plain or Piedmont areas from

<sup>1</sup>Section of Plant Introduction, Horticultural Crops Research Branch, Agricultural Research Service, United States Department of Agriculture.





*Margin of mature grove of the Meyer Bamboo, showing natural size attained under conditions of unrestricted growth.*

east Texas to approximately the latitude of Washington, D. C. They also thrive in many similar areas along the Pacific coast.

All of the species named branch close to the ground as long as culms of only small or moderate height are produced. A close hedge therefore results. The taller culms that are produced later do not branch from the lower nodes, but this has not proved a real disadvantage. New culms of the Narihira bamboo can be forced into developing lower branches by cutting the culms throughout the hedge just above the second or third bud.

Before deciding on planting a hedge of running bamboo, a person should have some notion of how this hedge is to be kept within the desired bounds. Rhizomes of running bamboos spread underground in all directions from the parent plants. Each spring (April to June) new aerial shoots are sent up from these underground organs to form the current season's culms. The

major flush of growth appears during a very relatively short period of several weeks. Certain locations favor easy control of the running habit, as, for example, when a hedge is laid out to bisect a lawn area which is regularly mowed. The new culm shoots which appear beyond the main hedge can be controlled by the lawn mower although better results are obtained if the new sprouts are severed just below ground level with a hoe or narrow spade. By cutting below ground level, the development of leafy growth at lawn level is prevented. If the hedge borders a concrete or macadam walk or road or parallels the wall of a building, the new shoots may also be effectively controlled, though the rhizomes eventually will travel beneath a walk, sending up shoots beyond. These should be cut as quickly as they appear.

In locations less favored for such easy control, curbs must be used to confine running bamboos to a hedge form. A somewhat permanent curb is made with a durable sheet metal (concrete, though expensive, could also be used), preferably about 36 inches wide, sunk about 33 inches into the ground when the hedge is planted. The ends of the sheets should be bent over and hooked together in order to prevent the rhizome tips from working their way between them. A more permanent and effective barrier can be made from sheets of asbestos board, usually available in  $\frac{3}{16}$ -inch or  $\frac{1}{4}$ -inch stock. This material is readily cut to 3 x 4-foot size after which it can be lapped and bolted securely to make a durable and rhizome-resistant barrier when installed in a trench.

Once a location is determined and the method of control decided upon, planting of the hedge may take place. Whatever the type of planting materials used, they should be set out in the early spring before the normal sprouting season. A trench, about 18



inches deep and preferably 36 inches or more wide, should be excavated and filled with fertile soil containing a high percentage of humus or well-rotted manure.

Rhizome cuttings, when used to start a hedge, are obtained from established plants and should have been formed the previous year. They are easily distinguished from older rhizomes by the presence of sheaths or bud scales. Each rhizome cutting should have a minimum of six to eight good buds. Care should be taken to dig rhizomes with as many small feeding roots as possible and to prevent their drying out during transplanting. Once ready, the rhizome cuttings may be planted in either of two positions:

1) The cuttings are placed vertically in two (or three) rows, one row at each side of the trench (about 18 inches apart) and the cuttings about six inches apart in the row. Rhi-

zomes planted in this manner usually give a quick growth of culms and a delayed growth of rhizomes.

2) The rhizome cuttings are laid horizontally in rows paralleling the sides of the trench. Rhizome cuttings planted in this way tend to produce a large proportion of new rhizomes whose direction of growth is along the axis of the hedge. Every other cutting in a row should be reversed.

One- or two-year-old bamboo plants that have had the tops cut back for shipment can also be used for the establishment of a hedge. They should be placed in the trench in staggered position. Allowance should be made for a 5- or 6-inch covering of loose soil over the roots. Any rhizome attached should lie parallel with the sides of the trench, if at all possible. It is desirable to mulch the plants with leaves, peat moss, or some organic litter that will aid in keeping the soil moist and loose.

*Hedge of Meyer Bamboo, nineteen years old and six feet high at Savannah, photographed in June. The main flush of new shoots already has been trimmed once and the few tardy new shoots visible appeared after the original clipping. Lateral spread of rhizomes is controlled by mower.*





If the planting is carefully done and the plants properly cared for thereafter, there should be few losses, and these can be replaced at the end of the first season or the beginning of the second by transplanting from a reserve nursery.

A hedge planted with established plants older than two years will give immediate utility with a minimum of loss. Small plants or rhizome cuttings used for the growing of these plants should be spaced about three feet apart in the nursery row and grown for a few years or until the plants are well established and have made such growth as is desired. The plants should be moved with a ball of earth approximately eighteen inches square and eight or ten inches deep or with such soil as will cling to the roots. Care should be taken in lifting the plants to protect the rhizomes radiating from the original plant material, and these rhizomes should not be removed or severed from the plant. The clumps or plants can be

spaced twenty-four inches or more apart in the trench (closer if an immediate dense hedge effect is desired), but the rhizomes attached should all be turned in such manner as to have them run parallel with the sides of the trench. After the plants and rhizomes are placed, they should be covered with loose fertile soil, which can be settled about the roots and the plants by slight firming and watering. Established plants moved or transplanted in this manner will not need to be pruned or cut back at the time.

Once established and under effective control (against spreading), a bamboo hedge requires little care. The tops of the plants are not pruned or cut back until the new culms equal or exceed the desired height of the hedge. Pruning of the lateral branches will be necessary when the width of the body of the hedge becomes too great for convenience or for good appearance and usually should be done in early summer, after the branches are extended on any

*A 15-year-old hedge of Narihira Bamboo at Savannah showing the somewhat bare nature of culms near ground level.*





new culms. In pruning culms and branches, it is desirable to make the cuts slanting rather than at right angles and at a distance of an inch or two above the nodes.

A single strand of galvanized wire (about No. 12 gauge) strung on posts set on each side of the hedge at suitable intervals is a helpful device in controlling the width of the upper growth of a formal hedge. The height of the wires should be slightly greater than half the height of the hedge. Cross wires, also at suitable distances, should be run through the hedge and attached to a pair of longitudinal wires to hold the latter to the line of the desired width. There is a tendency, as a hedge attains some age, for the new culms to incline toward the outside, and the longitudinal wires will serve to confine these. Wires are unnecessary where the width of the hedge top is not important.

The new culm shoots that appear each spring should be allowed to grow

naturally until they have attained their maximum height, at which time they should be pruned back to the level of the hedge. Only in this way can proper development of the leafy branches be assured. After the lower branches and the leaves have fully developed, any necessary pruning of the upper branches may be done. One or two prunings a year are thus sufficient to maintain a bamboo hedge. When culms have grown outside of the longitudinal wires, the wires may be detached or loosened from the posts and cross-ties and the wires placed outside of the new growth and then reattached to the posts and cross-ties as before. Dead or old culms may be removed as necessary at any convenient time between late summer and the end of winter.

Bamboo hedges may be kept vigorous and with attractive foliage color through the regular application of high nitrogen content fertilizer, either of an organic or of a commercial type.

*Demonstration hedge of Metake (Pseudosasa japonica) six feet high at left and the Narihira Bamboo (Semiarundinaria fastuosa) at right*





# Some Chilean Species of *Oxalis*

WALTER C. BLASDALE

The species of *Oxalis* represent one of the most widely distributed and most clearly defined natural groups of flowering plants. Some of them appear in small numbers on all of the continents and many of both the larger and smaller islands. There are two areas in which they are more concentrated and form a fairly large percentage of the total number of species represented in these areas. One is a narrow belt which follows the coastal line of the tip of South Africa, in which, according to the excellent book by T. A. Salter published in 1944, there are two hundred and eight species. The more extended region, with whose cultivated species I am here concerned, extends along the coast of South America from southern Peru to the end of the continent. It includes regions ranging from eighteen to fifty-five degrees of south latitude and variations in altitude varying from sea level to ten thousand feet above it, thus including a wide range of variations in climate and soil. It is not surprising, therefore, that the range of variation in the species of *Oxalis* there found is greater than that found in the South African region. Unfortunately, the former species have not been studied exhaustively and both the nomenclature and range of variation in many of them have not been established. It is noteworthy that, while all of the South African species form bulbs, many of the South American species do not and, while all of the South African species are herbs of moderate size, several of the South American species are worthy of being called shrubs.

*Oxalis valdiviensis* Berneoud. This is one of the relatively few species usually classed as an annual. It was first

found growing in profusion "On the borders of forests in the Province of Valdivia in southern Chile where the climate is cooler and the water supply more bountiful than in much of Chile." It was first introduced into England about 1826 and found to be an excellent out-of-door plant. It does not produce bulbs or rhizomes but forms a few stout, deeply burrowing roots. It also develops a stout, erect central axis with a few but large branches, all of which become thickly clothed with long petioles and each of them articulated with the sustaining stalk by a short, clasping joint and terminated by three broadly wedge-shaped, emarginate leaflets as shown in Illustration No. 7. The still longer peduncles arise from the leaf axils, are also articulated at their bases, and terminate in a cluster of from two to five short flower-bearing branches.

This, like a large percentage of the species of *Oxalis*, is called a "trimorphic" species. Its ten stamens are supported by a ring of ten filaments, which are more or less united at their bases and alternately longer and shorter, so that one set of five bears a ring of anthers to the same height in the corolla tube and below the ring formed by the other five. The length of the five styles, each of which supports a single stigma, is the same for all of the styles of any one plant but may vary in different plants. In all plants of the same "form" of the species, the stigmas are held at the same level, but there are three different forms in all species called trimorphic. In one the five stigmas are all held well above the upper ring of anthers and are called "long-styled"; in a second form the styles are shorter and the stigmas held at a level be-



tween those of the two anther rings, and they are called "mid-styled;" and in the third form the styles are still shorter and the stigmas held at a level below that of both the anther rings and they are called "short styled." These differences have been found to be associated with small differences in the form and size of the pollen grains of the plants concerned but, with this exception, there are no observable differences in the other organs of the three forms. Elaborate experimental work by Hildebrand and Darwin proved that there is a physiological difference between the forms of trimorphic plants which greatly restricts the ability of such plants to produce seed. The whole subject was fully discussed by Darwin in 1877 in a remarkably interesting book entitled *Different Forms of Flowers of Plants of the Same Species*. In it two very important facts were established.

*Flowering plants of Oxalis lobata* (Upper, Illustration No. 1); *Oxalis adenophylla* (Center, Illustration No. 2); and *Oxalis enneaphylla* (Lower, Illustration No. 3).

First, when flowers of any of the three forms were pollinated with pollen from flowers of the same plant or from other plants of the same form, little or no seed was produced and very little of that was capable of germinating. Second, when flowers of any one form were pollinated with pollen from either of the other two forms, seed was produced in abundance and this seed gave good germination.

When *O. valdiviensis* was introduced into cultivation in England, seeds of all three appear to have been included. That which I imported from England several years ago produced plants which gave me a fair crop of seed for I had taken the precaution to plant the





seedlings close together in order to insure the possibility of cross-pollination between plants of different forms. By way of contrast, it is widely accepted that the better known *O. pes caprae* (until fairly recently called *O. cernua*) was introduced through either seed or bulbs of a single form, which happened to be short-styled. So far as I can ascertain, not a single capsule has been produced by any of these plants in any part of the world, although seed is produced in South Africa where plants of all three forms grow spontaneously. The ease with which this species becomes disseminated, and in some places becomes a pest, results from its ability to produce large numbers of small bulbs and scatter them widely by means of its spreading root system.

Another feature of the species, which is fairly common in the genus but known in only three other genera, is a mechanism clearly designed to scatter its seeds as soon as they ripen. The seed capsules consist of five carpels whose walls are joined together along a central vertical axis to form a short cylinder as shown in B and C of the first series of drawings. Each carpel contains a single row of from one to four seeds, each attached to the central axis by a very short funiculus (stalk). If a carpel whose seeds are not fully ripened is opened cautiously, its seeds can be studied under a microscope and will be found to be enclosed in a glistening white, translucent membrane through which the outline of the reddish-brown seeds themselves can be observed. If the seed had been fully ripe, the membrane would have "exploded" and driven the seeds through the slits which appear along the median line of the carpels and scattered them a foot or more from their original positions. It is possible to watch the explosion process by placing ripe capsules in the bottom of a drinking glass, covering it with a card and exposing to

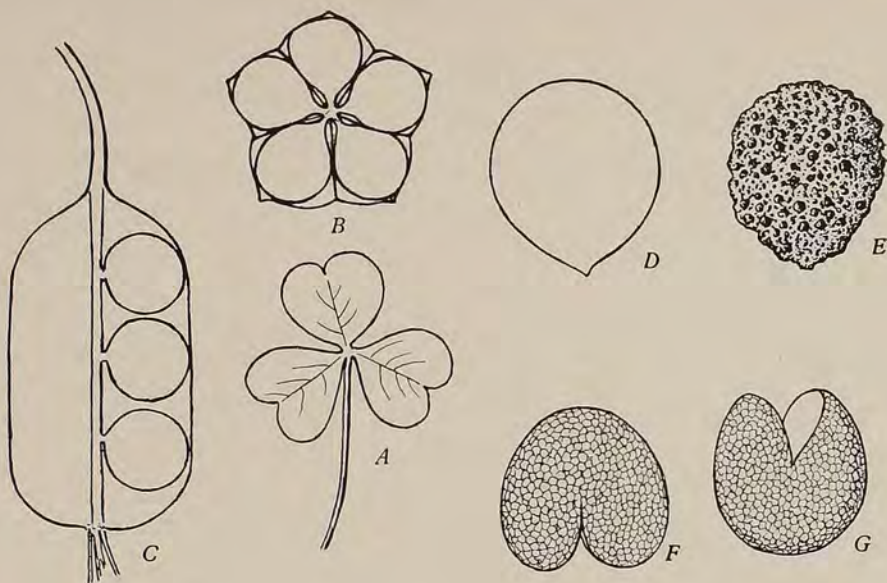
sunlight. The human eye is not quick enough to follow this process but the liberated seeds and discarded membranes, still complete in one piece, can be studied. In the No. I series of drawings, D represents a seed enclosed in its membrane before exploding, E a liberated seed whose surface is covered with reddish brown protuberances of greatly varied sizes, F and G different views of discarded membranes. My interpretation of the explosion process is that expansion of the growing seed finally caused a tear to start in the enclosing membrane near the point of attachment to the funiculus, which tear progressed in opposite directions far enough to permit of the escape of the seed from the enclosing membrane. This process is quite different from that which takes place in such genera as *Vicia*, *Impatiens* and *Alstromeria*, in which it is the capsule and not the individual seed which explodes.

This scattering mechanism makes the harvesting of such seeds troublesome. It calls for repeated examination of each group of plants, selection of those capsules that appear to be ripe and treating them as just described. Fortunately, the germinating ability of the seeds is not seriously affected by the cold and wetness of a temperate climate during the winter. In England it is customary to devote the same plot of ground for a series of years to this species, which results in a spontaneous appearance of new seedlings every spring. I find this procedure perfectly satisfactory in this climate, but also find that old plants can be kept alive through the winter, that is the species becomes a perennial in this climate.

I find *O. valdiviensis* a pleasing and easily grown bedding plant, which is at its best grown in a slight shade and given a constant but not excessive supply of water.

*Oxalis rosea* Feuille. This is also a true annual, even when grown in the





Drawing No. 1, relating to *Oxalis valdiviensis*. A: Showing the six lobes of a leaf, all poised in a nearly horizontal plane after exposure to sunlight. B: A horizontal cross-section of a capsule showing the five seed-containing carpels, 8 $\times$ . C: Vertical median cross-section of a capsule showing a seed-containing carpel, 8 $\times$ . D: Outline of a membrane enclosing a single nearly spherical seed, 30 $\times$ . E: Surface of a seed removed from its membrane, 30 $\times$ . F and G: Forms of membranes which have expelled their seeds, 30 $\times$ .

State of California, whose scientific name was derived from the color of its flowers. It was first described in Jacquenot's *Monograph of the Genus Oxalis* published in 1794. Like several of the other species of the genus, it was known for a long time as *O. floribunda* but this was abandoned as soon as it was shown that the supposed *O. floribunda* was identical with *O. rosea*.

A recent account of it, as found in its native habitat, was prepared by G. W. Robinson and published in *Journal of the Royal Society*, Vol. 75 (1950), page 157. He wrote: "It is extremely common in Chile and is always one of the first plants to establish itself after a forest fire (not uncommon in these parts). It has bright green foliage and pink flowers, the leaves are pleasantly acid, much like sorrel and is appreciated as salad." Other authorities report it to range from southern Chile in the island of Chiloe, frequenting moist situations both in open fields and in moderate shade. It usually flowers in March and April."

Like most of the annuals of the

genus, the root system consists of a clump of fibrous roots some of which are much thickened near the ground surface and some of which penetrate deeply into the earth. Like many of the annual species also, its seedlings rapidly develop several free-branching stalks, well filled with sap and soon attaining a height of a foot. These branches are usually short and straight rather than curved and give rise to many single-flowered stalks of large flowers. In time each plant becomes a tangled mass of foliage in which the flowers and later the capsules are conspicuous objects.

The upper of the two anther rings is exceeded in height by the ring of stigmas and, so far as I can ascertain, the long-styled form of the species is the only one known. Fall of the ring of red, pink or white petals brings into view the form of the five broad sepals which are only slightly exceeded by the dome-shaped apex of the seed capsules. The five follicles are short and yield from one to four small seeds enclosed in a very thin membrane which



discharge their seeds explosively when ripe. The seed, like that of *O. valdiviensis*, has the ability to survive the cold and wetness of a temperate climate and at least in California makes it easy to establish a group of self-perpetuating plants. It has also been reported that new plants are easily started from cuttings made from the lower branches.

Clarence Elliott in his book on *Rock Garden Plants* (1935) makes the following statement; "It is one of the few annuals I can recommend for the rock garden, it is a pretty, graceful plant and quite one of the most good natured and accommodating plants I know. It flowers continually from early summer till autumn."

My limited experience in growing *O. rosea* in this state leads me to class it as an attractive, early-flowering annual which is easily grown from seed but needs more water than some of those we grow here.

*Oxalis lobata* Sims. The name given to this species by Sims in 1823 (*Botanical Magazine*, No. 2358) calls attention to one of its most unusual characters which does not appear to have been reported on in any of the other species. As in all of the other three-leaved species, the two lobes of each leaflet are joined together by means of a common mid-rib, but in this one the mid-rib is shorter than usual and the two lobes are so widely separated as to make them suggest the wings of a butterfly. When exposed to sunlight, the poise of the six lobes at the top of the petiole is such that four of them are in approxi-

mately the same horizontal plane and the two others in practically the same vertical plane, as I have endeavored to show in A of the second series of drawings. Actually, the two lobes in the vertical plane are derived from different leaflets whose second lobes are poised in the horizontal plane and appear at the front of the drawing. This is quite different from the usual situation in which all six lobes are held in the same horizontal plane, as shown in *O. valdiviensis*, A of the first series of drawing, and in *O. braziliensis*, C of the second series.

A further difference appears when leaves of *O. lobata* are subjected to darkness and assume a "sleeping" form, when all six of its lobes fall together and then fold into a single flat package as shown in B, which has the same general outline as that of a single lobe. In the other species, sleeping results from the folding together of the two lobes of each leaflet accompanied by the drooping of entire supporting mid-rib to a more or less vertical poise as shown by *O. braziliensis* in D. In this species, these changes have attained a maximum degree of perfection, but in other species there are variations between this maximum and an entire absence of sleep movement.

An equally outstanding peculiarity is that there are two periods of growth per year; a short one in April and May, in which only a few leaves are formed, and a much longer one in the fall and early winter during which both flowers and leaves are perfected over a

*Drawing No. 2, relating to Oxalis lobata and Oxalis braziliensis. A: Showing poise of the six lobes of a leaf of O. lobata after exposure to sunlight. B: Form of the six lobes folded into a single flat package after exposure to darkness. C: A single leaf of O. braziliensis after exposure to sunlight. D: The six lobes folded into three nearly vertical but different surfaces after exposure to darkness. E: Side view of a bulb of O. lobata, 2×. F: Horizontal section of a bulb of O. lobata, 2×.*





long period of time, especially long if grown in a greenhouse.

