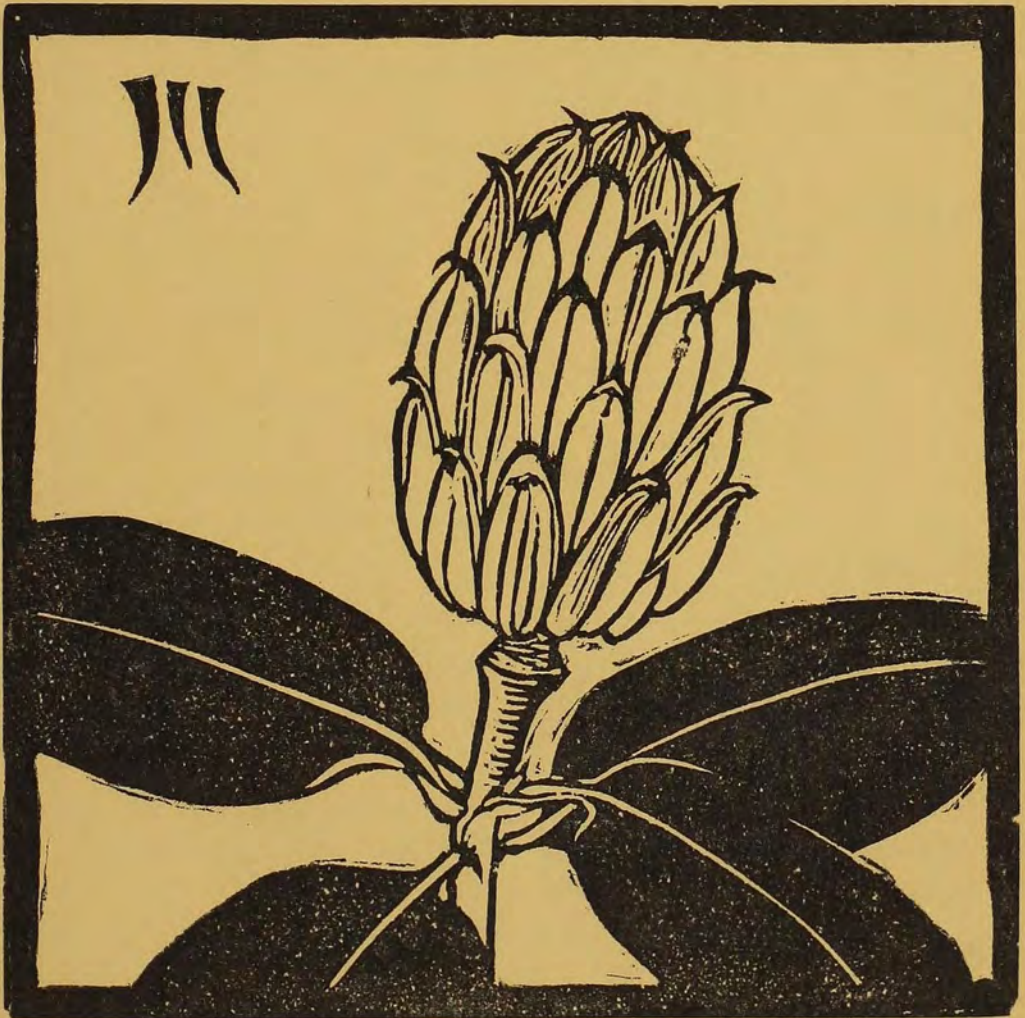


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*Editor Benjamin Y. Morrison, on the occasion of his relinquishing the Directorship of the United States National Arboretum in 1951. Mr. Morrison retired from civil service to his residence in Mississippi where he continues an extremely active life in the pursuit of many subjects, and where he remains on call of the U. S. Department of Agriculture as a consultant.*

# Arthur Hoyt Scott Garden Award

The Executive Committee and the Board of Directors of The American Horticultural Society are honored to record for the information of readers of *The National Horticultural Magazine* the presentation of the Arthur Hoyt Scott Garden Award to Benjamin Y. Morrison. This award was made on June 8, 1953.

The Arthur Hoyt Scott Garden and Horticultural Award was established in 1929 by Margaret Scott Moon and Owen Moon, Jr. It consists of a Gold Medal and One Thousand Dollars, and is awarded at irregular intervals. Swarthmore College is the custodian and trustee of the endowment funds.