An early account of this species was published by Claud Day in the first volume of his *History of Chile* devoted to its Botany. I quote from it as translated from the Spanish as follows: "It is most abundant in the fields and between the pasture lands of Santiago, Valparaiso, Ranagar as far as Valdivia. It is almost the first plant which flowers then and in the month of April to cover barren fields which continue until the end of May and even June." I also make use of a quotation from *Journal of the Royal Horticultural Society*, Vol. 75 (1950), page 167. The writer, G. W. Robinson, devoted most of his time for five years to collecting and describing the native plants of Chile and after returning to England published a number of papers entitled *Some Chilean Plants Cultivated in Britain*. He states: "one of the most brilliant masses of color I have ever seen was produced by millions of *Oxalis lobata* the Dedal d'Oro (Thimble of Gold) in a basin which was during the rains a pond but for most of the year baked land and dry. Now a well known rock garden plant; it produces in early summer little tufts of bright green cloverlike foliage which soon disappears. Later, about September, another crop appears together with the clear golden flowers." It should also be noted that the species has been collected in southern Brazil and in Argentina.

The root system is also quite different from that of the two species just described and, unlike them, its underground organs center around bulb formation. The accompanying illustration (No. 9) shows a plant which has already passed through its flowering stage and is in the process of developing new bulbs for the following season. Unfortunately, in washing away the soil before taking this picture, a large portion of the roots and old bulb scales

which surrounded the original bulb were torn off. The white, turnip-shaped objects are tuberous outgrowths of the larger roots which originated from the still active base of the old bulb. They are obviously water-storage reservoirs for the protection of the plant during periods of drought.

This is one of the many species whose leaves and flowers originate from below the ground surface, not from a special axis as in the two species just described. Each one of the many petioles here shown originated from thin, flat scales as outgrowths from the original bulb but they changed abruptly into a narrow cylindrical petiole, four or more inches long and topped by three leaflets. It is also from the base of the original bulb that the new crop of bulbs originate. I found ten such bulbs in various stages of development on the plant here illustrated but they do not show in the illustration.

The central core of these bulbs (Figures E and F) is composed of ten or more narrow but thick, white, fleshy scales which are filled with starch grains. They are enclosed in a series of protective scales whose inner surfaces bear long single-celled brown hairs that are so abundant and so intertwined as to make a furlike protective coating. The actual size of the mature bulbs barely exceeds four-tenths of an inch in diameter. Though much smaller than those of most of the species in cultivation, they are capable of producing good flowering plants the following season.

A second illustration (No. 1) shows a plant still in bloom in the month of October. The single-flowered peduncles are usually somewhat longer than the petioles but not always held erect. The corollas are nearly an inch in diameter and the crowning glory of the species. They are of a rich golden yellow and adorned with reddish lines radiating from the throat. The petals are pleas-



ingly rounded, overlap at their edges and of a satinlike texture. My plants, and apparently all of those in cultivation, are mid-styled but only a few of the flowers produce capsules and the number of seeds produced per capsule is small. Fortunately, abundant bulb formation insures abundant propagation of the species. British gardeners agree in reporting this one of the finest of the species and I fully agree with this verdict. Since both foliage and flowers rarely exceed four inches in height, it is not suitable for a perennial border but is especially valuable for small areas in a rock garden. It is at least equally rewarding for growing as a pot plant in the conservatory or greenhouse.

*Oxalis adenophylla* Gilles. It would not be incorrect to designate this and the closely related *O. enneaphylla* freak members of the genus. In them the number of blades per leaf has been increased from the conventional three to anywhere between eight and twenty-two, each of them attached to the top of their respective petioles to form a structure that suggests the propellor of a helicopter. Further than this the usual vivid green of the blades has become glaucous gray, in part because of a small amount of a waxy secretion and in part because the epidermal cells of the upper surface have been expanded into bubblelike protuberances which reflect light in many directions. The general features of both leaves and flowers are shown in the accompanying illustration (No. 2) which was published in the *Garden Magazine of London*, Vol. 75 (1911), page 385.

The first specimens of *O. adenophylla* were collected by Dr. Gilles of Mendoza in southern Chile and were described by him in Vol. 3 (1893), page 156 of *Hooker's Botanical Miscellany*. Later H. J. Elwes collected it in Chile at an elevation of six thousand feet and nearly forty degrees of south

latitude. Bulbs were sent by him to Kew Gardens, some of which flowered in 1903. It has now become a cherished rock garden plant in England.

The most conspicuous feature of its underground system is generally called a bulb but is of a very unusual type, as shown in the accompanying photograph (No. 8) of a small dormant plant from whose roots the soil has been washed, leaving a mass of fine fibrous roots and a bulblike structure nearly an inch in diameter. The latter is made up of a buttonlike base from whose upper surface originate a voluminous mass of grasslike scales in various stages of growth and decay. A large percentage of them are prolonged into what have become petioles, each supporting a leaf blade and the whole mass forming a compact covering for the protection of the inner true bulb scales. These scales are short and quill-like but filled with starch grains which make possible the rapid development of both leaves and flowers as soon as the period of dormancy has expired. New bulbs also arise from the base of the old bulb in the form of leaf-bearing buds which gradually increase in size but remain attached to the base until they equal or exceed that of the parent bulb. When in cultivation, the accumulated cluster of bulbs should be separated and replanted at two or three year intervals.

The flower stalks also arise from the base of the bulbs and somewhat exceed those of the leaves in height. They bear one or two slightly funnel-shaped corollas having a spread of as much as an inch. The color of the petals varies from pure white to pale pink or rose with a deep red blotch on each one of them. With the exception of the sister species next to be described, I know of no other species of the genus which has been more enthusiastically praised for the beauty of its flowers by European devotees of the art of gardening.



Here in California I have grown only a few plants of *O. adenophylla* as the bulbs are hard to procure and I have never seen seed of it offered for sale. I have grown it in pots kept in an unheated greenhouse but feel assured that it will grow equally well in the open if given a sunny situation and a site in which the drainage is good. It should be realized that the plants rarely exceed five inches in height and I am disposed to grow it as a pot plant where its beauties can be more fully appreciated than when viewed from several feet above the level at which it grows.

*Oxalis enneaphylla* Cavanilles. This species, in spite of its close relationship with the one just described, grows naturally in a very different kind of an environment. Instead of appearing on lofty mountain peaks, it flourishes within sight and sound of the ocean or, to be more specific, on both of the two Falkland Islands and along both the northern and southern shores of the Strait of Magellan. It has been conceded that its flowers are even more beautiful than those of *O. adenophylla*, but it is also recognized that it is a more difficult species to grow. Like the last species also, it is a poor seed producer and I have not been able to obtain plants of it.

*Oxalis enneaphylla* was first described by Joseph Cavanilles, a Spanish botanist and skilled engraver, in his *Icones et Descriptiones Plantarum* (Pictures and Descriptions of Plants), Vol. V, page 57. Although it seems probable that he knew the species only through dried specimens, his Latin description and engraved plate convinced later botanists that his was the first Latin name used for the species. It was not until 1876 that a comprehensive account of it was made possible through the British Challenger Expedition from 1872 to 1876. Plants collected at the Falkland Islands by Mr. Linsey were

placed in a Wardian Case and sent to the Kew Gardens, where they soon produced flowers. By this time also it had become known to navigators as Scurvy Grass and found helpful in dealing with that disease. The plants grown at Kew were studied by Sir Joseph Hooker and his report, accompanied by colored plate No. 6356, was published in the Botanical Magazine, which I have reproduced in black and white in Illustration No. 3. It reveals a close relationship to *O. adenophylla* in the form of its foliage and flowers. The number of leaflets per petiole is usually greater than the nine suggested by the specific name *enneaphylla*. Hooker found the number varied from nine to twenty and also noted that the blades were sometimes in two ranks rather than a single rank as in *O. adenophylla*. Hooker also notes that "It grows in profusion at Barclay Sound on the bank overhanging the sea so as to cover them with a mantle of snow in the spring month of November."

Another account of the species appeared in 1921 in a book by Mrs. E. F. Valentine entitled *Illustrations of Plants and Ferns of the Falkland Islands* and I have felt obliged to reproduce her (Illustration No. 5) colored plate of a naturally growing plant for two reasons. First, it gives quite a different conception of its habit of growth in the cold and wetness of the Falkland Islands as compared with single specimens growing in England, of which Hooker's plate is a good illustration. The contrast between the lengths of the petioles and peduncles in the two illustrations is decided and the accompanying text relating to the Falkland Island plants shows that they reach a height of from five to eleven inches.

Second, a more significant feature of Mrs. Valentine's plate shows a part of the root system, which happens to be





Young plant of *O. gigantea*.



*Oxalis enneaphylla*.



Old plant of *Oxalis carnosca*.

Illustration Nos. 4, 5, 6, respectively.

far the most important feature which distinguishes it from *O. adenophylla*. Further than this these same differences appear in the engraved plate of Cavanilles to which I have already referred. The voluminous mass of fine, brown roots of *O. adenophylla* is entirely lacking in *O. enneaphylla* and there is little more than a suggestion of what might be called a bulb. There is a rhizome which travels horizontally about an inch below the surface of the ground and bears a few scattered rather stout roots. Its growing end becomes more or less erect for a short distance and slowly acquires several rings of stout fleshy scales, from the youngest of which a few leaf and flower stalks arise. Such rings might conceivably be considered primitive bulbs. Those who have learned to grow the species in Europe have found that, if such a rhizome is cut into lengths bearing a single ring of scales and planted separately, each ring becomes a new plant and this has become the standard method of propagating the species. It is difficult to see how the species can be propagated in nature by this method. Seeds are reported to be produced sparingly in nature and there is some evidence that it is a trimorphic species.

The fact that the seeds are scattered explosively when ripe also favors natural reproduction.

There is little reason to question the hardiness of *O. enneaphylla* in most parts of the United States and the success attained in growing it in England justifies the belief that it can be grown here in many regions. Anyone who has enjoyed the beauty of the better known sister species will never be quite satisfied with himself until he has made a real effort to grow *O. enneaphylla*.

*Oxalis carnosca* Molina. This species was introduced into Great Britain through specimens collected in Chile by James McRae and a description and illustration based on them were published in the *Botanical Register* (1825), plate 1063. Other reports emphasized its frequent occurrence among the coastal cliffs and rocky areas of southern Chile.

The outstanding features of the species are shown in the accompanying Illustration No. 6. It portrays a two-year-old plant which has developed a long caudex bearing all of its leaves and flowers on long stems well above the ground surface. All specimens of the species show the same delay in the formation of the caudex until a large



cluster has been formed, but additional branches which include the same features as the original stalk arise and in time produce bushlike plants. So far as I know, Hildebrand was the first to call attention to the fact that in this species we have a peculiarity which has long been recognized in many of the species of palms. It is remarkable that such an unusual feature should have appeared in genera belonging to natural families so distantly related as *Oxalidaceae* and *Palmaceae*.

Below the ground surface of mature plants of this species, there is a carrot-like enlargement of the upper portion of the root but no suggestion of a bulb, a water-storage reservoir or a rhizome, although many of the habitats of the species are hot and dry. The long petioles are articulated through a short joint at their bases and it is this joint that remains attached to the caudex long after the main part of the petioles has withered and disappeared. The three nearly stemless leaf blades are fleshy and their upper surface glabrous. The portions of the epidermal cells are inflated into balloonlike protuberances.

Equally long peduncles begin to form very early in the leaf axils and each

gives rise to a single flower, then forms two lateral branches each of which gives rise to another flower and repeats the same process, thus forming either five or seven widely separated yellow blossoms. Flower formation continues for at least six months and in California persists throughout the winter season. The latter at once attract attention because of their calyces. Three of the sepals are both large and broadly expanded at their bases to form triangles and furthermore fold over the two other sepals and nearly conceal them. These changes make it appear at first sight that there are three rather than five sepals.

The capsules are also conspicuous because they are large but short and cone shaped, rather cylindrical, and retain their elongated styles at their apices. The five carpels split open for their full length and display as many as ten seeds each. Each seed is enclosed in a membrane which is so transparent and colorless as to display fully the red brown seed they enclose. The seeds explode violently and I have no difficulty in obtaining all the seedlings I have use for by simply digging up those which appear spontaneously in the pots of

*Illustration Nos. 7, 8, 9, respectively.*

*Oxalis valdiviensis.*

*Bulb and Root System*  
*O. adenophylla.*

*Foliage, Bulb, and Root*  
*System of O. lobata.*





plants kept near a seed-producing plant of this species. The ease with which seedling plants are produced in this manner suggests that it may be necessary to class the species as a weed under certain circumstances.

It must be admitted that the ornamental features of *O. carnosa* are less outstanding than those of many of the others, but it is certainly an interesting one to study. In central California it gives promise of being a good bedding plant in many situations. I am glad to be able to quote from *Gardener's Chronicle of America*, Vol. 49 (1937), page 303, from a paper by Lester Rowntree, a skilled botanist and grower of rare plants at Carmel, California. She wrote "*Oxalis carnosa* makes an ideal, small, neat shrub for the rock garden of temperate climates and an excellent pot species for either glass or house when winters are severe. With me it is a permanent evergreen sowing itself freely and the seedling plants come into flower when very young."

*Oxalis gigantea* Barneoud. As might be inferred from its specific name, this is probably the largest known species of the genus. Naturally growing specimens form erect, freely branching stalks six to ten feet in height and as much as three inches in diameter at their bases. It has often been reported to form a conspicuous feature of the vegetation found along the coastal region of Chile at and below the twenty-fifth parallel of latitude, including portions of the Provinces of Atacama and Coquimbo where it flowers in August and September.

The comparatively few and small specimens I have grown form a deeply burrowing root which does not include bulbs of any kind or water storage reservoirs. The above ground portion consists of a perfectly erect stalk from which develop short but almost equally stout branches as shown in the photograph of an eighteen inch plant (No.

4). The stalks soon acquire a reddish-brown surface and become well covered with scales, which later become horn-like, and it is from the axils of these scales that arise first a single leaf and later a cluster of from two to five. The petioles vary from a half to two inches in length and the small blades are narrow and scarcely a half inch long. The abundance and uniform distribution of these leaf clusters clothe each stalk with vivid green and impart to them a plumelike character.

The single-flowered peduncles also arise from the scale axils and their stalks are but little longer than those of the leaves. The yellow corollas are short tubed and fully a half inch in diameter. The ten stamens are well united at their bases and both groups of five are exceeded by the five stigmas.

An attempt was made to grow the species at the Edinburgh Botanic Garden from plants collected by Clarence Elliott about 1910 but apparently was not a success. Living plants were collected and brought back to the University of California Botanic Garden by members of one of their exploring expeditions. They were found to grow vigorously in a heated greenhouse devoted to succulents but as yet have not produced seed. Cuttings made from these plants rooted readily in my little unheated greenhouse and have made regular but slow growth without becoming dormant. Two of these plants survived our last winter season out of doors without injury. An even more favorable report was made by Lester Rowntree of Carmel, California. She grew it for six successive seasons in her garden (Latitude about 37° 20'). It seems probable *O. gigantea* will be added to the long list of species of succulent character now in cultivation in many parts of California and similar regions. Its habit of growth at once arouses interest both because of its uniqueness and its inherent beauty.



# Minor Fruits

GEORGE L. SLATE<sup>1</sup>

There are many edible fruits of little or no commercial value that can add interest and variety to the home fruit garden. Some of them have considerable dessert value while others are of little value except in the kitchen. Several withstand the severe cold and the dry climate of the Great Plains and Rocky Mountain region, and the early settlers made good use of them as there were few other fruits available. Now that transportation is so rapid and refrigeration and canning are so highly developed, the inhabitants of the horticulturally less-favored regions fare nearly as well, insofar as fruit is concerned, as those who live where our finest fruits are grown.

These minor fruits are not likely to be of much value as important sources of food as they are inferior in eating and cooking quality to our best standard fruits. They are interesting novelties, however, and they are not much troubled by insects and diseases. Some are useful ornamentals as well as food producers.

Most of them are not improved much from their wild state, but occasionally some enthusiast has sought out and propagated superior forms. The sand cherry has received much attention from the Great Plains experiment stations, and hybrids as well as selections have come from their efforts.

The horticulturists of the past have had considerable to say about these fruits and their possibilities, but not much has come from their literary efforts. There is too far to go and there are already many good fruits to occupy

our attention. Nevertheless it should be pointed out that the blueberry was once a minor fruit, albeit a good one, but the efforts of Dr. F. V. Coville transformed it into a fruit that is now the basis of a rapidly expanding commercial blueberry industry that is utilizing land of little value otherwise to produce highly valuable crops.

The discussion of these fruits which follows is mostly based on the writer's experience with them, but he has drawn freely on the experience of others when necessary to round out the picture.

## *Native Persimmon*

The native or common persimmon, *Diospyros virginiana*, is an attractive tree that grows to fifty feet in height in the open where it makes a narrow, round-topped tree. The leaves are dark green and lustrous. The persimmon is dioecious, but rarely male and female flowers may be borne on the same tree, and occasionally the flowers may be perfect. The flowers, which appear in June at Geneva when the leaves are more than half grown, are greenish yellow, urn-shaped and inconspicuous. The fruit is variable in size, color, flavor and time of ripening. It varies from three-fourths of an inch to two inches in diameter, is usually yellow or orange, often with a reddish cheek. The large seeds are embodied in the soft flesh and vary considerably in number; occasionally seedless types have been found.

The persimmon is native from southeastern New York and Connecticut near Long Island Sound southward to

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Florida and westward to Kansas and Texas. It is a common tree south of New York and is found on light, sandy, well-drained soils and the deep, rich bottomlands of river valleys. It is one of the first trees to move into abandoned fields in the South.

The native persimmon is not likely to become of commercial importance, but the sweet, rich, distinctive flavor and high food value (640 calories per pound as compared to 445 for bananas) make it well worth growing as a home garden fruit in regions where the growing season is at least as long as at Geneva, or long enough to fully ripen the Concord grape.

It is useful to eat as a dessert fruit and a number of recipes have been devised to use persimmon pulp in puddings, custard, cakes and sherbet. The fruit has considerable wild life value, being eaten by raccoons, opossum and some birds. It is eaten readily by hogs and could well be utilized to a greater extent for this purpose. The trees bear heavy crops annually and often grow on land that would not otherwise produce much food of value for hogs.

The glossy foliage and golden fruits have some ornamental value as they hang a long time on the tree.

The persimmon is a very variable fruit and many varieties have been selected and propagated from time to time, but they are not generally available from nurseries. However, an occasional nursery can supply a few varieties.

The writer has assembled a collection of more than twenty varieties, all of which usually ripen at Geneva before severe freezing. The idea that a frost is necessary to make the fruit edible is poppycock. Many ripen about the time a frost occurs, but the frost has nothing to do with making them edible. On the contrary, if they are not fully ripe before a hard frost occurs (twenty-three

to twenty-five degrees), the fruit is ruined. Fully ripe persimmons are pleasing to eat when frozen hard.

Farther south there are, of course, late varieties that would never ripen this far north.

The persimmon is noted for its astringency, and this varies greatly among the different trees. Fully ripe persimmons of the best varieties are almost wholly free of astringency. Fruit not fully ripe, and even some fully ripe varieties, justify Captain John Smith's statement about the persimmon written in the first years of the seventeenth century, "If it be not ripe, it will draw a man's mouth awrie with much torment."

The varieties in the writer's collection, which are mostly grafts on seedling trees, have been judged almost wholly on the basis of flavor as there is not much use in growing them unless they are good to eat. The best varieties have been 'Garrettson' and 'Kansas.' 'Early Golden' is nearly as good. 'Killen' and 'Penland,' the latter seedless, are good, but have not been tested long enough to make definite recommendations.

'Hicks,' 'Miller,' 'Miles' and 'Lambert' are not as good in quality. 'Bleeker,' 'Conchin,' 'Edmonds' and 'Kitch' are too poor to grow, although they ripen here.

There should, of course, be a male tree in the planting to provide pollen.

Persimmons tend to overbear and there is danger of limb breakage unless the fruits are thinned severely. The quality of the fruit suffers when the crop is too heavy. 'Garrettson' bears good but not too heavy crops, and the quality is always good. 'Kansas' is even better, but it overloads and the quality is not good when the crop is so heavy.

These varieties ripen mostly in October and November. 'Garrettson' keeps as well, perhaps better, than any



on the tree and is good to Thanksgiving or later.

Persimmons are easily raised from seed and for those out of the persimmon range this is an easy way to get some seedling trees for grafting stock. The seeds should be stratified, or planted in the fall with a mulch, as they require chilling for germination. Seedlings spring up under the writer's trees which are mulched with leaves.

The writer's collection has been assembled by grafting on seedling trees. The Jones' modified cleft graft is used and the scion is covered with melted wax. Sprouts appearing below the graft should be rubbed out weekly as they appear. Persimmons graft easily if the scion wood is good. Other methods of budding and grafting are undoubtedly suitable.

The principal cultural difficulty that has been encountered is getting the trees through the first winter. The persimmon has a tap root and the loss of part of it sets the tree back so that it does not grow very vigorously the first season, and is consequently not as winter hardy as if it made good growth. In this latitude, a two-year-old nursery tree had better be protected by wrapping during the first winter. The writer much prefers to set young seedlings which winter all right and graft them over to varieties after two or three years. The grafts have wintered so far without difficulty.

Persimmons tend to prune themselves and many small twigs die each year. When pruning a grafted tree with several varieties, one should make sure that one of his choice varieties is not being eliminated in this manner. Close observation is necessary to make sure that the grafts get their share of light and nutrients and that competing branches are eliminated. Heavy pruning appears unnecessary and light corrective pruning is suggested.

Mulching plus nitrogen fertilization has kept the trees in a vigorous condition. Probably mowing the grass two or three times would do just as well. Clean culture is probably not necessary.

The only insect noted so far has been a large caterpillar with the appetite of a horse that eats the foliage very rapidly in midsummer. This insect must be controlled as defoliation at this time may result in winter killing of the defoliated branches. Handpicking and parathion dust have handled this situation.

### *Papaw*

The papaw, also spelled pawpaw, *Asimina triloba*, is the only member of the ANNONACEAE, the Custard Apple family, which is hardy in the northern United States. It should not be confused with the papaya, an entirely different plant which is sometimes called papaw.

The papaw is a small tree which may grow to twenty or thirty feet in height, but usually is much less as the suckers which grow from the roots tend to make a thicket ten or fifteen feet in height. The leaves are large, six to eight inches long, and glossy, giving the plant a tropical appearance unlike the other small trees that grow in the northern states. The flowers are dull red in color, an inch and a half across, are interesting but not handsome and appear in late May before the leaves.

The fruits are borne in pairs or clusters of five to six and the seedlings grown at Geneva ripen from mid-September onward, many failing to ripen before hard freezing. The fruits of the better types are four to six inches long with thin, glaucous, yellowish skin and edible pulp in which are embedded numerous brown seeds as large as lima beans. The flesh suggests the banana in texture, is highly perfumed, and very sweet and rich. One papaw enthusiast



has said of it, "A person of the most hypochondriac temperament relaxes into a smile when he tastes it for the first time." Others dislike the flavor. The fruit is very rich with 435 calories per pound.

The papaw is found throughout the eastern half of the United States, except New England and eastern New York, and it extends from the latitude of the north shore of Lake Ontario southward to about a hundred miles from the Gulf of Mexico. Westward it reaches Michigan, eastern Kansas and northeastern Texas.

Its preferred habitat is rich bottom-land soils, but it will grow well on fertile upland soils. In the Mississippi Valley it forms large thickets many acres in extent.

The papaw is certainly one of the more interesting and useful of the minor fruits. It is distinct from our common fruits, high in food values, and valued by many who know it. The tree is well worth a place in the garden.

It is very variable in size, quality and time of ripening, and systematic searching would undoubtedly bring to light superior types. In 1916, the *Journal of Heredity* awarded a prize to a superior papaw, but it is not available from nurseries; in fact, no named varieties are offered. The writer's plants were raised from seeds from a planting of superior types, and they vary considerably. The earliest ripen in mid-September at Geneva.

Papaws are best raised from seeds which require stratification, and the seedlings should be planted in their permanent location within two years as older plants transplant with difficulty. The seedlings grow very slowly and are not over four inches tall the first year. After three or four years, they grow more rapidly. The suckers are very difficult to move and establish as they have no fibrous roots. In view of

the difficulties of vegetative propagation, nurseries are not likely to offer other than seedlings.

The trees at Geneva have been rather unproductive, although they bloom heavily.

The trees are easy to grow after they are established. A fertile soil and the elimination of weed competition are desirable while the trees are young. Suckers should be subdued as the trees are more attractive if grown with a single stem rather than as a thicket. There are no insect and disease troubles of any consequence.

### *Actinidia*

*Actinidia arguta* is a handsome vigorous climbing vine with attractive dark green leaves with reddish midribs and small whitish, saucer-shaped flowers with a prominent mass of stamens in the center. The fruits are greenish yellow, about an inch long, ellipsoid in shape, and with an agreeable, mild, sub-acid flavor. This species grows wild in Japan, Korea, and Manchuria, where the fruit is collected and eaten by the natives.

This *Actinidia* is unlikely to become of commercial importance, but the fruit is pleasant to eat and makes an excellent jam. The three vines observed by the writer are growing on the side of a building and are not very productive although of great vigor. It is an excellent vine which produces a useful and worthwhile late autumn fruit. It is slow in coming into bearing.

No horticultural varieties have been selected as its rampant growth and delay in coming into bearing make it unattractive to the plant breeder.

Propagation is by seeds, layering, half-ripened wood and hardwood cuttings.

This *Actinidia* apparently has no decided soil or climatic preferences. It



is very hardy, being grown as a clipped hedge in the Bar Harbor region of Maine.

Another species, *A. chinensis*, the Chinese gooseberry, is a vigorous grower with large leaves, varying in shape from nearly round to ovate and pointed, and large white, deliciously fragrant flowers which change to buff yellow as they age. The fruits are the size of a small hen's egg, round to oval, russet colored and hairy. The skin is very thin, and the flesh is green, sweet and excellent for dessert or preserves.

*A. chinensis* is a native of the Yangtze Valley in China where it grows to great size.

It is not winter hardy enough for the Northern States, but is hardy in California and similar climates. E. H. Wilson has described it as the handsomest *Actinidia* and one of the most beautiful of all climbers. In New Zealand, the Chinese gooseberry is grown commercially to the extent of sixty-five acres which produce a hundred tons of fruit. The New Zealand Department of Agriculture has published a bulletin, *Chinese Gooseberries*, with cultural instructions.

### *Juneberry*

The Dwarf Juneberry, also known as Serviceberry and Saskatoon, is *Amelanchier alnifolia*. It is usually a low shrub growing about three feet tall. It spreads slowly by suckers to make a wide bush. The small white flowers which appear in late April are borne profusely so that the bushes are mounds of white when in flower. The fruits, which grow to the size of a pea or larger, are purplish blue, or black, with a heavy bloom which gives the fruit the superficial appearance of a blueberry. The berries are juicy, mild in flavor, rather insipid, and ripen in late June or near the end of the strawberry season.

The Dwarf Juneberry is a plant of the Great Plains States and the prairie provinces of Canada, a range which indicates its great hardiness and ability to thrive where rainfall is low. It is not particular as to soils.

The plants bear very heavy crops annually and in the Great Plains region was very popular with the early settlers, whose choice of fruits was very limited owing to the harsh climate which prevented the culture of our common fruits. It was esteemed for preserves and pies. Its mild flavor was greatly improved by the addition of rhubarb or lemon juice.

It was an important food of the Indians of the West who gathered it for winter use, crushed the berries, dried them spread out on stones or bark, and stored the product in sacks. The soldiers of the Lewis and Clark expedition used this fruit extensively to eke out their scanty diet.

The birds, especially robins, are very fond of Juneberries and soon strip the bushes unless they are covered.

Several varieties have been offered by nurseries. Five from as many sources were fruited by the writer and all appeared identical. They may have all been the same or so similar that they could not be distinguished from each other. The 'Success' variety has been widely distributed in the past and is probably as good as any available from nurseries.

The Juneberries are propagated by taking up the suckers which root deeply and are rather hard to get out of the ground with enough roots to ensure a good transplanting job.

### *Elderberry*

The American Elder, *Sambucus canadensis*, a member of the honeysuckle family, is a common native shrub that grows from Nova Scotia



and Manitoba to Florida and Texas. The plants are large, rather coarse shrubs that grow to a height of twelve feet or less. Several botanical varieties are known. The flowers are small, white, and are borne in large compound cymes. The purplish-black berries ripen in late August and September.

The elderberry is often used for making wine in the home. Elderberry pie is a common dish where this fruit is common, but the insipidity of the berries requires the addition of lemon juice to make a good product. The berries may be dried and stored for winter pies, the strong elder flavor being somewhat dissipated in drying. Elderberry juice cooked with sugar and bottled makes a refreshing drink with the addition of water and lemon juice.

The plants have some landscape value where large, rather coarse shrubs are needed, and the fruit is used by many birds.

Horticultural varieties with larger berries and fruit clusters than the general run of wild elders have been selected from time to time and sold by nurseries. 'Brainard' was introduced in Ohio about 1890 with the claim that the berries were nearly one-fourth inch in diameter. 'Adams' was brought out by the late W. W. Adams of Union Springs, New York. He selected superior wild types and raised seedlings, but it is not known whether the several selections he sent to the New York State Agricultural Experiment Station in 1915 were wild selections or seedlings. One of these was distributed by the New York State Fruit Testing Co-operative Association, Geneva, New York. When it was discovered that this clone was self-sterile, another clone was added and orders for more than one plant were filled with a mixture of both clones to provide the

necessary cross pollination.

Other improved types have been brought to the writer's attention from time to time, but these have not been introduced.

The elder varieties vary considerably in size of berry and cluster, and a serious effort to search out wild types and use them in breeding would undoubtedly be worth while. The writer crossed the 'Adams' variety with *S. coerulea*, a Pacific Coast species with large, acid, blue-black fruits with a heavy bloom that gives the fruit a blue appearance. The hybrids were intermediate in character and not equal to the 'Adams' variety. Had the second generation been raised, some interesting seedlings might have resulted.

Elders are propagated easily by hardwood cuttings or by seeds which should be sown as soon as ripe.

Elderberries are occasionally planted commercially as there is a limited demand for the fruit from canning factories. The culture has not been investigated, but there appear to be no serious problems. The plants are very hardy, bloom after danger from frost is past, and have no pests except birds. A spacing of about ten feet between plants should be about right. The soil should not be soggy. Weeds should be controlled to some extent and if fertilizers are used, nitrogen should be tried. Pruning consists of thinning out the older canes a little.

#### *High-bush Cranberry*

The high-bush cranberry, *Viburnum trilobum*, is not a cranberry although the berries bear a superficial resemblance to cranberries in size and color. *V. trilobum* is a vigorous, handsome shrub that grows to twelve feet in height. The white flowers are borne in a terminal cyme with a border of con-



spicuous sterile flowers surrounding the small fertile flowers in the center. The berrylike fruit is bright red, acid, and contains a large flat seed. This species is closely related to *V. opulus* but differs in that the fruit is clear acid in flavor, whereas the flavor of *V. opulus* is intensely bitter. This *Viburnum* is a northern shrub that ranges from New Brunswick to British Columbia southward to New York, Michigan, South Dakota and Oregon. It grows in moist woods and is very hardy.

The high-bush cranberry, or pem-bina, as it is sometimes called in the Great Plains region, is a useful fruit for jelly and preserves in the colder areas of the Northern States and Canada where the winters are too harsh for other fruits. The fruit is rich in pectin and makes a fine, clear, sparkling jelly which resembles apple jelly in appearance. It is suitable for eating with meat. Elsewhere it is useful as an ornamental and fruit-bearing shrub to add variety and interest to the diet. The fruits are eaten by pheasants and ruffed grouse.

The berries begin to turn red in late July and remain all winter on the plants in good condition.

Several collections of superior types have been assembled by experiment stations. One notable collection was gotten together by A. E. Morgan, formerly president of Antioch College, who collected in the Northeastern States and Canada. From this collection three varieties, 'Wentworth,' 'Andrews' and 'Hahs,' were turned over to a nursery for distribution, but their identity was lost and no named varieties selected for their fruit are now known to be available from nurseries.

It is not likely that much work will be done with this fruit as the ease with which a great variety of fruits are now shipped all over the country makes it

unnecessary to grow this fruit except as a novelty.

The plants may be raised from seeds, hardwood cuttings, mound layering and tip-layering, the last method being very certain and easy.

The plants grow naturally in moist woodland and are tolerant of light shade, but they grew well at Geneva for many years on a tight, silty, clay loam in full sun. They have no special cultural requirements. Weeds should be controlled, nitrogenous fertilizers used if needed for greater growth, and pruned lightly if the bushes become too thick and renewal appears necessary.

Unlike its close relative, *V. opulus*, the European cranberry bush, this species is not subject to the aphid which so often disfigures its European relative, of which the Common Snowball is the chief representative.

### *Buffalo Berry*

The buffalo-berry, *Shepherdia argentea*, is a thorny shrub or small tree that grows from five to twenty feet high. The flowers are small, yellow, and dioecious. The small, red, acid, but pleasantly flavored fruits are borne in very compact clusters in the axils of small branches. They ripen in July and remain on the bushes until frost or later. The fruits vary in size from currants to small gooseberries.

The buffalo-berry is native from Saskatchewan southward through the Rockies to the mountains of New Mexico where it is found along streams.

The early settlers in the cold, dry Great Plains region valued this fruit highly as there were few other fruits that could be grown in that region. The name buffalo-berry is said to be derived from the custom of eating the berries as a sauce with buffalo meat. The berries make a very good jelly and they dry and keep well.



In addition to its fruit, the handsome silvery leaves make the buffalo-berry a useful ornamental, especially where plant material is limited by a harsh climate. The small size of the berries and the thorniness of the plant make harvesting tedious.

The buffalo-berry grows and fruits well at Geneva and is easy to grow.

Propagation is by hardwood cuttings taken in the fall and handled like grape cuttings. It may also be increased by suckers and seeds. Because of its dioecious nature, half of the seedlings will be staminate and bear no fruit. If seedlings are raised, they should be kept in the nursery row until flower buds are produced, then moved to their permanent location with a ratio of one staminate plant to eight or ten pistillate plants. Unless both sexes are present, no fruit will be produced.

#### *Dwarf Cherries and Plums*

Several species of the genus *Prunus* are interesting fruits, borne on small garden-size plants that are of considerable interest to home fruit growers. Their winter hardiness and drought resistance make them useful in the Great Plains region, and they have novelty value elsewhere in the Northern States.

#### *The Western Sand Cherry*

The Western Sand Cherry, *Prunus besseyi*, is a low, gracefully spreading shrub three to four feet high, with slender ascending branches or slightly drooping branches. The foliage is glossy, silvery green and attractive. The flowers are borne in axillary clusters all along the younger branches so that the plants are a mass of bloom when in flower.

The fruits are usually purplish black, but yellow and red-fleshed types are known. The flavor is usually bitter and astringent, but sweet and fairly

palatable forms are known. They vary in size from three- to five-eighths of an inch in diameter. Very heavy crops are borne and the trees begin bearing two or three years after planting.

The pectin content of the fruit is low but, combined with apple, good jam and jelly can be made. The cherries are also useful for sauce and pie. The South Dakota Experiment Station has published recipes for utilizing sand cherries.

*P. besseyi* is a Great Plains native, ranging from Manitoba to Wyoming, Kansas and Colorado. In this region, the winters are harsh and the summers hot and dry. For this hard country the Sand Cherry is a valuable home garden fruit.

Its ability to thrive under severe conditions and its usefulness, especially to the Indians and early settlers, brought it to the attention of the early horticulturists of the Great Plains region. Many have worked with it and have brought forth improved varieties. The late N. E. Hansen did much with it, selecting superior varieties from thousands of seedlings as well as hybridizing it with its *Prunus* relatives. Several of his originations have been cultivated for many years.

In the humid East, the Sand Cherry is subject to brown rot which attacks the twigs and fruits but, with spraying, it may be grown satisfactorily.

The extensive breeding work by Hansen and other Great Plains horticulturists has resulted in varieties much superior in size and quality to the wild types. These are propagated vegetatively and are much to be preferred for planting. Among these varieties are 'Sioux,' 'Brooks' and 'Black Beauty.' They are self-sterile and two varieties should be planted to provide for cross-pollination.

Unfortunately, some nurseries have



flooded the country with Hansen's Bush Cherries, described in glowing terms to make the purchaser think he is getting something akin to a sweet cherry on a small plant. While the best varieties are a long way from a sweet cherry, they are at least much better than the seedling junk so widely distributed. Those who want sand cherries should buy the named varieties from reputable Great Plains nurseries and pay their prices.

Among the sand cherry hybrids are 'Opata,' 'Sapa,' 'Zumbra,' 'Compass,' 'St. Anthony,' 'Nicollet,' 'Tom Thumb,' 'Oka,' and others catalogued by Great Plains nurseries.

Sand cherries are easily raised from seeds which require stratification. The seeds may be sown in the nursery as soon as ripe and should not be allowed to dry out. The seedlings fruit in three years.

The improved varieties are propagated by budding and grafting on sand cherry seedlings. Cutting the roots with a spade eight inches from the main stem during the dormant season will cause the cut-off roots to send up new shoots and produce new plants.

The plants fruit better on poor sandy soils than on more fertile soils. They do well on dry gravelly embankments. Obviously, no fertilizer should be used, especially in the humid East. A moderate amount of renewal pruning is desirable or the bush will become filled with old wood.

In the East, brown rot control measures as used on cherries and plums may be needed.

### *Prunus pumila*

This is an eastern relative of the sand cherry that grows eastward to the Atlantic Coast, being especially abundant on the sandy shores of the Great Lakes. It has not been improved, as has its western counterpart, and better fruits may be available in the East.

### *Nanking Cherry*

The Nanking cherry, *Prunus tomentosa*, is a wide-spreading, compact, small tree that grows to six or eight feet in height. The leaves are heavily tomentose, hence the specific name. The flowers open white from pink buds, but some seedlings produce flowers with a slightly pinkish cast. The plant is one of the first to bloom and this and its floriferousness make it an attractive ornamental.

The fruits are small, bright red cherries that are borne in great profusion, and a plant in fruit is an attractive sight. The cherries are rather soft, but the flavor is cherrylike and refreshing. They ripen with the other cherries.

The Nanking cherry came to us from Japan, Northern China and Manchuria.

This little cherry is a good dual-purpose plant as its refreshing flavor is much like a sour cherry, and the tree is well worth growing as an ornamental where a low spreading tree is wanted. It makes a refreshing juice for a summer drink.

The writer has grown many hundreds of seedlings in an attempt to increase the size and firmness of the fruit. Some progress was made each generation but the material was later lost. Many of the seedlings were unproductive or otherwise undesirable; hence, one should procure vegetatively-propagated plants of good selections to have this fruit at its best. The Minnesota Experiment Station has introduced one named selection, 'Drilea,' and several under number.

Propagation by seeds is easy and the plants should fruit the third year. Superior types may be budded on seedlings of the species.

The plant is easy to grow and is one of the hardiest. The usual care given



to small trees is sufficient. Brown rot may occasionally damage the twigs, and mice and rabbits find the bark to their liking.

### *Korean Cherry*

The Korean Cherry, *Prunus japonica*, is a low shrub that grows to a height of four feet and bears heavy crops of cherrylike fruits that are about the size of sour cherries and much firmer. The fruits vary greatly in size, firmness and quality, most of them are rather acid and astringent, but a few are of fair quality and make good pies.

The plants bloom freely, are attractive when laden with the red cherries, and the autumn foliage is colored.

This cherry is very hardy, and the Minnesota Experiment Station has introduced two selections, 'No. 20' and 'No. 60,' which are similar, but ripen at different times. Further attempts to improve it by breeding would undoubtedly be worth while.

There are no cultural problems other than brown rot control which may be done with a knapsack sprayer.

### *Beach Plum*

The Beach Plum, *Prunus maritima*, is a straggling shrub growing from four to ten feet or more in height. Under cultivation, it may be grown as a low tree. The flowers are small and appear before the leaves. The tree in flower is a mass of bloom and, growing in colonies, it resembles drifts of snow.

The fruit ripens in late summer, is about one-half inch in diameter, usually dark purple with a waxy bloom, sometimes red and occasionally yellow. The skin is thick and tough and the flesh crisp, juicy and sweetish. Both ripening season and flavor vary greatly.

The beach plum is a plant of the sand dunes of the Atlantic Coast from New Brunswick to the Carolinas.

Beach plum jelly is a prized product

in beach plum territory. In Massachusetts, particularly on Cape Cod, the crop is harvested for jelly.

The plants are highly tolerant of salt spray and this, with their picturesque beauty and the useful fruit, makes the beach plum a popular plant for ornamental planting near the sea.

The usefulness of the fruit and its great variability have stimulated a search for improved types to be propagated and planted on the sandy soils of the Atlantic Coast. The Arnold Arboretum has been given a fund to award prizes to persons making significant contributions to beach plum culture and utilization. The New Jersey Experiment Station has recently named the 'Raritan' beach plum, and two other selections are recommended to pollinate it.

Beach plums are propagated from seeds sown after harvest. Superior types must be propagated vegetatively. Root cuttings three to four inches long, made in the fall and planted two to three inches deep with a winter mulch, is one method. Softwood cuttings, treated with a root-inducing substance, root well with good care.