Provisions of the trust stipulate the Committee on Award shall consist of nine members, representing seven specific organizations and two members at large. These organizations and their 1953 representatives are as follows:

To Chairman the Committee: President of Swarthmore College, John W. Nason; Pennsylvania Horticultural Society, John M. Fogg, Vice Provost, University of Pennsylvania; Massachusetts Horticultural Society, Arno H. Nehrling, Executive Secretary; Horticultural Society of New York, Mrs. W. Redmond Cross, President; a nationally known garden or nature organization, National Council of State Garden Clubs, Mrs. Lewis M. Hull, Former President; a nationally known flower society, American Rose Society, R. C. Allen, Executive Secretary; an editor within the Philadelphia zone, Robert Reed, Editor, *The Country Gentleman*. The two annual members at large appointed by the President of Swarthmore College for 1953, are John C. Wister, Director, Arthur Hoyt Scott Horticultural Foundation; and

Mrs. James Bush-Brown, Director, School of Horticulture.

The Gold Medal executed by Sculptor Walker Hancock, in collaboration with Architect W. Pope Barney, personifies the spirit of Arthur Hoyt Scott in the application of horticulture in gardening. The purpose of the Award is to promote a greater love of nature, make the nation more conscious of the beauty of the outdoors, develop a greater knowledge and love of plants and flowers, spread the gospel of better planting and design, and arouse a wider interest in better planting and more beautiful gardens among all citizens.

The Committee considered over forty persons, and made the Award to Mr. Morrison because of his work with many different plants and in many fields of horticulture.

His recognized horticultural works include his early participation in the organization of the American Iris Society in 1920. His work in Iris breeding in the 1920's was sponsorship of Iris Shows in the New York Area in those years. The Committee considered also his work with Daffodils in that same period, when he imported into this country varieties then but little-known, including Beersheba. His work with this Society and his Editorship of *The National Horticultural Magazine* since 1926 were considered next. For many years he was Editor of The American Iris Society, beginning about 1934, and continuing for some years.

The Committee also recognized Mr. Morrison's connection with the U. S. Department of Agriculture, which dates from 1920 when he accepted employment in the Bureau of Plant In-

dustry as a specialist in ornamental plants. During his first ten years, while still untrammelled by administrative chores, several basic studies on ornamentals were completed. He was particularly interested in the many new and little known ornamentals coming in through the federal plant introduction programs, but groups such as Iris, Dahlia and Azalea received considerable attention. About 1930 he joined the staff of the Division of Plant Exploration and Introduction and became its head in 1934.

In 1937 the development of the U. S. National Arboretum was also placed under his administration. He held both responsibilities until 1948, when he became full time Director of the Arboretum, leaving the Department's important plant introduction work to others.

His travels abroad began as a graduate student when he went to the Orient as a Sheldon (Harvard) fellow in landscape architecture. In 1931 he was sent abroad to study the botanical gardens and arboretums of northern Europe and the British Isles. He was a delegate to the International Botanical Congress in Amsterdam in 1935. In 1941, and again in 1943, he was sent to Peru and Columbia respectively to assist those countries in planning an agricultural program.

Probably, as the years pass, Ben Morrison, will be most remembered through his development of the magnificent series of cold-hardy, large-flowered Azaleas which have come to be known as the Glenn Dale Hybrids. He began this program in the 1920's and the first named selections were distributed about 1940. In all about 400 named clones were placed with commercial nurserymen. Most of these

now may be seen in spectacular display over a sixteen acre planting at the U. S. National Arboretum. Many of the later selections have not yet been offered to the public as some years must pass before the nurserymen have sufficient stock for distribution.

The Arboretum was fortunate in having Mr. Morrison in charge during its formative period. His academic background as a landscape architect, combined with his great wealth of knowledge of plants and their habits of growth, has given to the Arboretum a basic planting plan for years to come. Also, through his position as head of the plant introduction group, he was able to give the Arboretum priority attention in the placement of woody ornamentals little known in the United States.

While he administered the Division of Plant Exploration and Introduction, appropriations for operations were lean and costs sharply on the upgrade. Personnel of the Division were halved in number and many services to the public were all but discontinued. Yet, it is to his outstanding credit that during that period, he managed to bring into the country 92,000 plant introductions from all parts of the world, largely through his voluminous correspondence. About one in every 250 of these has contributed to advances in horticulture and farming, either as new things for the garden or as breeding stock carrying some new quality of use to the plant breeder.