Beach plums are best suited to the sandy soils of the Atlantic Coast, although they will grow on heavier soils inland. Pruning is mostly removal of dead wood and moderate thinning of the older branches. The Massachusetts Experiment Station recommends fertilizing the plants with 500 pounds of a 7-7-7 fertilizer per acre.

Several insects and diseases may be troublesome. The Massachusetts Experiment Station in its bulletin on the beach plum offers a spray schedule for this fruit if it is needed.

### *Mulberry*

There are several species of mulberries and these make large, spreading trees. The White Mulberry, *Morus*



*alba*, a native of China, is a variable species that has given rise to a number of varieties. This species is the hardiest, and varieties suitable for cultivation in the North are derived from it. Of these varieties, 'New American' is probably the best. 'Downing' is another.

Purchasers of mulberries may have trouble getting a good variety true to name as the nurseries are apparently little interested in this fruit. A variety collection assembled by the writer some years ago brought together a group of trees that produced very little satisfactory fruit, and all were much inferior to an old tree of unknown variety growing near the Experiment Station.

The fruit of the mulberry is very soft and rather insipid. Although it is sometimes used for dessert, its best use is as a bird food.

The Russian mulberry, a variety of this group, is inferior, but the tree is unusually hardy.

The black mulberry, *M. nigra*, from Asia, and the Red mulberry, *M. rubra*, from the southern United States, make large trees and have contributed varieties suitable for the South.

Mulberries may be propagated by grafting on seedlings of the Russian type.

The mulberry is hardly worth the attention of the plant breeder, but, if the best varieties could be made available true to name, it would be worth having on a farm or in a large garden.

### *Japanese Quinces*

This well-known garden plant, *Chaenomeles lagenaria*, usually bears only a few fruits, but, when cross pollinated as in a seedling planting, heavy crops are borne. The fruit is high in pectin, but the jelly lacks character and is inferior to many other fruit jellies. The writer fruited two hundred seed-

lings of this species as well as a number of the large-fruited *C. lagenaria wilsoni*. There seemed to be no reason why any of them should be propagated for fruit.

### *Medlar*

The medlar, *Mespilus germanica*, a relative of the apple, pear and quince, is a shrub or small tree growing to fifteen feet. The fruit is an inch or more in diameter, russet brown, and acid. It is usually picked after a light frost and laid away to soften, or blet, as it is called. It is a sort of internal decay that softens the flesh and is said to make it edible. There are many other fruits that are much more pleasant to eat. The tree is attractive and about as hardy as the quince.

### *Elaeagnus*

This Asiatic fruit, *Elaeagnus multiflora*, is a shrub that grows to nine feet. The fruit is variable in size, acid and pleasantly flavored. No attempt has been made to raise improved types, but its variability, pleasant flavor, hardiness, and drought resistance are characteristics that make this fruit worthy of some attention. The few plants observed by the writer have very small fruits, but others have noted fruits as large as cherries.

### *Missouri Currant*

The Missouri currant, also known as Golden Currant and Buffalo Currant, is *Ribes odoratum*, an American shrub that grows from Minnesota and Arkansas westward to the Rockies. It is often grown for its attractive yellow flowers which come early and are strongly clove-scented. The black berries, which are borne in very short clusters, are edible and may be used to make pies and jelly. 'Crandall' is a large-fruited variety introduced long ago.



# Mist Propagation for the

Widespread interest in the propagation of softwood cuttings by the use of constant misting or the newly developed system of spraying the leaves of cuttings with mist intermittently or only often enough to prevent the transpiration of moisture, thus promoting rapid rooting, has led to the designing of a small complete propagation outfit, scientifically made for trouble-free economical operation by home gardeners, small nurseries, or horticulturists who want to experiment with the various phases of mist propagation under easily controlled conditions.

It is possible, of course, to propagate softwood cuttings by the mist system in greenhouses or other enclosures or outdoors in full sunlight with the use of wind screens. However, greenhouses are expensive, require careful maintenance and sometimes are not justified for home gardeners or small operators. In outdoor propagation wind is sometimes troublesome even with wind screens. Besides the wind factor, there is considerable evidence that the full intensity of sunlight in certain cases is detrimental. Dr. H. Evans,<sup>1</sup> as a result of extensive tests using constant mist with cacao cuttings in Trinidad, writes of his experiments, "Rooting actually occurred at all light intensities from 10 per cent. to 100 per cent. of sunlight. In full sunlight, however, under these moist conditions active decomposition of chlorophyll took place, resulting after 3 to 4 weeks in extensive bleaching of the leaves. The bleached areas were

<sup>1</sup>The light intensity quotation is from *Investigations on the Propagation of Cacao* by H. Evans, B.Sc., Ph.D.



# Amateur Horticulturist

JEWEL W. TEMPLETON

very susceptible to attack by micro-organisms and subsequent losses in hardening were high. A reduction of the light intensity to 75 per cent of full sunlight prevented bleaching but decomposition of chlorophyll resulting in paling of the leaves was still active. With decreasing light intensity the effect on chlorophyll decomposition decreased steadily without any detrimental effect on root production.

"Excellent rooting has been obtained with a light intensity of 25 per cent. of full sunlight. At 15 per cent. sunlight rooting was satisfactory but there was a small loss of cuttings due to starvation caused by mutual shading of the cuttings."

From Dr. Evans' observation it seems that some modification of full sunlight to the range between 30 per cent. and 70 per cent. is desirable.

This small softwood mist propagator was designed with the following ideas in mind:

1. It should be easy to set up in almost any location, preferably in full sunlight but adaptable for full shade, and should be simple to operate with very little attention.
2. No special arrangements for drainage, such as subterranean tiling, should be necessary.
3. It must use as little water as feasible and still insure optimum rooting conditions because of the drainage problem with excessive water, its added expense, and because there is evidence that too much water produces some degree of leaching of nutrients from the leaves of cuttings.





4. Its integral strength should be great enough to withstand high winds without collapsing.

5. Optimum light intensity and ventilation should be incorporated in its cover.

6. Whereas this propagator was to be designed for use with constant mist, it should be easily adapted to various other types of propagation such as intermittent misting.

7. It should be attractive looking for lawn or garden.

A steinen mist nozzle with a capacity of one and one-half gallons per hour, a 120° spray angle, and a spraying radius of two feet was chosen. Beginning with the nozzle, the mist propagator was logically designed step by step.

The nozzle was attached to a one-eighth inch galvanized supply pipe with a coupling. The pipe was bent so that the nozzle projected upward in the center of the propagator to a height desirable for even mist distribution. A sleeve welded just under the nozzle and fitted over a spike in the ground held the nozzle in an upright position. A hose connection was soldered to the other end of the supply pipe.

Using the supply pipe as a radius, a circle of eighteen bricks was laid on the ground. The circle was then filled with concentric circles of bricks, forty-eight in all, with some drainage space between them. A saran screen four feet in diameter was cut and laid on the bricks with the spike projecting through a hole in its center.

A metal band three and one-fourth inches wide and long enough to form a circle four feet in diameter was set up on the outer course of bricks and fastened with a simple end lock. A notch was cut in the bottom of the band through which the supply pipe could pass. Twelve slots were cut equidistance apart in the band to receive the ends of the ribs of the super-

structure.

With the band in place, twelve curved wire ribs were stuck into the prepared slots and brought to the center directly above the nozzle. One-half inch hooks on the upper ends of the ribs were fitted into a cuplike assembly and held securely with a washer and wing nut.

The ribs served to hold the metal band in a perfect circle and even without the sand rooting medium made a very substantial structure. The rust-proof screen was for drainage and to prevent weeds, etc., from growing into the propagating bed.

With the nozzle pipe fitted on its spike and projecting through the band at the edge of the bed and the whole structure centered on the bricks, the band was filled full of coarse concrete sand—not the finer mortar sand. The sand was gently flooded with water. Then the hose was attached to the hose connection.

The twelve-gored cover that fitted over the structure was made of Ultron film. Considerable research went into selecting this plastic. Its light transmission had to be about 50 per cent. It should have no absorption bands, as shown by spectrophotometer readings, that would be adverse to plant growth, e.g., those coinciding with the absorption bands of chlorophyll. It had to allow the essential gases, oxygen and carbon dioxide, to pass through fairly easily and still confine the mist. It must also be durable and strong enough to withstand high winds. Ultron has proved very satisfactory.

After the cover was fitted over the top it was pulled down over the metal band and held securely in place with a wire, spring and hooks.

The mist propagator was now ready for operation. It looked so much like a bubble that we called it "The Mistic Bubble" and the name seems to fit it.



This propagator can be operated in several ways. It can be successfully run by simply turning on the mist, sticking in the cuttings, and transplanting them to growing conditions after they root. It can be advantageously turned off at night. In most climates it should be turned on an hour after sunrise and should run continuously until half an hour before sunset. However, if there is any chance whatsoever of forgetting to turn on the mist in the morning or if the attention should prove burdensome, the mist should be allowed to run continuously day and night. This system will not add appreciably to the water bill since it uses only thirty-six gallons of water in twenty-four hours.

The Bubble can be converted to intermittent misting readily by using the newly developed "Electronic Leaf" control system in connection with a small solenoid water valve. With this method of operation, only enough water is sprayed periodically on the leaves to keep them moist at all times. The "Leaf" automatically compensates for most weather conditions and provides more nearly perfect rooting conditions.

A soil-heating cable, coiled around through the open spaces between the bricks in connection with its thermostat inserted in the sand rooting medium above, can be used to provide bottom heat, which is often advantageous with some plants. A small embankment of sand or soil against the outside of the bricks at the base of the propagator will confine the heat to the sand layer above.

An electric bulb with water-proof socket and wire suspended inside the Bubble will permit rooting much earlier in the spring and later in the fall.

In selecting cuttings for mist propagation healthy, young, vigorous parent plants are naturally desirable. However, cuttings from old plants will usually root well. The cuttings must be taken during the growing season

and every cutting should have leaves. If this produces crowding, half of each leaf may be cropped off. The leaves should be stripped or cut from the end to be stuck into the sand. It is not necessary to cut at a node or joint and from long sections of new growth several cuttings can be made. Each cutting should be from two to five inches long.

The best way to get the cuttings into the sand is simply to stick them in only deep enough to hold them erect, usually half inch to an inch and a half. They should be spaced half inch to an inch and a half apart depending on size and variety. For soft or tender cuttings, holes should be made with a nail or a small pointed stick and the cuttings should be smoothed and firmed by gently flooding with water from a sprinkling can. The sand should *never* be packed.

If cuttings have to be carried any distance, they should be sprinkled and put in plastic bags or wrapped in plastic and kept out of direct sunlight. If it is impossible to plant cuttings soon after they are taken, they will keep several days if they are simply laid in the Bubble on the sand with the mist running.

Treatment with plant hormones, such as indolebutyric acid, has proved helpful in rooting some difficult softwood cuttings. However, nearly every plant which can be rooted at all will root to some extent without hormones. Each plant variety has its own hormone requirement and many plants can be permanently damaged by the use of too strong a hormone.

This propagator can be operated all the year in tropical climates and can be started in any climate as soon as danger of freezing is past and can be run until frost.

It will hold a thousand cuttings at one time and, of course, they can be of any number of varieties.



# Some of Pierre Morin's American Plants

MARJORIE F. WARNER

In a recent paper, *The Morins* (*Natl. Hort. Mag.* 33: 168-176, July, 1954), I mentioned some North American plants, nearly all of them Canadian, that were grown by Pierre Morin, the Paris nurseryman. Not that he specialized in American wild flowers, but I believe he was the first commercial grower to group such plants according to soils and seasons of blooming. Some of those listed in his *Remarques nécessaires pour la culture des fleurs* (Paris, 1658) are remarkable for their flowers or other characteristics, and it may be a mark of his taste and discrimination that Morin cultivated and recommended them to his patrons.

They are too few to constitute a selection, and may have been merely the residue of a considerable variety of American species grown in former years. There is absolutely no evidence on this point, but it would be a reasonable presumption that he tried many of the American species that got into France in the 1620's. His elder brother, René Morin, offered a number of them in his *Catalogus plantarum* in 1621, and the following years brought the introduction of numerous species that would be worthy of a place in Pierre Morin's or any other garden in a suitable climate. But some of them were difficult of cultivation and not easy to keep in stock and, while North American exotics were more and more distributed in the university and amateur gardens of Europe, I think they largely disappeared from the florist trade. Pierre Morin by 1650 had become so absorbed in commercial bulb growing that it may well have superseded his interest in herbaceous exotics.

Some North American species, however, persisted in the Jardin Royal des

Plantes in Paris, and in the garden of Gaston duc d'Orléans, at the Château de Blois, where he employed the artist Nicolas Robert (1614-1685) to paint his flowers in miniature. An account of this undertaking, begun by Gaston and after his death sponsored by Louis XIV, is given by Wilfrid Blunt in his *Art of Botanical Illustration* (1950, p. 110-116). It only needs to be said that 319 plates, mostly by Robert, were prepared for a great *Histoire des Plantes* projected by the Académie des Sciences, the text of which was only privately printed in 1788. But the plates, which had been completed in 1692, were issued in 1701 as the *Recueil des plantes gravées par ordre du roi Louis XIV, par N. Robert, L. Chatillon, et A. Bosse*.

To many persons these and other floral plates by Robert and his fellows are merely beautiful examples of seventeenth century art, but to botanists they are important as history because they were drawn for the most part from living specimens, or at least based on original drawings of plants actually grown at Blois. They are not dated, but there is reason to assume that most of these plants were at Blois during its period of conspicuous activity under the Scotch physician, Robert Morison, before the death of Gaston in 1660. Hence they were essentially contemporary with those found in Morin's *Remarques nécessaires* (1658), and it is fitting to represent his American species by the accompanying photographs from a copy of the *Recueil des plantes* in the Bibliothèque Nationale.

Morin's "Anapodophyllon" (*Podophyllum peltatum*), an account of which was printed in this journal some years ago (*Natl. Hort. Mag.* 31:173-



180, April, 1952); and "Hydrophyllon" (*Hydrophyllum virginianum*), were first noticed in his *Remarques necessaires* (1658), although they may have been brought into Europe long before this book was published. His other species had been introduced earlier, although we have no definite dates for any of them; but we may assume that Morin was responsible for bringing them into garden cultivation.

Linnaeus ruined "Anapodophyllon," Morin's name for the May apple, but adopted *Hydrophyllum* as a genus name, taking as type species *H. virginianum*, a plant of Gronovius that was received from Virginia after Morin's genus was well established in literature. It was called "Dentariae affinis Echijflore; Hydrophyllon Morini," in Denis Jonquet's *Hortus sive Index onomasticus plantarum* (1659), and the *Hortus regius pars prior* (Parisiis, 1665 & 1666); and "Dentariae affinis Echii flore, capsula rotunda," in Morison's *Hortus regius Blesensis auctus* (1669, p. 269). Morison later substituted the name, "Dentaria facie planta monopetalos fructu rotundo monopyreno," in his *Historia plantarum* (1699, 3:599). Tournefort, in both his *Éléments de botanique* (1694, p. 71-72), and *Institutiones rei herbariae* (1700, p. 81), called it "Hydrophyllon," with one species, "H. Morini."

In his *Species plantarum* (1753, 1:146), Linnaeus added a note under *Hydrophyllum virginianum*, partly describing a Canadian species, which was an aquatic, the fructification of which was unknown to him. Evidently he was slightly confused about Morin's name, "Hydrophyllon" (waterleaf), possibly imagining it signified an aquatic plant; moreover he had an imperfect knowledge of the species later called *H. canadense*, and perhaps an inkling of the Canadian origin of Morin's plant. For while *Hydrophyllum virginianum* is not a characteristic Canadian species,

it does grow in part of Ontario, and "Hydrophyllon Morini", which is unquestionably a Canadian plant, was probably collected in that region during the earliest French explorations.

The name "waterleaf" proved puzzling to other botanists. Tournefort gave its derivation from the Greek words for "water" and "leaf", but could see no reason for it, and later authors echoed Tournefort. Its application is



*Hydrophyllum Morini* (*Hydrophyllum virginianum* L.), by Abraham Bosse. From *Recueil des plantes gravées par ordre du roi Louis XIV, par N. Robert, L. Chatillon, et A. Bosse* (3 v., 1701?).

In *Bibliothèque Nationale, Paris*.

clear, however, to those who are familiar with the plant in the woods. I remember asking as a child, what was the plant with water on its leaves. It may have been noticeable only after a season of rain or heavy dew that the upper surface showed a kind of pattern, as though moisture clung there after it had drained off or evaporated elsewhere. Whatever the cause, it seems to me this effect would have been fam-



iliar enough to the Indians to give rise to a name meaning "waterleaf", although the Greek version of the name would make little sense to botanists who knew the plant chiefly as a herbarium specimen.

The effect of water on the leaves is certainly not rendered in any of the illustrations I have seen; and apart from that, *Hydrophyllum virginianum* is in my estimation a rather coarse, uninteresting plant. It is somewhat "prettyfied" in the accompanying plate by Bosse from the *Recueil des plantes*.

Aside from "Hydrophyllon" and "Anapodophyllon", all Morin's American plants had been noted in Europe. Our "Joe-Pye weed", *Eupatorium purpureum*, was called "Eupatoria foliis Enulae" in the *Canadensium plantarum historia* (1635, p.190-192) of Cornut, who gives a figure of it; and it had already been listed in the *Enchiridion isagogicum* (Parisiis, 1623) of Jean and Vespasien Robin, as "Valeriana peregrina, flore rubro," though it is not "red". Another species listed in the *Enchiridion* was "Valeriana peregrina, flore niveo," probably the "Valeriana urticae-folia, flore albo" (*Eupatorium urticaefolium*) of Cornut, which he describes with a similar species having a "violet" flower, the "Valeriana urticae-folia flore violaceo" (*E. coelestinum*), in his *Canadensium plantarum historia* (1635, p. 20-23), with illustrations for both.

The last two may never have entered garden culture. *E. urticaefolium*, the white snakeroot, though not without grace, might have been thought very commonplace when big blooms and brilliant colors were favored; and *E. coelestinum* is very exacting about its habitat. The blossoming plant is lovely in itself, but it is most effective when blooming in mass in low ground that is partially or often flooded, when it sometimes suggests a pool of blue so ethereal as to justify its name of "mist-

flower"; but this effect which often happens in nature would not have been so easy to achieve in the gardens of three centuries ago. I cannot recognize either of these species in the list of Robert's plates, nor in Morin's book, but his "Eupatorium de Canada" (*E. purpureum*) evidently flourished in



*Eupatorium Canadense foliis Enulae* (*Eupatorium purpureum*), by Nicolas Robert. From *Recueil des plantes gravées par ordre du roi Louis XIV, par N. Robert, L. Chatillon, et A. Bosse* (3 v., 1701?). In *Bibliothèque Nationale*, Paris.

the Jardin de Blois, where it was drawn by Robert for the *Recueil des plantes*.

The bloodroot, *Sanguinaria canadensis*, was in Morin's garden. It had been described in Cornut's *Canadensium plantarum historia* (1635, p.212) as "Chelidonium maximum Canadense acaulon", but when Dillenius in his *Hortus Elthamensis* (1732, 2:334-335) distinguished it from the other celandines, he gave the Canadian species the garden name of *Sanguinaria*, used by



Morin in his *Remarques nécessaires*. Morin also had an American lady's-slipper, "Calceolus Mariae de Canada", which must have been the "Calceolus Marianus Canadensis" of Cornut (l.c., p.204-206). This was apparently *Cypripedium reginae*, which is traceable under other Prelinnean names, and was figured by Cornut and Nicolas Robert, and also in Vallet's *Le jardin du roy Louis XIII*, in 1624.

The jack-in-the-pulpit, *Arisaema triphyllum*, was grown by Morin as "Serpentaire à trois feuilles d'Amérique". *Serpentaria* is not a bad name, and was



*Dracunculus sive Serpentaria triphylla, Brasiliana (Arisaema triphyllum)*, by Nicolas Robert. From *Recueil des plantes gravées par ordre du roi Louis XIV*, par N. Robert, L. Chatillon, et A. Bosse (3 v., 1701?). In *Bibliothèque Nationale, Paris*

appropriately used for various *Arum* relatives, but our plant is so familiar in many parts of temperate North America that it is unthinkable as "*Dracunculus sive Serpentaria triphylla*

*Brasiliana*". Although its individuality is oddly exotic, so that one might guess it had been accidentally credited to a tropical locality, this was a case of pure error. The plant was first described by Kaspar Bauhin in his *Prodromus theatri botanici* (1620, p.101) with the name, "*Serpentaria triphylla Brassiliana*", and he said it was "ex Tououpinambault Brassiliae anno 1614 allata".