The Committee recognized his many other government projects, and in all, it was felt that he perfectly exemplified the work in horticulture which the Medal was established to encourage.

The Award has been given nine times since 1929.

# Irrigation In Utah's Landscape

ERNEST F. REIMSCHUESSEL<sup>1</sup>

The supplementing of water to lands by means of irrigation is not new. The Egyptians, four thousand years ago lifted water by means of a well-sweep (*shadoof* or *shaduf*) to irrigate their crops and gardens. In some parts of Egypt this method is still a common practice. The Assyrians under Sennacherib's rule developed one of the first great water systems. The usual custom of the age was for the king to receive the water first for his garden; afterwards it was directed into the city. Numerous water systems and devices of great note that were created in the past still exist. Parley R. Neeley, area engineer, of the Bureau of Reclamation, stated in the *Provo Herald* Centennial issue, March 23, 1947 that: "A system still in operation today, was established about 2,300 years ago on the Ming River in China by Lin Pang, a Chinese engineer. Made up of some 550 miles of main canals and 2,200 miles of laterals, this system furnished water to 500,000 acres of lands supporting more than 2,000 inhabitants per square mile."

Modern irrigation, however, had its beginning in 1847 when the Mormon pioneers entered Salt Lake Valley. The leader of the group, Brigham Young, had the foresight to keep the natural streams as public property. This has proved extremely beneficial.

Irrigation is most variable. The methods used depend on the water supply, the topography, the type of soil, the plant grown, and the method of applying the water. The source of water may have its origin in the moun-

tain from where it is conveyed by natural streams to the valleys below (See illustration). The supply may come from natural springs, from wells or from man-made storage ponds and lakes. No matter what its source, man has to direct the life-giving water to the plant. The method of applying the water may be by flooding, ridge and furrow, or by sprinkling.

The Utah pioneers had little choice as to the method of applying the water. The afternoon they arrived, many planted their corn and potatoes, not stopping to eat until finished. They dammed up the streams and forced water onto the newly-planted areas. They adopted the method of flooding and the ridge and furrow, as these were the easiest to construct and to apply. The water was diverted from the natural streams by community organization into supply canals and ditches (See illustration), then rationed out according to shares with time limits. By the end of the Civil War, some fifteen years later, as stated by Gates in the *Life Story of Brigham Young*, there had been developed "277 canals irrigating over 150,000 acres of what would have been otherwise unusable land."

Man has gained much since the beginning of modern irrigation through trial and error. Flooding is well adapted for use on lawns or pastures where water can be forced to spread over an area. This is good as long as there is enough water in the stream. When the stream decreases in flow, some parts of an area may not obtain sufficient water. The flow of water needs to begin at the highest point of

<sup>1</sup>Landscape Architect, Brigham Young University, Provo, Utah.

an area so that, even though the stream is decreased, all parts of the area can be watered during a specific time.

Another method of irrigation is the forcing of water into corrugations or furrows. The new technique of siphoning the water by means of a tube aids in the controlling the rate of flow into each furrow. Its advantages are that less labor is required, and less soil erosion takes place. This method is widely acclaimed by the commercial vegetable and flower growers. It is highly recommended for the property owner who has a small plot of ground with a water-right and who desires to grow his own produce.

Irrigation by sprinkling is the most common method used for the growing of ornamental plants and lawns. Sprinkling irrigation uses piped water in which there is pressure to spray water on the plants. The pressure is developed by gravity flow or by means of a pump. Outlets are placed so that a garden hose may be attached and water applied by hand or by means of rotating sprinkler-heads. In the permanent system, the water is conveyed in pipes through distributing lines to nozzle outlets. The sprinkler or nozzle outlet should spray the water on the soil only as fast as the soil can fully absorb and only until the moisture content reaches field capacity. Field capacity as defined by J. E. Christiansen of the University of California Experiment Station, "is the amount of moisture a soil will retain against the downward force of gravity, or the upper limit of the available moisture range." Often not enough time is allowed to build up the moisture content: the roots then stay near the surface, and when not watered every day, the lawn soon reveals effects of drought. Sometimes two plants compete for the moisture in

an area, such as lawn or ground covers under trees; then it is even more important to raise the moisture content to near field capacity. The soil should be thoroughly moist but not waterlogged, since frequent waterlogging causes the plants to become stunted or to die.

Portable systems, the type of system in which the pipes can be easily dismantled and moved, are successfully used on uneven topography, in the field of agriculture. Portable sprinkling systems are now available under various trade names. The system used, whether portable or permanent, may have rotating-head sprinklers or fixed-head sprinklers. The area which can be covered by each sprinkler-head varies with the type of sprinkler, the water pressure and the operator, ranging from fifteen feet to two hundred feet diameter. Some sprinkler-heads are mechanically constructed so that they can be moved. Different settings can thus be had from the same type of nozzle.

Sprinkling irrigation offers a number of advantages. The effects are like rain in which the foliage gets washed. Sprinkling gives better water distribution and the rate of supply is easier to control. Less supervision and labor are required to start and stop the flow. The eroding of soil can be held to a minimum. Finally, sprinkling irrigation has

*Top: Top of Mount Timpanogos looking west. West Mount and Ophir Mounts in distance. West Lake Left. "The snow builds up in the mountains and through melting keeps the water in the streams for the valleys below." Bottom: Mount Timpanogos in Utah Valley and Provo River. The source of water may have its origin in the mountains.*

*Biddulph Studios Photographs*





a lower maintenance cost. The disadvantages lie in the high cost of initial installation and the fact that certain diseases start on the foliage of certain sprinkled plants.

The amount of water to apply by each method of irrigation depends upon a number of factors: precipitation, temperature, wind movement, humidity, soil fertility, available water supply, type of soil, and type of plant. A plant in the shade requires less water than a similar plant in the sun. More water is needed in the early growing season than during the time the plant is maturing. Each crop or plant has its own water requirement. The amount of water needed is also influenced by various local conditions. The major factor in determining the time to irrigate is the need of water by the plant. The plant usually indicates the need for water by wilting; if the wilting persists too long the plant is in danger.

It is known that water is one of the primary essentials for growth. Water is necessary for respiration, conduction, transpiration, photosynthesis and other synthetic processes. The dependence of plants on water can readily be seen from the fact that all soil nutrients must first be dissolved in water before they can be taken into the plant. If it were not for water these nutrients could not be transported up and through the plant. The water supply and the relation of nitrogen to the available carbohydrates seem to be of special significance in the process of flower bud formation in woody plants. When there are no flowers there is no fruit for beauty or for use.

Plants require prodigious amounts of water. It has been estimated that about 250 to 1000 pounds of water are used for each pound of dry matter produced by plants. Fruits contain from

85 to 90 per cent water. An oak tree with about 700,000 leaves gives off 120 tons of water in a season. A good-sized tree may take up as much as 125 gallons of water a day, while a medium-sized tree will use about 75 gallons of water a day. A vigorous, mature apple tree will use from 15 to 20 tons of water per year when making food growth and producing a good crop. These facts are most astounding when it is realized that 90 to 95 per cent of the water is transpired by leaves through the stomata. The stomata are the small openings, usually entirely or largely confined to the lower surface of leaves. There may be 100,000 or more to the square inch.

An acre of grass gives off as much as six tons of water in a single day. A lawn grown in an average loam soil can lose about one-fourth inch of water in three days during the summer, according to studies made by the Scott Lawn Seed Company. This amounts to a loss of fifty gallons per one thousand square feet in twenty-four hours. The length of time needed to replace the water lost depends upon the sprinkler and water pressure. A good sprinkler at 20 pounds pressure would need to run about two hours. The best time to apply the water is early in the morning. Most turf fungi are active at night and their activity is increased if the

*Top: Irrigation Canal at Hurricane, Utah. Man has to direct the life giving water to the plant. The natural streams were diverted into supply canals and ditches.*

*Dr. D. Eldon Beck Photograph*

*Bottom: Brigham Young University Campus. An example of Utah's beauty as a result of sprinkling irrigation.*

*Biddulph Studios Photograph*



grass is watered in the evening. High humidity and high temperatures induce fungi growth.

Other plants are attacked by fungi when sprinkled and kept damp. Roses and Delphiniums are very susceptible to mildew. These plants do best if watered by the furrow method and soaked thoroughly. Peony plants and most bulbs are very susceptible to rots if the soil is kept too wet. They require good drainage and prefer early morning watering. The flowers of some plants become blotched when sprinkled at the wrong time.

Man can improve the water balance of plants by improving the environment. The loss of water can be reduced by means of mulches, good cultivation, windbreaks, by providing shade and by the use of drought-resisting plants. Those plants which make the best growth with the least amount of water are the most valuable where the water supply is limited.