The story of Bauhin's Brazilian plants is as amusing as it is baffling. They include *Cornus canadensis*, *Linnaea borealis*, *Trientalis Americana*, *Trillium grandiflorum* and others equally absurd, which were described in his *Prodromus* (1620) and more or less accepted by botanists as Brazilian until Linnaeus resolved the confusion. Bauhin could have had very little idea of the plant geography of the New World, and readily perpetuated the misinformation he got from Burser with the specimens. Joachim Burser had obtained a collection of plants supposed to have been brought back by a Parisian apothecary from Brazil, and this error occurs on a number of specimens in his herbarium now at the Botanical Museum at Upsala; but apart from the fact that most of the plants are clearly recognized as Canadian, there is no clue to their source.

There is, however, an explanation of the geographical error, which seems fantastic but is probably true. In 1613, Paris was excited about the Topinamboux or Toupinambault tribe of Brazilian Indians, six of whom were brought from Maranhao to France, where they were exhibited to the Queen Mother, Marie de Medici, and caused a great sensation among the Parisians. At this time, the Jerusalem artichoke, *Helianthus tuberosus*, was being cultivated and sold on the streets of Paris as a delicacy and, possibly because it was reputed to have come from the New World, it became associated with the Brazilian Indians and received a name that is per-



petuated in the vernacular "topinambour." The circumstances are obscure, but the plants of Burser's herbarium must have been brought or sent from Canada to France while the Toïpinambault craze was at its height, when anything American was assumed by the ignorant to have come from Brazil.

The error was not universal. Although Bauhin named the sun-flower that yielded the edible tubers, "*Chrysanthemum latifolium Brassilianum*", I think it was known at the royal garden in Paris simply as "*Chrysanthemum tuberosum*", which is listed in the *Enchiridion isagogicum* of Jean and Vespasien Robin in 1623. And *Arisaema triphyllum* is probably listed there as "*Serpentaria Americana*". It may be noted that when the adjective "American" was used by the Paris garden, it commonly though not invariably meant "Canadian", while "Virginian" plants were usually distinguished as such. Morin, being a Parisian, naturally used the vernacular, "Serpentaire à trois feuilles d'Amérique", which may have been intended to signify its Canadian origin.

Bauhin's name had been adopted by botanists and was therefore used at Blois in naming Robert's plate; but

when it came before the committee of the Académie des Sciences that was editing the names and descriptions for the projected *Histoire des plantes*, "*Serpentaria Brasiliana*" was criticized by Denis Dodart in his *Mémoires pour servir à l'histoire des plantes* (Paris, 1676, p. 80-81). He explained that Bauhin had said in his *Prodromus* that this plant was brought from Brazil in 1614, but it had since been received from Canada. If there was any tradition to this effect at the royal garden or the academy, it must have been lost. I can find no trace of the source or original receipt of *Arisaema triphyllum*, though it probably reached France by or before 1614, as living material of some of Bauhin's "Brazilian plants" must have been received at the royal garden in Paris about the time Burser got his herbarium specimens.

Besides the foregoing, which are all from Canada, Pierre Morin did not offer many plants of the New World. His *Remarques nécessaires pour la culture des fleurs* (1658) were instructions for open-air gardening; plants such as the lady's-slipper and jack-in-the-pulpit are listed among those that "fear the cold in the third degree", and all his American species were fairly hardy.



# The Geiger Tree and its Relatives in Florida

EDWIN A. MENNINGER

Heliotrope and Forget-me-not are outstanding representatives of the Borage Family (BORAGINACEAE) in the Temperate Zone, but these are a far cry from the chief member of their family in the tropics—the genus *Cordia*. Practically all of the 280 *Cordia* species are trees, but only two of them are in what might be called common cultivation, one in South Florida, the other in Texas, which are the only places they are found in this country. Some

botanists break down *Cordia* into several genera.

Because many *Cordia* trees are spectacular in bloom, the following notes on thirteen species under cultivation at Stuart, Florida, may be of interest:

*Cordia sebestena*. Commonly called “Geiger tree” in memory of an early pioneer in the Florida Keys, is the only showy-flowered Florida native tree that blossoms all the year ’round. Because of this habit, its evergreen foliage, and

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*Cordia alliodora*





its rounded, moderate habit of growth, it is a favorite dooryard ornamental in the south half of the State where frost does not cut it down.

This is by all odds the best known of the *Cordia* trees and shrubs because it grows abundantly in the Keys, as well as throughout the West Indies, and for half a century has been cultivated as an ornamental. Its burnt-orange or vermilion, crepy, tubular flowers in clusters are from 1 to 2 inches long, usually an inch or more across, with six lobes. The bloom is followed by a white, apple-fragrant fruit one inch in diameter in which is imbedded one pear-shaped seed one-half inch or less in diameter. These sprout readily after being dried, but the trees are slow-growing and seedlings take three years to reach blooming size. Propagation by cuttings is not unusual.

Leaves of the Geiger tree are a beautiful dark green, but to the touch extremely rough, almost like sandpaper, and they vary a good deal in size, even on the same tree, from 4 to 9 inches long.

The Geiger tree never exceeds 25 feet in height, so lends itself to planting in average gardens. It blossoms both winter and summer and several times in between, maintaining no set schedule but depending perhaps more on the available moisture. The flowers are in loose clusters of 8 to 12, beyond the dark green foliage which makes a striking background for the brilliant color of the bloom.

*Cordia dodecandra*. A beautiful, tall tree of southern Mexico, sometimes to 100 feet, which I introduced from seed sent me by Thomas MacDougall from Tehautepec. Record & Hess call this the most important species of the Boraginaceae in Guatemala, British Honduras, Yucatan and southern Mexico. It has six-inch, very rough, gray-green leaves, and the bright orange flowers resemble those of *C.*

*sebestena* except they are much larger (often two inches across) and individually more spectacular, with twelve to seventeen petal lobes instead of five. My ten-foot tree blooms off and on all year, but so far is less prolific and showy in flower than *C. sebestena*. The edible acid fruits have not yet been produced.

*Cordia alliodora*. An evergreen tree, 25 to 40 feet or more with round crown and thick trunk, is called "onion Cordia" because the crushed leaves have an odor suggestive of garlic. It is the most widely distributed species, ranging from the West Indies and southern Mexico into the tropics as far as Peru. It bears small, white flowers in large clusters. Standley says: "it is exceptionally showy and conspicuous in flower because of the great abundance of white blossoms. These remain upon the tree for a long time (almost unshriveled), finally turning brown and making the tree quite as conspicuous as when the corollas were pure white." The brown flowers finally serve as parachutes to the tiny falling fruits, the whole resembling a dried flower. In Trinidad the tree rises to 90 feet, often has girth to 10 feet, and is in demand for its tough but easily worked timber. This tree is also called *Cerdana alliodora*.

*Cordia holsti*. A rather crooked East African timber tree, which covered with its big heart-shaped, dull green leaves looks like a Catalpa. Jex-Blake calls it "very handsome" when covered with its very delicate, lacelike flowers, "but will only make a fine tree with heavy rainfall." In Florida, I found that it dropped its leaves repeatedly during our dry spells and was anything but an attractive ornamental most of the year and I gave up trying to grow it.

*Cordia dentata*. A small evergreen Mexican tree with rough leaves, bearing twice a year 10-inch clusters of





*Cordia boissieri*

light yellow, cup-shaped flowers, each one-half inch across. The flowers are pretty just for a day; they keep coming so the tree is attractive for several days in the blooming period, but disappointing the rest of the year. The half-inch yellow, jellylike fruits are sticky.

*Cordia obliqua*. A handsome shade tree from Cochin China with vigorous foliage and a good habit of growth that recommends it as an avenue tree. The spikes of white flowers are not showy. This species is hardier than most and will survive temperatures below freezing. It seeds prolifically in Florida.

*Cordia nitida*. The Puerto Ricans call this species *Cereza* (cherry) because of its cherrylike red fruits that

are exceedingly attractive to birds, does not look like a *Cordia* at all. It has very glossy, dark green five-inch leaves, and sometimes grows to 70 feet though usually it is much smaller, even shrubby. Its many-flowered clusters of tiny, yellowish-white flowers are not attractive, but the bright red fruits are pretty. Dr. Britton wrote of a tree at Coamo Springs; "It was loaded with fruit when we arrived. This was nearly all devoured by the birds that came to it morning and evening. The tree then bloomed profusely, was covered with small white flowers and set another crop of fruit before we came away." (Interval of 3 months). My "glossy *Cordia*", as it is sometimes called, is



growing in a poultry run and it is the preferred roosting and feeding spot.

*Cordia leucosebestena*. Descriptions published by Grisebach a century ago in *Cat. Pl.Cub.*p.208, is a native of Cuba. He said the flowers were supposed to be white but he had never seen them. I spent ten years growing this tree in Florida and finally dug it out. Its dirty-white, crepy flowers, in size and shape like *C. sebestena*, are borne singly in Spring here and there over the tree, but they never look fresh even on first opening and they fall off at the slightest touch. The bushy, small-leaved tree with gray-green persistent foliage is not worth the space it takes. It never set fruit in Florida.

*Cordia superba* var. *elliptica*. This introduction from Kenya is one of great promise. It is a small tree with leathery, oblong-elliptic, dark green leaves to six inches long, about as big as a man's hand, densely stuck on the branches. Terminal clusters of 2-inch, showy white flowers make this an attractive and novel garden subject for Florida. It is rated by Chittenden as a better tree than *C. sebestena*.

*Cordia lutea*. Introduced from Ecuador twenty years ago by the USDA. It is an ornamental, much branched though sometimes straggling shrub, bearing clusters of bright yellow, trumpet-shaped  $\frac{3}{4}$ -inch flowers over a long summer. These are followed by small white fruits that are said to be edible.

*Cordia boissieri*. In its native Texas

is called the "wild olive", perhaps because its yellowish fruits are olive-shaped. Spanish-speaking folk on the border call it Anacahuíta. It is a small evergreen tree to 20 feet bearing clusters of bright, pretty white  $1\frac{1}{2}$ -inch crepy flowers, much like those of *C. sebestena*. It is more precocious than most *Cordia*, blooming when less than one foot high and it is hardy enough to take considerable cold without damage. It is propagated by seeds, though often with some difficulty. One Texas nurseryman sent me a quart of seeds from under his tree with a note: "Not much use to send these, as we cannot germinate them." However, I did sprout and grow scores of them.

*Cordia angiocarpa*. A Cuban tree with four-inch, gray-green, stiff, persistent leaves, very slow growing. Its flowers are burnt-orange color, rather like *C. dodecandra* but smaller. It bloomed first in 1954 and the initial display was scarcely a fair indication of its possibilities.

*Cordia abyssinica*. Eggeling: *Indigenous Trees of Uganda* says this shrub or tree to 30 feet has "very decorative" flowers, white, massed in compact panicles, appearing as if made of tissue paper. C. E. Duff's calendar for March in Northern Rhodesia calls this "a tree on anthills near Ndola, with great masses of white flowers which show up at long distances." I have succeeded in establishing this tree only this year, so its possibilities in Florida are unknown.





# Charming

## But Forgotten Plants

ERIK HANS KRAUSE

*Stars in your garden . . .*

The trend of our times towards sensationalism has had its effect on horticulture, and many a beloved plant had to give way to a yearly deluge of novelties. Though pushed into the background, many of these plants never lost their appeal or the affection of the genuine gardener. So it is with the Clematis. This enchanting member of the Buttercup Family (RANUNCULACEAE) is still contributing the incomparable grace of its star-shaped blossoms to many an old trellis or handwrought iron fence. These large white, magenta or purple stars seem to be floating in the air, as the supporting vines are so delicate that they disappear among the handsome foliage. Most enchanting of all are the multiple star-blossoms of the Duchess of Edinburgh as they glow like pale silver from the shadow of an ancient tree.

The Clematis, so much more frequently planted in the milder, lime-rich regions of Western Europe, are divided into several groups, according to their habit and time of flowering. In the opinion of one grower in Western New York, it should not be more difficult to meet the requirements of this interesting species than those of many less deserving plants. Anyone who has once been entranced by these luminous stars of the garden will not be satisfied until he has planted a few of the over forty species and varieties now listed. Many of these Clematis we owe to China, which has contributed so many other horticultural treasures. In turn, quite a few of these Chinese species, not to forget the Japanese *Clematis florida* var. *bicolor* (*C. Sieboldii*), became parents of numerous beautiful varieties. The line-drawing—it should be a painting—can give only a vague idea of the favored Duchess of Edinburgh, a *C. florida* hybrid.

So hitch your wheelbarrow to the star of a Clematis blossom.



# Recent Advances in Horticulture

FREEMAN A. WEISS

## *The Near Conquest of Rose Pests*

Now that bills are pending in Congress<sup>1</sup> to establish the rose as the national flower of the United States, the claims of this oft-cited "queen of flowers" to such high distinction are being minutely scrutinized. That the rose stands high among flowers in popular appeal—is tops in fact—is hardly to be questioned, and was demonstrated anew in the National Flower Contest conducted recently by Radio Station WRCA. In this poll the rose received nearly half of the more than 4,000 votes cast, about 6 times the number of its nearest competitor. Yet some partisans in setting forth the claims of other flowers are unkind enough to allege that the rose is a finical garden subject, exacting in its cultural requirements and prone to the ravages of innumerable pests. To such disparagements the champions of the rose retort that anything so choice is worthy of high effort—would indeed be unworthy if success were easily attained.

Timely in behalf of the rose, therefore, are some recent developments in pesticides, both their compounding and their application, which make it far easier to prevent damage to roses by its multitudinous enemies, even though

mere control of pests does not necessarily insure the production of fine roses. One may perhaps be excused for the not excessive exaggeration that the conquest of rose pests is near if not actually at hand.

Time was when Bordeaux mixture, sulfur in several forms, lead arsenate, and various tobacco products constituted the rose grower's arsenal against the leaf spots and cankers, the mildews, the aphids, and the beetles that menaced his floral pets. In truth, they were not very effective for this purpose and some of them had seasonal or other limitations that militated against their use. Sulfur burned the foliage and faded the blooms in warm weather, copper sprays were damaging in wet weather, and who wanted roses that reeked of tobacco juice?

The first fully effective, wholly non-injurious fungicide for the control of black spot, and also rust, of roses was the ferric derivative of thiocarbamic acid, introduced about a decade ago under the trade name Fermate, and now widely used under its common name ferbam. Then came in quick succession the "miracle" insecticides, DDT, methoxychlor, lindane, and the ethyl phosphates. Their miraculous properties were often overrated, and sometimes their use brought new pest problems in their wake, such as the inordinate rise in the prevalence of spider mites, which was attributed to the destruction of the natural insect enemies of mites by DDT.

It is to be noted that although the development of these synthetic insecti-

<sup>1</sup>House Joint Resolution 102, introduced by Frances P. Bolton, Member of Congress from the 22nd Ohio District, and Senate Joint Resolution 11, introduced by Margaret Chase Smith, Senator from Maine.



cides was a direct result of the increasing applications of chemistry to agriculture, they came into use when certain natural insecticidal materials, such as rotenone and pyrethrum, were scarce because of war conditions. The new materials were therefore doubly welcome. Furthermore, most of them were inter-compatible, and also compatible with standard fungicides, which gave impetus to the concoction of multi-purpose pesticides. The older fungicides and insecticides were often incompatible, or even antagonistic, thus requiring separate applications. Mixtures of the new organic pesticides often contain four, sometimes five, active ingredients; furthermore, some can be used either as spray or dust. A final point in their favor is the relatively small quantity required for suitably lethal effects—only one or two pounds of any one component in 100 gallons of spray, and proportions as low as 1 to 5 per cent in dusts. This in contrast to 10 or more pounds of the older chemicals in 100 gallons, and dusts containing 10 to 25 or more parts of active ingredients per 100.

Finally, when an otherwise near-perfect fungicide against black spot, such as ferbam, was objectionable solely because it left a sooty residue, the chemists came forth with captan, equally efficient, and of a neutral color. When spider mites flourished because the insecticides were too efficient, or perhaps were just not adapted to mite physiology, the chemists produced a series of miticides, one of which is capable of destroying even the egg stage. The latest in this succession is malathion,

a versatile insecticide as well as miticide, and of exceptionally low human hazard.

Now the chemists are attacking the problem of mildew control anew, and have devised several mildew specifics, the latest of these being Mildex and Omazene, though neither is entirely beyond the experimental stage as yet. Then there are soil fumigants for freeing soil of nematode infestation, both of the gall-forming and the root-feeding kinds. Nematodes as factors in the persistent low vitality of roses, as well as many other plants, are not only prevalent but have been largely neglected until recently. In prospect is the cure of crown gall, a bacterial disease, by means of low antibiotics.

For easier and more efficient application of pesticides several makes of small power sprayers, of 5 to 15 gallon capacity, mobile by one man (or woman) power, and capable of producing pressures up to 150 pounds, are now on the market. The grower of several dozen or a few hundred rose bushes, who formerly had too many to spray by hand, but neither space nor money for a conventional power sprayer, finds these midget power outfits entirely practicable both in operation and budgetwise. For those who prefer to dust, there is now an inexpensive crank duster, light in weight, almost effortless to operate, which will throw a dust cloud 8 to 10 feet, and bans forever that onerous though potent forearm developer, the plunger type of dust gun.

Surely, rose growers "never had it so good."



# The Seal and Membership Certificate

*Adopted recently by the American Horticultural Society*

When an organization has existed for thirty-three years without these symbols of maturity and then suddenly adopts them, perhaps some are led to wonder why.

It might be supposed that the Seal betokens a concern for genealogy, such as persons newly come into wealth may feel for the origin and prestige of their family. And the Membership Certificate—perhaps a bauble to impress the unsophisticated, like the resplendent stock certificates issued by those specializing in “wallpaper” securities.

No one acquainted with the history and official personnel of the American Horticultural Society and in particular with its journal, *The National Horticultural Magazine*, would ever be led to unworthy conjectures such as these. Still, they might wish to know why these changes were made at this time.

The Executive Committee of the Board of Directors could reply that it believes the Society has rather more than just come of age, when such assumptions of dignity are a proper right. Next, the Society is somewhat more affluent than in times past, thanks to the generous bequest by the late Furman L. Mulford. It can accomplish some long cherished objectives. Finally, this action represents an enhanced appreciation of the artistic, thanks to the earnest efforts to improve the Society's position in this respect chiefly by John Creech, James Harlow, and Stuart Armstrong.

The Seal merits just a word of explanation. It symbolizes the fruitful union of science and art in contributing to country-wide achievement in horticulture. This is also the special aim of this Society.

It is a pleasure to record our appreciation of the skill of Artist Robert Thomas, who created the design for the Seal, and of Engrosser Walter J. Filling, who executed the Membership Certificate.

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# American Horticultural Society



*Through the Board of Directors  
has elected you*

*a member of that Society*

*In recognition of your active interest in the  
advances of horticulture and its contributions to  
the culture of the peoples of the world through  
the growth, development and dissemination  
of the knowledge of horticultural science.*

*In Witness Whereof, this certificate  
has been signed and presented.*



*John L. Cech*  
President

*Francis de Vos*  
Secretary



# A Book Or Two

(Books noted "(Library)" are available for loan to the membership.)

## *Some Beautiful Indian Trees.*

Ethelbert Blatter, Walter Samuel Millard, William T. Stearn. Published in India by the Bombay Natural History Society, and in London by Wheldon and Wesley, Ltd. 165 pages. Illustrated in color and black and white. 1954. 30 shillings. (Library).

The original issue of the work was made in 1937 and was sufficiently in demand to warrant a second edition. Various unhappy events prevented this until the present year, when the 1954 edition, under the supervision and care of Mr. Stearn of the British Museum in London, appears, unfortunately after the death of Mr. Millard, who was the original guiding spirit. There are splendid acknowledgments in the author's and the present editor's prefaces so that one has a very personal feeling for the work.

At first thought it might seem that such a book would have little use in this country, but that is not the case. Many of the trees described and illustrated may be seen in Florida where some seem as happily at home as the originals in India. A few have not yet been established happily, if at all.

To this reviewer, who has had a little experience under tropical conditions, the most intriguing portion of the descriptive texts is that which comes under the paragraph heading of "Leaf-Shedding, Flowering and Fruiting." For the gardeners' data on the first point are almost impossible to come by specifically; usually there is no more than a note that leaves are shed in the dry season. . . . But these are not the only details of special interest, for the descriptive texts have been done with great detail and are supported by data on economic and medicinal uses. These are of local significance probably and the sort of data that are most likely to disappear in time with those called "March of progress."