There are a number of ornamental plants that have a low consumptive use of water and have been adapted to the arid conditions of Utah. The native plants are of course the best, but *Gaillardia aristata*, *Yucca filamentosa*, *Salvia azurea*, and *Anchusa italica* are first-rate perennials. The Siberian Elm, *Ulmus pumila*, Russian Olive, *Elaeagnus angustifolia*, Siberian Peashrub, *Caragana arborescens*, Green Ash, *Fraxinus pennsylvanica lanceolata*, and Poplars, *Populus sp.* are among the best drought-resistant deciduous trees. In other plants the consumptive use of water is reduced early and the plant becomes dormant. Such is the condition in Tulips, Daffodils, *Iris*, Oriental Poppy and Bleeding Heart. Some plants require more water as autumn nears, as in most fall-

blooming perennials like Chrysanthemums or the tender Dahlias.

It is the lack of water that limits the distribution of plants more than does any other single factor. Drought reduces the size, vigor, and yield of plants and, when periods of drought occur, growth is impaired. Supplementing the supply of water by means of irrigation is then important.

Irrigation water has certain influences on the soil: the soil contracts and expands on drying and wetting; thawing and freezing cools the soil; reduces soil aeration by removing the soil gases. With too much moisture the soil becomes waterlogged, requiring drainage; in fact irrigation and drainage go hand in hand, depending upon the soil and the subsoil. Improper drainage builds up alkalinity, creating other problems. Research studies have been made on drainage, waterlogged lands, alkalinity, and the consumptive use of water as related to soil and plants. While most of the studies have applied to agricultural crops, few studies have been made of the ornamentals.

In the west, rain and snow in the mountains are the primary sources of water supply upon which the success of irrigation depends. The snow builds up in the mountains and through its gradual melting keeps the water in the streams for the valleys below. Snow survey studies enable researchers to forecast seasonal water yields of streams. Trained men working in selected stations keep the records. When the total depth of water contained in snow is below average, forecast of a "dry" year ahead is given. For example, a record kept at a station at an elevation of 8,300 feet showed there were 44.6 inches of snow at the end

of February, 1953, with a 16.4 inch water content, as compared to last year's record of the same time of 105 inches of snow containing 38.5 inches of water. A "dry" year could have been forecast had no additional precipitation fallen as the average is 66 inches with 29.9 inch water content. The alarm of insufficient water becomes greater when there is a low water supply indicated at all stations in the state.

Research has been carried on for several years to increase the yield of year-around water supply by studying the problems of watershed management. This research is carried on by the Division of Forest Research of the Intermountain Forest and Range Experiment Station. Much of the research work done by the Forest Service has demonstrated that if the proportion of vegetation on the ranges falls below two-thirds, there is trouble ahead.

The conservation program is most important since seven acres of forest and range land in the mountains are needed to provide water for each acre of irrigated land below. Water conservation needs to be practiced in the mountains to avoid erosion, floods, and to preserve the watershed. The watershed makes the storing of water possible so that it can be collected, saved and rationed out.

Laws were passed to assist in the regulating of the natural water supply that originates in the mountains. At present, Article XVIII, Section I, of the Constitution of Utah, "confirms and recognizes all the existing water rights to the use of the waters in the state for any useful or beneficial purpose." Under this provision no one can use a stream of water in which he has acquired no right, nor interfere with existing rights, or cut off or destroy the source of supply. Also, "when waters

of a natural stream have been appropriated, the appropriator acquires a vested right in the stream to the extent of his appropriation, and such a right carries with it an interest in the stream to the source from which the supply is obtained."

Various bills have been added to the *Constitution of the United States* which assist in the irrigation problems of the west. One of the first was the Desert Land Act passed by Congress in 1877; then the Carey Act of 1894, followed by the important Reclamation Law of 1902. The Bureau of Reclamation created by the law of 1902, made possible the direct use of federal funds without interest for the construction of large irrigation projects. The projects are ultimately owned and operated by the irrigators. Usually an irrigation organization is created to conduct and assume control of the constructed irrigation projects.