No one in this country need hunt for them, pills or powder made from these exotics, but perhaps the herb-lovers will experiment? Also there is an amazing listing of vernacular names, supported by careful localities. After them in a weary state comes the U.S.A. Standardized Plant Names, usually quite without glamor or historical notations.

For those of us who never will see the plants, perhaps not even in Florida, where Mr. Menninger has done so much to promote them, the text will be beguiling enough and the illustrations, done from quite nice water colors, will be reward enough.

B. Y. M.

## *Vegetable Production and Marketing.* Second Edition.

Paul Work & John Carew. John Wiley & Sons, Inc., New York. (Chapman & Hall, Ltd., London). 1955. 538 pages. Illustrated. \$4.72! (Library).

. . . an introduction to the subject of vegetable production and marketing, based upon the principles of basic sciences. A curious price tag.

## *Growing Nut Trees in Maryland.*

Harry W. Dengler & Albert F. Vierheller. University of Maryland, College Park, Maryland. 1955. 7 pages & cover. (Mimeographed).

Messrs. Dengler, Extension Forester, and Vierheller, Extension Horticulturist, of the University of Maryland, have interestingly combined the economical and beautiful aspects of growing nut trees (in Maryland). This paper, Miscellaneous Extension Publication No. 28, was probably prepared as a means of efficiently answering the almost daily questions that come to their desks on nut tree growing. It is very popularly written and, while exceedingly brief, it well covers the essentials: varieties, when, where, and how to plant, and care afterwards.

While designed especially for Maryland proper, the advice will also serve in our surrounding and climatological equivalent areas. If their supply of copies has not been exhausted by Marylanders, Mr. Dengler will probably send free copies to us denizens in the "foreign" states.

## *Complete Home Landscaping and Garden Guide.*

Raymond P. Korbobo. (E. L. D. Seymour, Editorial Consultant). William H. Wise & Company, Inc., New York. 1954. 368 pages. Illustrated. \$2.95. (Library).

This text answers about all the basic questions which may arise in the landscaping of the small property. Users are advised to read the Foreword to obtain quick and full benefit. The book is ideal for potential property owners of moderate means who have little knowledge of property development, but a sincere desire to proceed in the right direction when selecting, purchasing, and building a living area that will provide recreation, relaxation, service, and a feeling of proud ownership.

The author has included much information on how and how not to spend your money, how to start and proceed in an economical and orderly fashion with the placement of the house on the lot, locating walks, drives, service, public and private areas, and the selection of plant material.

Walter Hawley

## *The Story of Mosses, Ferns, and Mushrooms.*

Dorothy Sterling. Doubleday & Company, Inc., Garden City, New York. 1955. 160 pages. Illustrated. \$2.75.

The Junior Book department of Doubleday & Company dispatched this delightful pictorial-essay book to our office, and, for fear of the reader thinking me childish, I would like to say that it is extremely fascinating for my ripe old age. The illustrations from Myron Ehrenberg's camera are superb; their reproduction in dull matt-like paper is most pleasing. The reviewer would recommend that all renew their childhood memories and purchase a copy of it.



### *All About the Perennial Garden.*

Montague Free. The American Garden Guild & Doubleday and Company, Inc., Garden City, New York. 1955. 352 pages. Illustrated. \$5.95. (Library).

In this book the garden enthusiast will find described in clear, simple terms, how to have flowers outdoors for eight months of the year and lush shrubbery the year round. The author deals primarily with the hardy herbaceous perennials, including bulbs, but also devotes much attention to the woody perennials, biennials, and even annuals. Step-by-step methods are given in the text and illustrations for every operation in making the garden, selecting site, laying out plot, grading, improving the soil, digging beds, seeding lawn areas, setting out the plants, their culture, etc. Although Mr. Free's treatment is largely from the viewpoint of the northeast gardener, his cultural directions could be applied anywhere in the U. S. The plants considered could be grown almost everywhere (except southern Florida and the hot desert) but the author suggests contacting the local authorities for counsel on selected plants.

### *Plant Regulators in Agriculture.*

H. B. Tukey. John Wiley & Sons, Inc., New York. (Chapman & Hall, Ltd., London). 1954. 270 pages. Illustrated. \$5.50. (Library).

Covers basic principles and practical applications—bringing together latest information on the different uses of plant regulators, how plants respond to various plant regulators, what physiological processes are involved, what plant parts are likely to be effected, and in what way internal and external environment may be involved.

### *Plants Without Flowers.*

Harold Bastin. Philosophical Library, New York. 1955. 146 pages. Illustrated. \$6.00. (Library).

This is a very interesting English treatment of the Cryptogamic division of the Vegetable Kingdom, and includes the flowerless plants of the Thallophyta, Bryophyta, and Pteridophyta classes. (More popularly, the slime-fungi, bacterial, algae, lichens, tree fungi, mosses, liverworts, ferns, fern allies, horsetails, and club mosses.)

Mr. Bastin has an excellent pen: his style is indeed very readable, his presentation is scientifically sound, yet free from the usual technical lingo.

About 80 subjects are well illustrated in the 20 half-tone plates. Jane Burton illustrates some 50 subjects in ten plates of line drawings. Both methods of illustration reveal the fascinating beauty and detail of the plants portrayed and tell precisely what the author and artist wished to capture.

The book contains a list of English names of the plants mentioned (together with their universal Latin names), a short list of reference books, as well as a very enjoyable chapter on the Beginning and Early History of the plants without flowers.

### *The Care and Feeding of Garden Plants.*

American Society for Horticultural Sciences and The National Fertilizer Association. (Order from The National Plant Food Institute, Washington 6, D. C.) 1954. 184 pages. Illustrated. \$3.00. (Library).

No matter what your particular plant interest may be, this little book has something of value for you as a gardener. Its great value lies not in explaining the detailed methods of gardening but rather in its clear and accurate presentation on how plants grow and what horticultural practices should be used to provide for the plant needs. For more detailed information for his particular location, the reader is repeatedly and wisely referred to his local agricultural school, experiment station, or to the numerous references on gardening literature.

The opening chapter on "How Plants Grow" is a must for any gardener. There, in a clear and concise manner, the growth requirements are discussed and well illustrated. Succeeding chapters on the lawn, shrubs, trees, house plants, garden flowers, vegetable garden and small fruits, give a wealth of basic information.

The book is well illustrated by colored plates, maps, and line drawings. The color plates depicting mineral deficiency symptoms in a number of different plants are particularly good.

F. de V.

### *Twenty-five Historic Years. (Being The History of The Massachusetts Horticultural Society from March 1929.)*

Edward I. Farrington. Massachusetts Horticultural Society, Boston, Massachusetts. 1955. 210 pages. Illustrated. \$5.00. (Library).

Mr. Farrington, Secretary of the M.H.S. from 1924 to 1947, has presented a very lively account of the Society's transactions for the past quarter of a century. He has a very good command of thought and, while he records the statistical or otherwise dry history, he interweaves all into an exciting challenge and success story. This story is a sequel to Albert E. Benson's history of the first hundred years of the Society (1829 to 1929) and brings the Society's history up to 1950.

### *The Language of Taxonomy.*

John R. Gregg. Columbia University Press, New York. 1954. 70 pages. \$2.50. (Library).

Taxonomy has developed refined, effective vocabularies for its descriptions of animals and plants. This book attempts to show that mathematical logic offers linguistic techniques of a comparable subtlety and effectiveness for the study of taxonomy itself. It opens with a short account of elementary mathematical logic, whose symbolic methods are then employed in giving a precise analysis of the concept of taxonomic classificatory system.



### *The Complete Book of Annuals.*

F. F. Rockwell & Esther C. Grayson. The American Garden Guild & Doubleday and Company, Garden City, New York. 1955. 315 pages. Illustrated, 29 in color, 59 in black and white, 10 line drawings. \$5.95. (Library).

In that annuals have in many respects become the mainstay of American gardening and since the above title so well describes its contents, one might predict a heavy circulation for this clear and comprehensive discussion by two distinguished authors. The book gives a general discussion of garden annuals, their uses, a review of culture with consideration of special purposes, and a catalog of available kinds with a detailed treatment of the "leading" ten and a generally quite adequate discussion of the very many annuals which are less commonly grown. The black and white illustrations are excellent, as are the line illustrations which include maps of killing frosts and hardiness zones (based evidently upon U.S.D.A. & Arnold Arboretum studies). Unfortunately, except in a few instances, the color plates are not up to the standard of the half-tones or the text, while the frontispiece, twice referred to, has not yet been discovered.

The last criticisms, however, are very minor. It is a pleasure to find in this book so many facts so interestingly put together, as well as so much up-to-date information on the best current varieties of the American seed trade.

As a resident of Washington, D. C., this reviewer is once again confident that a realistic solution for his dry clay bank is now at hand and that in another year in his location he will have heat-resistant Sweet Pea No. 2 (No. 1 wouldn't work) to show his neighbors. The authors, in other words, are persuasive. Fortunately, this persuasion is largely based upon sound, first-hand knowledge. Even in the Garden Fact Department, it is good to find that seed catalog and other recommendations are treated in a refreshingly factual manner.

Henry T. Skinner

### *Climbing Roses.*

Helen Van Pelt Wilson. M. Barrows Company, Inc., New York. 1955. 212 pages. Illustrated. \$3.95. (Library).

It has been twenty years since anyone harped singularly on climbing roses, as such, and Mrs. Wilson's book was entirely overdue, based on the rate we are now covering all phases of gardens, and garden subjects. The climbing roses are among the easiest to grow and offer the greatest possible landscaping opportunities (and usually they do not require all the care that many of the other classes of roses do). Everyone who has a house with four walls has at least four places to plant them. Mrs. Wilson lists many varieties for you to select from, and gives many pointers that will lead to ultimate success and enjoyment in growing climbing roses in your particular geographical area.

### *45th Annual Report of the Northern Nut Growers Association.*

George L. Slate, (Geneva, New York), President and Chairman of Publications. 142 pages.

From these proceedings, the reviewer gathers no time was lost in the reporting of the usual business transactions and the reading of some very selected papers at this annual meeting held in Lancaster, Pennsylvania, August 30 & September 1, 1954. The usual reports occupy very few pages of the total, the remainder being given over to papers on: New nut trees varieties, Nut trees for use in landscaping, Blossoming characteristics of horticultural varieties and seedling progenies of Chinese chestnut, Harvesting the nut crop, Evaluation of the black walnut, and many more of most helpful coverage.

### *Year Book of the Canadian Rose Society, 1955.*

A. J. Webster, Editor and Chairman of Publications Committee.

The first report of the newly formed Canadian Rose Society which succeeds the now deceased (*per se*) Rose Society of Ontario after forty-one years of service and leadership to the rose-growing fraternity. Mr. Webster also serves as editor of this year's annual and puts together many interesting rose articles that will be equally well received wherever roses are grown.

### *Commercial Mushroom Growing.*

M. H. Pinkerton. Ernest Benn, Ltd., London. Distributed in U.S.A. by John de Graff, Inc., New York. 1954. 224 pages. Illustrated. \$4.50. (Library).

The author aims his reliable up-to-date textbook to include every aspect of mushroom growing based on his successfully experience in Europe since 1934. The book appears to be well planned and written.

### *Greenhouse and Garden Chrysanthemums.*

D. C. Kiplinger. A. T. De La Mare Company, Inc., New York. 1954. 120 pages. Illustrated. \$3.00. (Library).

As recently as ten years ago, year-round flowering of Chrysanthemums as cut flowers was but a promising possibility. Today, potted Chrysanthemums are no longer looked upon with disfavor and have become a staple article for the florist on a year-round basis. The optimum length of night (photoperiodism in reverse) has been successfully worked out. Control of insects has been revolutionized by the introduction of newer organic chemicals. Greater understanding of the nature of diseases plus new control materials have helped to reduce losses. The aim of this little volume, the first printing of the 2d Edition, is to present the most up-to-date information which will lead to production of quality merchandise. It admirably does that.



*Weeds.*

Walter C. Muenscher. The Macmillan Company, New York. 1955. Second Edition. 560 pages. Illustrated. \$10.00 (Library).

So well known was Muenscher's *Weeds* in its first edition in 1935 that a second edition hardly needs a review—the mere announcement that it is now available means that all libraries in which weed lore is kept up-to-date must have this volume. As in its predecessor, the subject matter in this edition deals primarily with weed identification and with living habits of weeds. Recommendations for control are given, to be sure, but those requiring a manual dealing more particularly with this aspect of weeds are referred to the book by Robbins, Craft & Raynor, which also has had a recent second edition. (Reviewed in this Magazine, January 1953, Page 49.) But students of weeds as such, both those in professional training and agriculturists and gardeners who need to know how weeds look and how they grow, as well as where they grow and why, will find Muenscher's book indispensable. The comprehensive key to weed identification (Pages 65-105, and indexing 571 species) is a masterpiece of practical character analysis, which should enable anyone with a modicum of botanical understanding to identify a weed stranger. The numerous plates of line drawings, depicting the gross habits and the details of root, leaf, fruit, and seed of 135 kinds of weeds, will usually provide the confirming evidence needed for identification. And for those whose approach to plant identification is first to find its particular habitat and then look for its picture, the lists of weeds that occur most commonly in selected ranges, such as lawns, meadows, cultivated field and gardens, will be very helpful.

F. A. W.

*Practical Horticulture.*

James S. Shoemaker & Benjamin J. E. Teskey. John Wiley & Sons, Inc., New York. (Chapman and Hall, Ltd., London). 1955. 374 pages. Illustrated. \$4.20. (Library).

Written primarily for students of vocational agriculture, and to meet the needs of gardeners for a reference text and a guide to the how, when, and why of horticultural operations. Gardening enthusiasts will discover a wealth of useful pointers that will increase their gardening pleasure by aiding them to achieve greater success with ornamental trees, shrubs, vegetables, flowers, fruits, and other plants.

*Commercial Chrysanthemum Culture.*

J. E. Curwood. Ernest Benn, Ltd., London. (Distributed in U.S.A. by John de Graff, Inc., New York.) 1955. 151 pages. Illustrated. \$3.00. (Library).

Mr. Curwood's new book is a complete guide for the Chrysanthemum grower, starting from scratch. It begins by discussing the needed equipment, followed by a stage by stage of how to grow the plants and the various snags that may be encountered, and, as usual, winds up with the chapters on pests, diseases, etc.

*Chemistry of the Soil.*

Edited by Firman E. Bear. Reinhold Publishing Corporation, New York. 1955. 373 pages. \$8.75. (Library).

This work represents the American Chemical Society's 126th contribution (since 1919) to its series of chemical monographs, and the efforts of fourteen expert soil chemists, who present a comprehensive picture of the chemical aspect of soils in relation to their development, present constitution, and the uses to which they are put.

It covers the chemical composition of soils, the nature of soils, colloids, organic matter relationship, oxidation-reduction phenomena, the acid, alkaline, and saline soil problems, and plant nutrition.

*Organic Gardening: How to Grow Healthy Vegetables, Fruits and Flowers, Using Nature's Own Methods.*

J. I. Rodale. Hanover House, Garden City, New York. 1955. 224 pages. Illustrated. \$3.95. (Library).

A further opus on the system whereby a fertile soil is maintained by applying nature's own law of replenishment: adding and preserving humus, using organic matter, making compost, and mulching.

*Soil Fertility.*

C. E. Miller. John Wiley & Sons, Inc., New York (Chapman & Hall, Ltd., London). 1955. 436 pages. Illustrated. \$6.75. (Library).

... a fundamental treatment of the principles of fertility in the soil, with emphasis focused on the plant itself. The author discusses the relevant aspects of soil chemistry, soil physics, soil microbiology, and plant physiology, from the viewpoint of their influences on plant growth.

*Cooking by the Garden Calendar.*

Ruth A. Matson. The American Garden Guild & Doubleday and Company, Inc., Garden City, New York. 1955. 258 pages. Illustrated by Margot Tomes. \$3.50. (Library).

Wrought with care and art, this little exploit could possibly make good cooks out of us gardeners and vice versa. It's not a book for those who don't know a hoe handle from a seed catalogue, however, or for those who think a rotisserie is a traditionally French soup. Nor is it intended for the experts who go in for *la haute cuisine* or the cultivation of hot house esoterica. It does cleverly combine down-to-earth gardening suggestions with over a hundred well-chosen, mouth-watering recipes—sure to spur both cook and gardener on to further adventures.



*First Aid for Flowers.*

Mary Reyholds Babcock. Farrar, Straus and Company, Inc., New York, 1955. 55 pages. Illustrated. \$2.00. (Library).

Among the many books written for persons interested in flower arrangement, this one is unique. It is a very personal book with an interesting and delightful style of its own.

Essentially it is a compilation, based on experience, of all the data assembled by the late Mrs. Babcock as to the best way of gathering material, keeping it in the best condition, before, during, and through its life in an arrangement.

The section headings are significant: First Aid for Flowers, First Aid Kit for Flowers, Gardening Terms, Alphabet of Flowers, with hints for the care of each, followed by several pages for the reader's own notes.

By all means have this rather than some of the more available stylistic works that may, or may not, last, thanks to passing whims, for people will always cut flowers, and even if they should come to be no more than "flowers in water," they might as well be in health and last as long as possible.

B. Y. M.

## Rinehart's Garden Library:

*Hardy Bulbs* by R. Milton Carleton

*Perennials* by Marjorie P. Johnson

Rinehart & Company, Inc., New York, 1955. Each title \$1.50. (Library).

These two releases bring the total of this series already published to eight—with eight more titles to come. W. W. Goodpasture is serving as general editor for the entire series. Rebecca & Douglas Merrilees prepared the illustrations for the present two. Both books appear to have much data on their respective subjects, yet each is under a hundred pages. Recommended for those who wish the complete series or who are interested only in hardy bulbs and perennials.

*Drying Flowers for Color.*

Sarah Whitlock & Martha Rankin. Dominion Service, Inc., Charlottesville, Virginia, 1954. 16 pages. Illustrated. \$1.00.

Mrs. Rankin has been singularly and extensively interested in the art of preserving flowers (growing, drying, and arranging) for the past six years. Her success, and that of the coauthor, in drying flowers to preserve color as well as form, appears to be guaranteed by her discovery of employing a mixture of meal and borax and completely engulfing the flowers and stem with said mixture. I understand the Indians had a similar idea many decades ago, but they used the hot, dry sands of the west with not as satisfying results. The authors claim success with such difficultly-shaped and colored flowers as Siberian iris and Narcissus.

Mr. Whitlock, 3 Gildersleeve Wood, Charlottesville, Virginia, has the supply of this hand-booklet and will fill all orders. Garden clubs and groups of interested persons may order 12 or more to one address for only sixty cents each.

*Gardening Handbook.*

Thomas H. Everett. Arco Publishing Company, Inc., New York, 1955. 144 pages. Generously illustrated. \$2.00. (Library).

Fawcett Publications, Inc., do-it-yourself Book No. 259—another in the popular series for the home gardener. Mr. Everett, of the New York Botanical Garden, has probably assembled within these 144 pages more data than one could use in a lifetime. He certainly more than adequately covers the usual subjects of lawns, diseases, shady gardens, rock gardens, vegetable gardens, hedges, shrubs, vines, annuals, perennials, pools, pruning, compost, trees, herbs, weeding, ad infinitum—some 43 sections. There are numerous selected lists of the "best" plant kinds, etc., which contain amongst the usual and monotonous standards, many recent introductions.

The book is highly recommended for those of us desiring a comprehensive library, especially if you have liked the other books in this series.

*The History of Holly in Murals.*

Harry William Dengler. The Holly Society of America, Inc., (Mr. Charles A. Young, Jr.) Bergner Mansion, Gwynn Falls Park, Baltimore 16, Maryland, 1954. 24 pages. 50 cents.

... the recorded story of the Holly Murals of Forrest C. Crooks which were dedicated last year in Millville (the Holly City of America), New Jersey, by the Holly Society of America. The eight murals are in the 30 by 60 foot multiple-purpose civic room, Holly Hall, of the Y.M.C.A. building. Mr. Dengler gives as complete a verbal description of the murals as possible and also tells of the fastidiously scrupulous background research which Mr. Crooks performed and recorded in the murals. Unfortunately, for those of us who can neither read nor travel to visualize these murals, there are no reproductions in these pages.

*Landscaping Your Own Home.*

Alice L. Dustan. The Macmillan Company, New York, 1955. 248 pages. Illustrated. \$3.95. (Library).