Recently in the central part of Utah there was turned over to the Water Users Association the responsibility of administering the Deer Creek Reservoir Area. The reservoir was constructed in Provo Canyon, Utah County, Utah, by the Bureau of Reclamation. In 1951 some 41.8 miles of aqueduct to Salt Lake City, and in May, 1952, custody of certain constructed features of the Deer Creek Division was assumed by the association. The certain constructed features included 23 miles of Provo Reservoir canal and 9 miles of Weber-Provo Diversion Canal. The Provo River Project consists of three phases: 1. Construction of Deer Creek Reservoir in Utah County; 2. The Salt Lake Aqueduct, bringing Deer Creek waters to Salt Lake City; and, 3. The Duchesne Tunnel, bringing waters from Duchesne River into Deer Creek

Reservoir from the Colorado River Basin, some 100 miles distant.

The Deer Creek Reservoir Area was finished October 20, 1941 at a cost of \$3,550,000. Here some 150,000 acre feet of water are stored for irrigation use, providing water for 50,000 acres of arable land. The project has been beneficial to half the population of Utah, according to the reclamation project engineer, and has resulted in an annual increase of crop values in the area served by about \$4,500,000.

Legislators will continue to draft and propose bills approving construction of reservoirs, which provide water for domestic and agricultural purposes to open up new farming and livestock grazing areas. Provisions are usually made in the bills for full development of recreational potentials, profitable hydro-electric energy, and the preservation of natural scenic attractions.

The well-known frontiersman, Jim

Bridger, made a boast to Brigham Young when he learned of the pioneers going to the Great Salt Lake Region. He said, "Mr. Young, I would give a thousand dollars if I knew that an ear of corn could be ripened in these mountains. I have been here twenty years and have tried it in vain over and over again." Horace Greeley described the area as being "parched, glistening, blistering, blinding sterility." He declared that if the Mormons had paid the government a penny an acre for it they would have been swindled.

Now, 106 years later, the parched, blinding, sterile soil has produced many bushels of corn, potatoes, grains, sugar beets and beauty. More than 1,176,116 acres are now under cultivation. Through the use of irrigation the desert has been made "like the Garden of Eden." Brigham Young himself declared: "—we shall be blessed in living here and shall make it like the Garden of Eden."

# Propagation Of Hybrid Rhododendrons By Stem Cuttings

BERNARD BRIDGERS<sup>1</sup>

The Rhododendron is becoming one of our most important ornamental plants. Its color range is being further expanded, fragrance has been added to the flowers, and the diameter of the flower clusters has been increased greatly. These improvements, combined with comparative freedom from insects and diseases, have made a remarkable increase in demand for the Rhododendron in the general landscape of the home.

In the wild the Rhododendron grows luxuriantly and reproduces itself rapidly from seeds. With these American species, however, the color range falls into white and pale magenta, and the brilliant colors are found only in the hybrids. Since these hybrids do not come true from seeds, propagation by vegetative methods must be used.

Many nurserymen feel that grafting is the most satisfactory method of propagation. This is an expensive operation which requires considerable labor and specialized equipment. Simple and air layering are slow processes, and usually only a relatively few plants may be obtained from a layered mother plant at any one time.

Plants produced in such manner are costly and are thus not available to the average home owner. The best method of lowering the price of the Rhododendron plant is by propagating by stem cuttings. Attempts have been made to determine the factors inhibit-

ing the rooting of Rhododendron cuttings, however, at the present time the absolute causal factor of inhibition is undetermined.

Conventional methods of propagation by stem cuttings have been unsatisfactory; several extraordinary techniques have been tried with various results. Zimmerman and Hitchcock (11) reported heavy rooting when cuttings of Catawbiense hybrids were treated with a series of root inducing chemicals. Applications of potassium permanganate and acetic acid to the rooting media gave unfavorable results as described by Chadwick and Gunesch (1). When cuttings of mature wood were treated by solution immersion with 0.05 per cent potassium permanganate for 15 hours, there was an increase in per cent rooting. Kirkpatrick (4) and Skinner (7, 9) used various Catawbiense hybrids and *Rhododendron ponticum* and found treatment using 40 to 100 milligrams per liter of indolebutyric or indoleacetic acids was advantageous.

Leaf-bud cuttings were used by Skinner (8) who showed that cuttings of *Roseum Elegans*, taken in June and treated with root promoting substances in liquid or powder forms, were 100 per cent rooted in 12 weeks; cuttings of *R. maximum*, taken in July and treated with 90 milligrams per liter of indolebutyric acid for 24 hours, were 100 per cent rooted within 13 weeks as compared to 20 per cent rooted for the untreated cuttings. Doran (2) and Kirkpatrick (4) have reported that a different type of leaf-bud cuttings, the

<sup>1</sup>National Academy of Sciences — National Research Council, Handbook of Biological Data, Washington, D. C.

leaf mallet, was superior to terminal cuttings.