The reviewer wishes to state simply that this is a *must* book for the how-to-do-it home gardener. Miss Duston is more than well equipped to handle the subject by her long and varied experiences, and her studies in ornamental horticulture. She presents the entire theory of home landscaping in a very concise (step-by-step) and enthusiastic manner. The entire plan of the work appears to be designed for the "average" recently acquired home grounds.

*Gardening with Nature.*

Leonard Wilkenden. The Devin-Adair Company, New York, 1954. 392 pages. Illustrated. \$4.95. (Library).

The sub-title for this is: How to grow your own vegetables, fruits, and flowers, by natural methods. Illustrations are by Paul Sears.



# The Gardeners' Pocketbook

## *Bulbs, Corms, and Tubers*<sup>1</sup>

Bulbs and corms are generally sold under grade names such as forcing size, top-large, etc. In the case of Narcissus and Daffodils, the designations of "double nose" to indicate a split bulb with probably two flower buds and "rounds" are used.

With some groups, for example Hyacinths, the grade names indicate usage such as exhibition and forcing sizes and sizes more suitable for outdoor bedding purposes.

Some grade measurements have normally been given in centimeters of circumference, since this measurement allows closer grading. This system is in vogue and is generally accepted in the trade for the smaller sized bulbs such as Crocus and Grape Hyacinth, while for larger and particularly for the flat type corms, inches in diameter is the generally accepted measurement: for example, Gladioli, Tuberous Begonias and Caladiums.

For such items as Peonies and Bleeding Heart and Cannas, the number of "eyes" or buds on the tuber is designated.

The following grades conform in substance to generally accepted trade usage. Both grade names and sizes in inches or centimeters should be given; size in inches or centimeters must be designated.

Offers of bulbs, corms and tubers (except Peony divisions) which cannot reasonably be expected to bloom in the season after planting should not be made to the public. If they are, then they should be clearly indicated as "non-blooming" sizes for naturalization or other plantings for which "non-blooming" sizes might be acceptable.

### 1. Tulips.<sup>2</sup>

Designated by centimeters or inches of circumference.

Top size	12 cm. and up	4 $\frac{3}{4}$ " up in circumference
Large	11-12 cm.	4 $\frac{3}{8}$ "-4 $\frac{3}{4}$ " circumference
Medium	10-11 cm.	4 "-4 $\frac{3}{8}$ " circumference
Small	9-10 cm.	3 $\frac{5}{8}$ "-4 " circumference

### 2. Hyacinths.

Designated by centimeters or inches of circumference.

Top Exhibition Forcing Size	19 cm. and up	7 $\frac{5}{8}$ " up in circumference
Large Exhibition Forcing Size	18-19 cm.	7 $\frac{1}{4}$ "-7 $\frac{5}{8}$ " circumference
Medium Exhibition Forcing Size	17-18 cm.	6 $\frac{3}{4}$ "-7 $\frac{1}{4}$ " circumference
Top Bedding or Garden Size	16-17 cm.	6 $\frac{3}{8}$ "-6 $\frac{3}{4}$ " circumference
Large Bedding or Garden Size	15-16 cm.	6 "-6 $\frac{3}{8}$ " circumference
Medium Bedding, Miniature, or Garden Size	14-15 cm.	5 $\frac{1}{2}$ "-6 " circumference

### 3. Grape Hyacinths.

Designated by centimeters or inches of circumference.

Top Size	9-11 cm. and up in circumference
Large Size	8-9 cm. circumference
Medium Size	7-8 cm. circumference

<sup>1</sup>Addendum (prepared by the American Association of Nurserymen in cooperation with the American Wholesale Bulb Dealers Association) to the **American Standard For Nursery Stock**, 1949 Edition, Revised 1951.

<sup>2</sup>Some botanical and species Tulips are smaller than above-designated sizes. Bulbs of botanical and species tulips should be so identified and sizes given.



#### 4. Crocus.

Designated by centimeters or inches of circumference.

Top Size	9 cm. and up	3 $\frac{5}{8}$ " up in circumference
Large	8-9 cm.	3 $\frac{1}{8}$ "-3 $\frac{5}{8}$ " circumference
Medium	7-8 cm.	2 $\frac{3}{4}$ "-3 $\frac{1}{8}$ " circumference
Small	5-7 cm.	2 "-2 $\frac{3}{4}$ " circumference

#### 5. Narcissus and Daffodils.

Designated by centimeters or inches of circumference.

Top Size Round	{	"Round" means single nosed bulbs which are fairly circular in cross-section and which show evidence of producing one flower. Slabs are not permitted in this grade.
Large Size Round		
Medium Size Round		
Top Size Double Nose	{	"Double Nose" means bulbs that show evidence of producing two or more flowers. Due to double character of bulb, circumference measurements are variable.
Large Size Double Nose		
Medium Size Double Nose		

There are certain varieties that normally have smaller bulbs than others. Until size grades are established, name grade designations as indicated and accepted by the trade (as bulbs are purchased) should be used.

#### 6. Narcissus.

Paper White. (A type of bulb that normally is a smaller bulb than other varieties and consequently are listed separately.) Designated by centimeters or inches of circumference.

Top Size	16 cm. and up	6 $\frac{3}{8}$ " up in circumference
Large	15-16 cm.	6 "-6 $\frac{3}{8}$ " circumference
Medium	14-15 cm.	5 $\frac{1}{2}$ "-6 " circumference
Small	12-14 cm.	4 $\frac{3}{4}$ "-5 $\frac{1}{2}$ " circumference

#### 7. Gladioli.

Designated by inches in diameter according to Fair Trade Practice Rules adopted by Gladiolus Growers as follows:

Jumbo		Over 2" in diameter
Large	No. 1	1 $\frac{1}{2}$ "-2 " diameter
	No. 2	1 $\frac{1}{4}$ "-1 $\frac{1}{2}$ " diameter
Medium	No. 3	1 "-1 $\frac{1}{4}$ " diameter
	No. 4	$\frac{3}{4}$ "-1 " diameter
Small	No. 5	$\frac{1}{2}$ "- $\frac{3}{4}$ " diameter
	No. 6	$\frac{3}{8}$ "- $\frac{1}{2}$ " diameter
No grade name	No. 7	under $\frac{3}{8}$ " diameter

#### 8. Amaryllis.

Designated by inches in diameter.

Fancy	3 $\frac{1}{2}$ " up in diameter
Top Size	3 $\frac{1}{4}$ "-3 $\frac{1}{2}$ " diameter
Large	3 "-3 $\frac{1}{4}$ " diameter
Medium	2 $\frac{3}{4}$ "-3 " diameter
Small	2 $\frac{1}{4}$ "-2 $\frac{3}{4}$ " diameter
Under 2 $\frac{1}{4}$ " not acceptable.	

#### 9. Regal Lilies.

Designated by inches of circumference.

Giant	10" up in circumference.
Fancy	9-10" circumference
Extra Large	8-9" circumference
Large	7-8" circumference
Standard	6-7" circumference
Medium	5-6" circumference



### 10. Caladium. (Fancy-leaved.)

Designated by inches in diameter.

Giant	3½" up in diameter
Large	2½"-3½" diameter
Standard	2 "-2½" diameter
Medium	1½"-2 " diameter
Small	1 "-1½" diameter

### 11. Tuberous Begonias and Gloxinias.

Designated by inches in diameter.

Giant Size	2½" and up in diameter
Extra Large	2 "-2½" diameter
Large	1½"-2 " diameter
Medium	1¼"-1½" diameter
Small	1 "-1¼" diameter

### 12. Tuberoses, Callas and other miscellaneous bulbs.

Designated in centimeters or inches in diameter or circumference as generally accepted trade practice may dictate.

(a) Tuberoses	
Top Size	4"-6" circumference
First Size	3"-4" circumference
(b) Callas	
Top Size	2½" and up in diameter
Large	2 "-2½" diameter
Medium	1½"-2 " diameter
Small	1¼"-1½" diameter
(c) Ranunculus	
Giant Size	1" and up in diameter
Extra Large	7⁄8"-1" diameter
Large	3⁄4"-7⁄8" diameter
Medium	5⁄8"-3⁄4" diameter
Small	1⁄2"-5⁄8" diameter
(d) Freesia	
Extra Large	7⁄8" and up in diameter
Large	3⁄4"-7⁄8" diameter
Medium	5⁄8"-3⁄4" diameter
Small	1⁄2"-5⁄8" diameter
(e) Anemones	
Extra Large	7⁄8" and up in diameter
Large	3⁄4"-7⁄8" diameter
Medium	5⁄8"-3⁄4" diameter
Small	1⁄2"-5⁄8" diameter

### 13. Peonies and Bleeding Heart.

Number of "eyes" or "buds" per division to be indicated.

Select	5-7 "eye" divisions.
Standard	3-5 "eye" divisions.
Small	2-3 "eye" divisions.

### 14. Cannas.

Number of "eyes" or "buds" per root to be indicated: for example 2-3 "eye" roots. Any root with less than 2 "eyes" not to be offered the public—suitable for growing on in nursery, or for potting or bedding purposes.

### 15. Dahlias.

Due to nature of divisions from different varieties no size designations can be listed. Each division must have a portion of live crown and at least 1 "eye" or "bud."



*Ixias and Sparaxis*

Among the many bulbous and cormous plants that were not tried while gardening in the North, these two African plants that had long intrigued me both in picture and text, were among the trials for 1954-1955. There was no particular risk in trying *Ixias* as Mr. Anderson had had three clumps of mixed *Ixias* in his borders for over four years and while their increase probably was not that expected from nursery plants, there was increase and annual flowering.

"The books" usually suggest that these genera can be grown in the North if one delays planting until December and immediately mulches well. But I had no protecting "south wall" and no inclination to add to the last minute chores of gardening. So no *Ixias* died by my hand up there.

The usual procedure for me is to buy all "the names" that can be found. In this case, this proved to be but thirteen, for the famous green-flowered *Ixia viridiflora* was not available and the refusal came too late to allow a trial elsewhere. The variety 'Bluebird' arrived, but failed after starting without so much as showing color in the bud. The other varieties planted here in November, which is still a frost free month, were more or less irregular in showing growth, but all sent up green shoots long before it was prudent. This is the difficulty with so many plants from climates where the winters are mild or where the seasons are the reverse of our own. As the winter proved to be mild until February 11-12, there was only moderate growth, a growth that very much resembles that of the local *Montbretias* in the same season. The frost of the February low point did no more than burn the tips of the foliage. No protection was given. Then all went well and flowering began in

March with all in fine shape till the famous night of March 26-27 when the thermometer dropped its mercury to 27° F. This time all the flowers that were in good condition were cut, and the two varieties that had not yet opened were covered with cartons. Between these two lows was one night when frost threatened and all were covered with cartons except a portion of the row of *Sparaxis*, and that suffered no apparent harm.

In planting the corms there was no difficulty in knowing which was top. They look much like *Crocus* corms and like *Crocus* arrived with little sprouts well in view. In this sandy soil, they were planted in clumps about 5 inches deep, and arranged in alphabetical order, a scheme that is one's salvation in case of misplaced labels. It does not, however, lend itself particularly to color schemes. A little ground bone meal was put in the bottom of each hole and mixed with the loose soil there.

*Ixia* foliage suggests that of *Montbretias* as has been said, or of *Freeseias*. The leaves form fan-shaped, rather erect masses, from which the inflorescences rise. The leaves here, at flowering time, did not exceed 10 inches, and the flower stalks rose to not more than 20 inches at best. In habit, the varieties tested fell into two groups, those in which the inflorescence rose on a tall slender stalk, with the flowers only in the upper portion, and so numerous and so large that the stalk bends under their weight. In the case of more vigorous plants, there was a secondary branch of bloom from the lower part of the stalk, no flower of which opened while the upper group was open. The other type grew less high, and the flowers held themselves less loosely, more in the fashion that the flowers of *gladiolus* are placed in their spike. Here again there were a few lateral branches.



'Azurea' grew with very slender foliage, very erect and stalks between twelve and sixteen inches. The stock was mixed, with the majority of the corms giving flowers that were a lovely greenish blue (Pale Methyl Blue of Ridgway) with an inner starry base of Bluish Violet. The outside of the buds when closed showed a faint tinting of purple. The other clone in the group had slightly smaller flowers, with a staining of purple running out from the basal star. This flowers in the wand-like shoots.

'Afterglow' was one of the more compact varieties, not at all wandlike. It rarely passed fourteen inches in height. The inside of the segments was Zinc Orange (a warm dull reddish orange), with the basal star of Acajou Red; the outside of the segments is Eugenia Red, a lively orange red. This variety is one that picks up the sunlight and gives a very brilliant effect in the border.

'Bridesmaid' belongs in the group with tall wandlike flower stalks, reaching as much as twenty inches. The color is white with a line of Phlox Purple running up through the center of each segment on the backs of the segments, from the basal star which is a deeper purple. In fading there is some spreading of the purplish hue over the flowers.

'Bucephalus major' is not a species in spite of its formidable looking name. It belongs in the group with crowded inflorescences and is difficult color in the garden, falling between Rosolane Purple and Rhodamine Purple of the Ridgway charts. These are brilliant magentas, not faded magentas, and among the other ixias that were grown, this combines best with Hubert and Invincible. It is particularly bad with the yellow and orange-tinted sorts.

'Conqueror' belongs in the group with crowded bloom stalks, and here,

this year, did not grow taller than one foot. The blooms are Brazil Red to Jasper Red, both of these colors reds with a touch of brown, and tinted with Carmine, a purplish red. This variety combines well with 'Afterglow' and 'Vulcan.'

'Golden Drop' as it appeared did not suggest its name, as the blooms were too close to those of 'Bridesmaid,' except that possibly the unopened flower buds were a little more yellow. It may be that the real 'Golden Drop' missed this shipment?

'Hogarth' belongs in the tall wandlike group, and was one of the latest varieties in flower of the set, opening its first flowers as the other, except Wonder, were finishing. It belongs in the group with 'Bridesmaid,' but is Baryta Yellow growing paler with age, but never to white. The basal coloration is dark, Blackish Red Purple, and there is a hint of purple that spreads over the aging flowers.

'Hubert' represents the dwarfer, stiff growing type with crowded blooms, not passing sixteen inches in height. The color is a Tyrian Rose, one of the lovely rose pinks that appears among azaleas. The outside of the segments is tinted with brown toward the tips, the basal star is darker rose.

'Invincible' again one of the shorter, more crowded varieties, is Aster Purple with a deeper base. This color falls in with the magenta series, but is not as trying as the color of 'Bucephalus Major.'

'Marvellous' falls into the wandlike group with stalks up to twenty inches. In general style it is much like 'Bridesmaid,' but the buds are faintly tinted with yellow as in 'Golden Drop,' and the stripe and basal star are between Phlox Purple and Mallow Purple which makes it a little deeper than the same coloration in 'Bridesmaid.' These colors are rather pleasant lavender



pinks, similar to the hues of many azaleas and iris.

'Uranus' another wandlike variety of precisely the same make up as 'Bridesmaid,' but the color is between Empire Yellow and Lemon Chrome, both good clear yellows. The basal star, inside, is Madder Brown, a warm reddish brown. This is the most distinctly yellow of all the so-called yellows that flowered here.

'Vulcan' is a crowded type not over fourteen inches tall, with Pomegranate Purple flowers, i.e., reddish-purple blooms, which are darker than the blooms of 'Bucephalus Major' and make a fine contrast with it.

'Wonder' was the very last to flower here, even a little later than 'Hogarth.' Its flowers are arranged in the crowded spike, that rarely exceeds fourteen inches. They are a staminode double, Rose Color, at times touched with green on the outside, particularly where the basal markings would come. Inside, these basal markings are white, the only example in the varieties grown here. The plant does not have the grace of the single varieties, but in its formal fashion is quite charming.

There must be many other named sorts of *Ixia* in cultivation abroad, and one may guess from the sorts seen here that the grower must have difficulty in finding varieties that are distinct enough to warrant naming. But there are species *Ixia* mentioned in the texts that appear to be distinct from the probably mongrel group just described. From the mixture already growing here, there is at least one sort not known under name, more or less the color and style of 'Uranus' but blooming two full weeks later than the latest of the named sorts.

Thanks to the frost and the cutting of the blooms, we have no present indication of the manner of seed setting, but seed have set on the old estab-

lished clump in past years, so doubtless it would be easy enough to grow seedlings if the seed are sown promptly.

As yet I have not come upon named lists of *Sparaxis* varieties and, amusingly enough, the "Mixture" that was purchased yielded precisely two sorts, one a clear white with yellow base, the other lower in stature with dull rose-colored flowers, clear yellow in the inside base, but largely covered over with a warm brownish red that looked almost velvety against the yellow, but fades out in a thinner and thinner hue toward the old rose tips. This is the sort of coloring that one can find in certain pansies.

The plant habit of *Sparaxis* is rather like that of *Ixia*, but more dwarf in height. The inflorescence is rather different however, as the flowers are more loosely set upon the stalk, and this forms an almost zigzag upward growth with a flower in the bract at each angle. Some of the stalks were branched. More visitors to the garden commented with pleasure over the *sparaxis* than one would have imagined, and perhaps this was due to the fact that the plants do make a pleasant low-flowering border.

Since the plants come into flower before Camellias have passed and while the great host of azaleas are coming in, they are useful plants for contrast. Dutch iris are mostly in excellent flower, and it is not inconceivable that rightly placed varieties might accent these last very happily. It would be interesting, for example, to try the effect of such *Ixias* as 'Afterglow' and 'Uranus,' placed close to some of the bronzed iris, such as 'Ankara' and 'Bronze Beauty.' Some of the paler sorts, like 'Bridesmaid,' might add a touch to the host of blue lavender iris, like 'Blue Triumphator,' 'Blue Horizon,' and so on, but there was no *Ixia* here that was as early as 'Wedgwood.'

B. Y. Morrison



*Berzelia languinosa*

In January the decorative light green knobs that cap my *Berzelia languinosa* bushes are among the most alluring growing things that cover my ocean-facing slope. About five years ago, when scouring a nursery for South African Ericas, I discovered a small nest of Berzelias where one usually finds the most interesting plants tucked in an out of the way corner and looking like things of shame. They were marked Erica but must have declared their un-erica like intentions early for they had already been pinched back to make them look more like heathers. When I got home I planted the foundlings on the South African heather slope even though I knew they were not Ericas. Here their soft fluffy foliage proved so tempting to cats and dogs that these creatures came from far and near to rub against the inviting foliage softness and I built a small fence around each plant until it rose above cat and dog height.

In their third year the Berzelias were almost three feet tall and in March the small green flower heads were stuck all over with creamy stamens and the once hard knobs now matched the foliage in downiness. As soon as the flower balls develop, the shrub, bent on rising still higher, puts forth a finger, or several fingers, of new growth from the center of each short spray. Had I known this earlier I might have kept the height within bounds by doing what I now do, cut the tallest branches down to the very base. This might have left the under part less bare though the smooth bark of pinkish gray is not unlovely.

By midsummer the flower heads have dulled and begun to shrink and the unsightly stage sets in. The little spheres go dull brown and remain on their stems until shaken loose by wind,

disfiguring the terminal clusters of limp silky branchlets feathered with thread-like quarter-inch leaves and casting a smirch on the ever-moving forest of light green.

Last spring I found two volunteer berzelias. A ten inch hidden in a low thicket of *Ribes viburnifolium* and a tiny seedling of the current season. The larger one I cut back to two inches. It is now four times as tall and bushy, but firm in its intention of forming the erect vaselike lines of its five-foot parent. Its junior was potted up and pinched back.

I need more information about this South African for, as so often happens, all I know about it is what I have found out from growing it.

Lester Rowntree

(See frontispiece for illustration)

*An Old Azalea, 'Emperor'*

Some years ago when I was establishing my collection of all the named clones I could discover of the so-called Southern Indicas, this azalea was among those bought from the Fruitlands Nurseries. It did not survive in the Takoma Park, Maryland, garden, but it has grown well here in Pass Christian, Mississippi, and now in mid-May is at peak of bloom. In habit and general style it is obviously of "macrantha" derivation, with the same twiggy growth, narrow leaves, and moundlike style of bush. Here it is in flower at the same time as the Glenn Dale clone 'Buccaneer,' and is almost identical in color with that variety, though it is perhaps a little more pink a red, or less scarlet a red, whichever way one wishes to put it. Here there is no need for both, but for the northern gardener who might wish to duplicate southern effects, this close approach is worth noting.