Approaching the study from environmental viewpoints, Skinner (8) recorded that a daylength of 18 hours increased root formation. A 20 per cent increase in rooting was obtained when such treatment was given to cuttings of *Album Elegans*. Nearing and Connor (6) developed a method which was dependent upon using a stratified rooting medium and a special type of propagation frame that would provide an adequate amount of north light. Chadwick and Gunesch (1) and Eckstein (3) concluded that a rooting medium of half sand and half peat was better than sand alone.

Work has been done in wounding cuttings, that is cutting or injuring the bark at the base of the cuttings, and beneficial results have been reported from such treatment. Wells (10) described a method whereby the bark of the cuttings was slit vertically for a distance of 1½ inches upward from the base. Kruyt (5) considered another method of wounding, the bark at the base of the cutting was scrapped on one side. Eckstein (3) showed there was an increase in per cent rooting when the bark was removed for a distance of 1 inch at the base of the cutting.

This paper is a report of chemical, environmental, anatomical, and physiological studies.

#### *Chemical Studies*

Observations from time to time of cuttings in the propagation bench have shown that a great percentage become blackened at the basal 1 to 2 inches. A typical example is illustrated. Since seldom did these cuttings show signs of root development, the idea was formed that this trouble might be a factor causing slow rooting. Tannic acid is present in the *Rhododendron*,

and it was believed that an oxidation of this acid might be a cause of the discoloration. It is understood that certain species and varieties produce heavier root systems than others; therefore, a quantitative study of tannins seemed necessary in order to discover a possible correlation between difficulty of rooting and amount of tannin present. Analyses were made separately of the leaf, petiole, bark, and wood of several species and varieties.

The results indicated that tannic acid is found in greatest concentration in the 1 year old stem, but no factor indicated that rooting difficulty was influenced by the amount present.

A prevention of this discoloration seemed so important that a further study was performed. It was believed that citric acid might retard oxidation of tannic acid, and a wax emulsion such as "Brytene" (Franklin Research Company, Philadelphia) might have a similar action. Cuttings were prepared 6 to 8 inches in length and placed in groups, 30 cuttings in each group. One group was treated with citric acid, a second group received a combination of citric acid and wax, and a third group was subjected to wax alone. Another group was untreated and served as controls. That is, these cuttings served as a check on the treatments, thus a comparison of the results from the treatments could be made with cuttings receiving no treatment.

The citric acid, U.S.P. grade, was used in the crystalline form; the wax was diluted in a ratio of 2 parts wax to 1 part water. The procedure for treatment consisted of dipping the basal end of the cutting into the citric acid to a depth of 1½ inches. This was followed by a similar dip into the wax solution.

After treatment the cuttings were in-



*All illustrations accompanying this article were prepared from photographs made by the author*

*Cutting of Rhododendron maximum roseum showing typical discoloration at basal end.*

served into a rooting medium of half sand and half peat in a greenhouse bench with bottom heat controlled at 75 degrees Fahrenheit. Air temperature was approximately 65 degrees, and relative humidity was from 60 to 65 per cent. These conditions were followed throughout the investigations, unless otherwise indicated.

The results were somewhat variable, but this treatment did not prevent the blackening and rooting was not stimulated to be of practical importance. Tannic acid did not provide an explanation for the blackened condition. The possibility that this was the result of cell injury in making the cutting and delayed healing was then explored.





*Cuttings of Rhododendron maximum L. showing the various wound treatments.*

#### *Anatomical Studies*

Studies of stem structure using different ages of growth were made, but no factor which might inhibit rooting could be formulated. The stem of the *Rhododendron* has a waxy coating, and it was believed that this might be an inhibiting factor to rooting. The waxy epidermis prevents water loss in plants, and it was felt that it might inhibit moisture uptake by the cuttings, thus causing wilting.