There is nothing in the *Tuinbouw* Encyclopedia to indicate that the name is known in Europe. There are two Emperors in the Index but neither could be the source of our variety: one, 'Empereur du Bresil,' the other 'Empereur Frederick III.' Each is double, and neither approaches this in color according to the descriptions given. There is always the off chance that our plant is a sport from one of them, that has survived. Each of the sorts named is double and our plant is single. Whatever its origin, for the South it is an excellent garden sort, and planted in the shrub border, a border in which blue-purple annual larkspurs are allowed to self sow, it makes a nice contrast to their color.

B. Y. Morrison

### *Growing Amaryllis in the South*

In Amaryllis, the world of flower lovers have the most beautiful and spectacular bulb flower of spring, a bulb which can be grown by any amateur or professional horticulturist, trained gardener, or hobby plantsman. There is perhaps no more universal spring bulb flower. It has size, shape and form, and above all, color. Amaryllis is one of the easiest bulbs to grow and keep in good condition, year after year. There is no limit to Amaryllis bulb's life. Under proper culture, it renews itself annually, and, barring accidents, it might live a thousand years.

October is the time to begin thinking about your spring Amaryllis. Begin by preparing the beds with the proper soil. Any fertile soil, particularly the Camellia soil prepared by the nurseryman, with good drainage, and a fair proportion of humus, will give excellent results. Amaryllis do not like hard packed ground.

In November the bulbs begin to arrive. The Holland Bulbs are generally later, but they have been in cold storage, and, as soon as they are put in the warm ground, begin growing immediately, and often bloom before they put on any foliage. In the South the open ground is best, and the plants stand the cold much better than those planted in pots. After planting the bulb one-quarter of it out of the ground, it will grow well, stand the heat and drought of the long summers, and, in addition, will withstand winter cold.

In December you may add a little bone meal, or 5-10-5 fertilizer is very good. Work this well in the ground, and then water well. There is very little to be done to Amaryllis through the colder months. If the cold kills the leaves, it is well to pull the leaves off, so the sour juice from the leaves will not run back into the bulb. Keep the bulbs well watered all through the winter, and water freely when they begin to bloom. Sometimes a second, and probably a third flower, will spring up from the bulb. When the bloom has faded, the stalk may be cut off at once, or allowed to remain and ripen seeds, if desired. You may propagate from seeds, offsets, or by cuttage, the first being the general method with all growers, and the way new hybrids are made. Offsets formed on the mature bulbs may be set out separately, and grown on to blooming size. Until the cuttage method for Amaryllis was worked out in the last few years, offsets were the only way to increase stock of a variety, and this made the development of named varieties a long and tedious affair. The seeds, offsets, and cuttage may be planted in the same kind of soil that the Amaryllis bulbs are planted in.

During February give another feeding of bone meal, or 5-10-5, and in March and April you will be rewarded



with nice Amaryllis blooms. Seeds should be planted in flats, and kept damp but not too wet until they come up, which will be between three and four weeks. When they are four or five inches tall, reset in yard, and they will grow much faster than leaving them in the crowded flats. Cuttage in Amaryllis bulbs means to cut the large bulbs into two, three or four quarters, roll in sulphur and plant. The cut piece will take root and grow well.

Water freely while Amaryllis is in bloom, but don't neglect your Amaryllis once their flower has faded. The bulb will be somewhat emaciated by that time, and will require watering and feeding to rebuild strength and to prepare for bloom another year.

After flowering, the bulb should not be dried off. Widespread, but erroneous advice on this point has probably caused more bloom failure than any other single factor. The normal habit of Amaryllis is to make leaf growth right after flowering. Simultaneously with the development of leaves, the bud expands, and buds for the next season's flowers are formed within. You may discover the approximate number of stems developing in the bulb by counting the number of leaves. In the axis of every fourth leaf, a primordial flower develops. Drying off at this period would naturally hinder the production of foliage, and check the formation of buds. Therefore, continue to water your bulbs after they have bloomed. With certain strains, summertime flowers are not unusual.

Protect your small seedlings the first winter; after that they will do well in the open ground. They will also do well in pots, but are less trouble growing in the ground. If you desire growing Amaryllis in pots, soak your pot from 12 to 24 hours in water, to make sure they are saturated thoroughly, and be sure of good drainage, by putting a

half inch layer of crushed crockery, stone or gravel in the bottom. Over this place your soil. Have your pot several inches wider all around the bulb.

The most interesting part of growing Amaryllis is the pollinating, and of course that should be done while the flowers are in bloom. If you want the same color, but a larger flower, take the pollen from one flower and pollinate back to another flower on the same stem, but if you are trying for another color, cross pollinate the pollen from one color to another. About the third day, the pistil is open and ready to receive the pollen. Place the pollen from the anthers into the pistil, then tie a small bag or wax paper around bloom, so the wind will not blow the pollen away, or bees will not do more damage.

If a few essentials are observed, the Amaryllis is so easy to grow. Good bulbs are of first importance. The demand for named Amaryllis is steadily growing in New Orleans. We are striving to make the Amaryllis one of the most outstanding flowers in the South.

The Amaryllis bulbs are dormant during July, August and part of September; they are having their rest period. It is not necessary to take them out of the ground in the South for a drying-off period.

The Amaryllis growers have made a wonderful stride in developing new solid colors and now have bulb treatment, guaranteeing a bulb to bloom in December for Christmas when planted in November.

From the time the seeds germinate in the seed beds, the seedlings are subject to a certain degree of molestation by their natural enemies. Mole crickets are often common in the seed beds, and may cause considerable mechanical injury by burrowing around in the soil



and cutting off the roots. Sowbugs are apt to be present, and they damage the young plant by eating off the tips of leaves. These crustaceans continue to feed upon the plants throughout the summer. They crawl up the leaves and feed on the tips.

Weeds may become troublesome in the seedbeds. The most bothersome weed is the chickweed. It produces a viny-type growth which may completely cover the young Amaryllis, and shut off the light. Another troublesome weed in the Amaryllis beds is a plant known as Wandering Jew. It thrives in rich damp soil so favorable to Amaryllis. It is a vigorous vinelike plant. The principal trouble caused by this weed is the tendency to overgrow the Amaryllis and shut off the light.

As the plants grow older they become subject to the attack of an imperfect fungus known as *Stagnospora Curtisii*, which produces a condition commonly known as *Red Blotch*.

Larvae of a moth sometimes appears on the leaves in the Spring. They are voracious feeders, and in a short time eat up most of the leaves on a plant. Moles seem to have a strong affinity for Amaryllis beds, where earthworms thrive in great abundance. They cause a great deal of damage by burrowing along the bulbs and destroying the roots of the plant. All the enemies may be counteracted by standard approved methods. In spite of the numerous difficulties, the Amaryllis keeps on growing and blooming. So long as the soil conditions are kept favorable the plant continues to thrive.

Mrs. W. D. Morton, Jr.

### *Oranges As Decorations*

In this particular area, the usual fruiting varieties of citrus are not to be depended on for commercial crops, even if one finds individuals who

solemnly assure you that their grapefruit has borne fruit for the last twelve years or whatever. With reports on the Satsuma types, one need not be so skeptical, for they frequently fruit and fruit well. Two other plants, the Calmondin Orange and the kumquat, are another matter.

The first, *Citrus mitis*, is a striking garden ornament. Its habit is approximately columnar which is very useful in any garden planning. No notes have been made here as to the time of blooming, but the main crop of fruit is ripened or rather well colored by early autumn. The fruits are about 1½ inches in diameter, and brightly colored, almost deeper than the color familiar to all as "tangerine." In the autumn, the flavor is, in my opinion, abominable; but the fruits hang on the tree through the winter, and sometime during the months before May, there is a change. I did not discover it this year, but in early June the flavor has become insipidly sweet. The use of the fruit in making ades is recommended; but the most pleasant way in which it has been met here is as marmalade, which has a very distinctive taste, somewhat like but distinct from that of the bitter orange.

The kumquats are members of the Genus *Fortunella*, and the plants that we have in the garden here, since they have oblong fruits, must be *F. margarita*, the Nagami kumquat. The plants here are grafted on the trifoliolate orange, and are still small, but at this writing, in mid-June, they are covered with their almost sessile star-shaped flowers, that have a very pleasant fragrance, even if not one that fills the air as does the scent of lemon and Satsuma early in the season, when there are many competing scents. Again, plants grown in one's own garden have a better flavor than those one gets from stores, as they can hang longer on the



trees and develop fully. And a marmalade made from them without too much sweetening is again something worth eating.

The germinating seedlings of Calamondin have developed enough to show that they, like the seed of many citrus, are not truly fertilized seed. This shows up by the development of two, and in some cases three seedlings from one seed, which presumably can be separated and grown on, when the plants have attained a little more size.

A neighbor who has a Calamondin grown from seed looks with some doubt on the whole project and says that they, again like other citrus, grow well from seed but are very slow to come to flowering. He did not know of any case in which Calamondin seedlings had been used as grafting stock for scions of their parent plant. The usual stock in this area is *Poncirus*.

B. Y. Morrison

### *The Pursuit Of The Vine*

It may have been interest in wine that originally brought both "Poison ivy" and the woodbine or Virginia creeper into Europe; but pure coincidence that they went out at the same time from the Paris garden of the royal botanists, Jean and Vespasien Robin. This may have suggested to some that both were from New France. Cornut, in his *Canadensium plantarum historia* (1635, p. 96-100), described and named them "*Edera trifolia Canadensis*" (*Rhus radicans*) and "*Edera quinque-folia Canadensis*" (*Psedera quinquefolia*). But they had been listed a dozen years earlier by the Robins in their *Enchiridion isagogicum* (1623), a catalog of the plants then in their Paris garden, as "*Vitis trifolia Americana*" and "*Hedera major Americana, seu Vitis Virginiana*"; and in 1622

Vespasien Robin sent them both to Kaspar Bauhin, who in his *Pinax theatri botanici* (1623, p. 521), named them "*Vitis Canadensis*" and "*Vitis Virginiana*," respectively, with descriptions sufficient to settle their botanical identity.

Without going into taxonomic entanglements it may be said that Kurt Wein, *Die erste Einführung nord-amerikanischer Gehölze in Europa* (Mitteil. Deut. Dendrol. Gesell. 42: 143, 1930), remarks that Cornut's figure is clearly *Rhus radicans*, and also (l.c., 42:145, 1930) that the related species first known as "*Arbor venenata*" (*R. Toxicodendron*), does not appear in literature till 1659, in the *Hortus, sive Index onomasticus plantarum* of Denis Jonquet. The actual date of introduction is not known for either, but *R. radicans* appears to have been considerably distributed before the other was distinguished. The toxic properties of the plant were probably not recognized at the outset.

There is no evidence that "Poison ivy" was grown in Europe except as an ornamental plant; but there is little doubt in my mind that it first attracted attention as a potential grape. The main object of French exploration of Canada in the early 1600's was emigration and colonization. In all the expeditions of Champlain, along the Atlantic coast as far south as Cape Cod, up the St. Lawrence and its tributaries, and the forest and water routes traversed with his Huron allies in New York State, he was looking for agricultural assets; continually noting stands of timber and fine meadows suitable for cultivation; everywhere looking forward to settlement and the development of a rich agricultural economy. Champlain frequently mentions "vines"; so does Lescarbot in his account of the resources of New France observed during his residence in Nova Scotia in



1606/07. Both of them sampled and compared the qualities of native grapes, and Champlain remarked that one of them yielded an excellent "verjuice," while others had good flavor but little juice. Apparently he found in different localities several species of American grapes, but we have no clue to those planted in the first garden at Quebec in 1609. One of Champlain's special undertakings in that first autumn after the founding of Quebec was the planting of grapes, both European vines brought for the purpose and some of the native kinds; and it was a sore disappointment to him that they were neglected during the following year.

The colony at Port Royal (Annapolis, N. S.) also planted vines; but it is not clear to me that they tried American grapes; although both Lescarbot and Louis Hébert, an apothecary with considerable botanical and agricultural knowledge who was another member of that colony, had taken notice of promising wild vines found in their explorations. They were interested in native plants that might be useful for food; but the French agricultural concepts derived largely from the old Roman economy; hence they could hardly imagine settling in a land without bread and wine. With this predisposition toward the grape, and curiosity about native strains, it would be strange indeed if the eyes of the explorers had not been interested in all the tangles of native vines bearing fruit in clusters of small berries, any of which might be susceptible of improvement.

What puzzles me is that the French did not, apparently, introduce American species of *Vitis* in Europe. Even though they hoped the wild vines of Canada might yield substitutes for *Vitis vinifera*, it seems to me that someone must have collected a few roots or

cuttings of the former for trial in French gardens. Botanists have shown considerable ingenuity in trying to prove that the "*Vitis laciniatis foliis*" of Cornut's *Canadensium plantarum historia* (1635, p. 182-184) was the *Vitis riparia* or *V. rubra* of Michaux, or other American species; but in fact Cornut described many non-Canadian plants, and this was the grape listed by the Robins in their *Enchiridion isagogicum* (1623) as "*Vitis vinifera laciniatis foliis*." Linné in his *Species plantarum* (1753, p. 203) gave the name *Vitis laciniosa* to Cornut's grape; but it was later referred back to *V. vinifera*, of which it is sometimes considered a variety, var. *apiifolia*. This is the "parsley vine" of the *Museum Tradescantianum* (1656) of John Tradescant, Jr., which incidentally is the earliest European record of *Vitis labrusca* and *V. vulpina*.

Bauhin's "*Vitis Virginiana*" (*Pse-dera*) was meanwhile rapidly distributed and soon found in many Old World gardens. Its first definite record on the European Continent must be that of Petrus Hondius, the pastor of Ter Neuzen in Zeeland, in Dodoens, *Cruydt-boek* (ed. by van Ravelingen, Leyden, 1618, p. 1439-1440). Hondius tells us that the "Cleyngen Wijngaert van Virginia" comes from that part of the West Indies where the English are now settled, and gives a fairly adequate description of the vine grown from a broken twig that had been brought from overseas. He gives it the suitable and euphonious name, "*Viticula Virginiensis*," but unluckily this did not come to the notice of Linné, or we might have been spared the monstrosities of *Psedera*, *Ampelopsis*, and *Parthenocissus*, invented to account for the nomenclature of Cornut and Linné.

Marjorie F. Warner



### Hardiness In Hollies

Plant hardiness is an intangible characteristic apparently affected by many environmental and source variables. In the hope of learning whether each clone of American holly possesses a pattern of hardiness, I planted 116 one- and four-year rooted cuttings of *Ilex opaca* in Arlington, Vermont, in the summer of 1954. There were 17 female and 2 male clones.

Forty-three of the one-year plants were kept in 3- and 4-inch pots which were plunged and covered with a half inch of peat. Sixty-eight were planted in a weed-free, well-drained, sandy loam to which had been added a liberal amount of sedge peat. The five larger hollies were spotted in an open oak-white pine woods, using compost and sandy loam soil.

Rainfall was adequate during the summer and fall. The plants received

no additional mulch in the fall, nor other attention, except a wire enclosure to prevent deer browsing.

The first freeze occurred on September 30th—unusually late, so the hollies were well hardened. By the last week in November the surrounding mountains were covered with snow and remained so until late March. At Arlington, 750 feet elevation, the snows did not last long. Icy periods were frequent. In February the temperature dropped to 22 and 24 degrees below zero (Fahrenheit) with no protective snow covering at either time. Heavy freezes alternating with warm periods continued through March and April. The last freeze occurred on May 22nd.

From the tabulated results of this test, it appears that the origin of an American holly clone does have a direct bearing on its hardiness.

H. Gleason Mattoon

Variety & Source	1-Year Rooted Cuttings				2-Year Plants		4-Year Plants	
	Potted	Lost	Lined	Lost	Lined	Lost	Lined	Lost
Arden, Penna.....	3	1	3	1	2		1	
Brooks, W. Va.....	2		2		2			
Cape Cod Dwarf, Mass.	2	1	2	1	1			
Cardinal, N. J.....	2	2	2	2				
Cheerful, Md.....	3	2						
Croonenberg, Va.....	2	2	3	3	1	1		
Draper, Penna.....	2	1	2		2			
Evans, Del.....	2	1	3	1	1		1	
Howard, Fla.....	2	2	2	2	2	2	1	1
Hume No. 2, Fla.....	2	2	3	3	1	1	1	1
Richards, Md.....	2	2	3	2	1	1		
Select No. 1, Conn.....	2	1	2		1			
Select No. 2, Conn.....	2		3		1			
Sewell, Md.....	2	2	3	2	1			
St. Mary, Mass.....	1	1	3	1	1			
Taber No. 3, Fla.....	3	3	3	3	1	1		
Tilghman, Md.....	3	3	3	3				
Male No. 1, Penna.....	3	1	3		1		1	
Male No. 2, Penna.....	3	1	3		1			
Totals.....	43	28	48	24	20	6	5	2



A BOOK REVIEW P. S. TO *NEW* (1955) *MEMBERS* OF THE SOCIETY:

Interested in growing Azaleas?

Do you have these two books?

*The Azalea Handbook.* American Horticultural Society's Editorial Board: Chairman Frederic P. Lee, Fred O. Coe, B. Y. Morrison, Milo Perkins, and Freeman A. Weiss, assisted by an Azalea Committee of distinguished scientists, nurserymen, and amateur growers. 1952. 160 pages, complete with varietal index, 44 illustrations, 4 in color, bound in red cloth with gold lettering. \$3.00. (A few copies of the *Third Printing* are available from the Society.)

"A compact, concise, clearly written, extensively illustrated handbook on a popular group of garden plants, which should appeal to all from the rank amateur to the professional. Chapters on garden Azaleas, regional adaptability of many varieties and clones, culture, identification, and control of pests will be instructive." Richard P. White, Secretary, American Association, in the *New York Herald Tribune*.

*The Glenn Dale Azaleas.* B. Y. Morrison, Agriculture Monograph No. 20, U. S. Department of Agriculture, Washington, D. C. 1953. 93 pages. 38 photographic illustrations. \$.40. (Available from Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C.)

"An account of the new group of hybrid evergreen Azaleas developed by Mr. Morrison when he was head of the Division of Plant Exploration and Introduction of the Department. This booklet describes some 450 named clones of the Glenn Dale Hybrids as to habit, foliage, height, size and color of flower, time of bloom, and parentage. It includes the story of the species and clones used in breeding work and an appraisal of their respective values in the creation of this hybrid group." Frederic P. Lee, April 1954, *The National Horticultural Magazine*.

Your Society has secured a limited supply of *The Glenn Dale Azaleas* for you and will include a *free* copy when filling your order for *The Azalea Handbook*. Because stocks of both books are very limited, the Society cannot guarantee to fill orders received under this offer after September 30, 1955.

AMERICAN HORTICULTURAL SOCIETY  
1600 Bladensburg Road, Northeast  
Washington 2, D. C.







## **A List of Societies Affiliated With The American Horticultural Society**

American Association of Nurserymen  
American Begonia Society  
American Begonia Society, San Francisco Branch  
American Begonia Society, Santa Barbara Branch  
American Camellia Society  
American Gesneria Society  
American Gloxinia Society  
American Iris Society  
American Peony Society  
American Rhododendron Society, Middle Atlantic Chapter  
American Rose Society  
Bel-Air Garden Club, Inc. (California)  
Birmingham Horticultural Society  
Cactus and Succulent Society of America  
California Horticultural Society  
Chevy Chase (D. C.) Garden Club  
Garden Center of Greater Cleveland  
Garden Center of Greater Cincinnati  
Garden Club of Alexandria (Virginia)  
Garden Club of Chevy Chase, Maryland  
Garden Club of Danville (Virginia)  
Garden Club of Fairfax (Virginia)  
Garden Club of Indiana  
Garden Club of Virginia  
Garden Library of Michigan  
Georgetown Garden Club (D. C.)  
Gulfport Horticultural Society  
Hemerocallis Society  
Herb Society of America  
Houston Horticultural Society  
Hunting Creek (Alexandria, Virginia) Garden Club  
International Geranium Society  
Iowa State Horticultural Society  
Men's Garden Clubs of America  
Men's Garden Club of Montgomery (Maryland) County  
Michigan Horticultural Society  
Midwest Horticultural Society  
Moline (Illinois) Horticultural Society, Inc.  
National Capital Dahlia Society  
National Capital Garden Club League  
Neighborhood Garden Club (Virginia)  
North American Lily Society  
Northern Nut Growers' Association, Inc.  
Ohio Association of Garden Clubs  
Perennial Garden Club (D. C.)  
Plainfield Garden Club (New Jersey)  
Potomac Rose Society (D. C.)  
San Francisco Garden Club  
Takoma Horticultural Society (Maryland)  
Washington (D. C.) Garden Club  
Worcester County Horticultural Society