#### *Wound Treatments*

To eliminate this possible inhibitory effect to rooting caused by the waxy coating on the stem, the bark at the base of the cutting was interrupted by various wound treatments. One method was used whereby the bark at the base of the cutting was slit vertically for a distance of  $1\frac{1}{2}$  inches upward. A second type of wound consisted of removing the bark for a distance of 1 inch from the base of the cutting, and another procedure was that of making 3 upward slices, each approximately  $\frac{3}{8}$  inch in length and  $\frac{1}{2}$  inch apart, into

the bark. These cuts were made just through the bark, not into the woody portion of the stem. The wound treatments are illustrated above and are referred to throughout the paper as slit, stripped, and sliced.

For a preliminary investigation to determine the effect of wound treatments when used alone, cuttings of Catawbiense varieties of *Duchess* of Edinburgh, *Gomer Waterer*, and *Roseum Elegans* were made in August. The wound treatments were performed, and unwounded cuttings were used as controls. There were 48 cuttings for each treatment. The cuttings were then placed in the propagation bench.

Observations showed that roots were not developing, and the characteristic blackened areas were common. These discolored areas were removed, and the respective wound treatments again were made. At this time the wound treatments were followed by treatment with *Hormodin 3*. Application of this powder was made in the usual manner, the base of the cutting being dipped into the powder for a distance of 1 inch

and excess powder was removed by gently tapping the cutting with the finger. The cuttings were then re-inserted in the medium.

Results were tabulated in terms of per cent rooting and rooting score. To obtain the average rooting score, cuttings were graded into 5 groups, each group having a specific score. Cuttings living but not callused received 1 point; cuttings callused but not rooted, 2 points; lightly, medium, and heavily rooted cuttings received 3, 4, and 5 points respectively. The average score was obtained by dividing the sum of the individual scores by the initial number of cuttings used in the treatment. This method was followed throughout the investigation, and heaviness of rooting and average rooting

score should be considered synonymous. The author feels the type of root formation is of such importance that it should be considered along with the actual per cent rooting.

Results, as shown in Table 1 and illustrated below, indicated a marked increase in rooting, in both heaviness and per cent rooting, when the cuttings were wounded. The wound treatments gave a better distributed root system than the unwounded cuttings, and extreme basal callusing and subsequent weak rooting—the item that many nurserymen hold against propagating by cuttings—was eliminated. The root system was quite strong, and in lifting the cuttings from the bench no trouble was noticed with the roots breaking from the plant.

*Typical rooting of cuttings of Rhododendron catawbiense 'Roseum Elegans' when subjected to the stripped wound treatment and Hormodin 3 (top row) and unwounded and Hormodin 3 (bottom row).*



Table 1.—The Effect of Wound Treatment with Hormodin 3 upon the Rooting Response of Various Catawbiense Hybrids (Cuttings taken August 10, retreated November 5, final data recorded January 20)

Variety Name	Treatment	Average Rooting Score	Per Cent Rooting
Gomer Waterer	Unwounded + Hormodin 3	1.2	25
	Wounded + Hormodin 3	2.1	42
Duchess of Edinburgh	Unwounded + Hormodin 3	0.9	8
	Wounded + Hormodin 3	1.5	44
Roseum Elegans	Unwounded + Hormodin 3	1.6	33
	Wounded + Hormodin 3	2.5	61

*Flower Buds vs. Vegetative Buds;  
One Year vs. Two Year Wood*

It has been suggested that flower buds may be detrimental to root initiation and development and that maturity of wood might be a factor. To investigate these factors an experiment was designed to learn the rooting response of cuttings with and without flower buds using 1 and 2 year old wood. In November groups of cuttings of *R. maximum roseum* were collected. One group consisted of cuttings with flower buds cut at the junction of 1 and 2 year wood, and another group was made with the cut 1 inch below this point, in 2 year wood. Similar groups without flower buds were prepared.

Cuttings taken at the junction of 1 and 2 year wood with or without flower buds rooted heavier and showed an increase of 40 per cent rooting at the end of 11 weeks over cuttings made of 2 year wood. Treatment with Hormodin 3 did not improve rooting response of these 2 year cuttings. Further observations revealed that flower buds were detrimental to root formation. This apparent effect of flower buds may be seen on Page 135. The root

system was extremely weak, and it was very difficult to lift the cutting from the bench without breaking the roots. If, however, such a cutting may be potted satisfactorily, it will produce a nicely branched plant as there will be from 1 to 4 side branches to develop at the point of the bud. But this one factor in favor of flower buds is completely outweighed by slow rooting and the extremely weak root system.

Along with investigating these different types of cuttings, certain chemical treatments were investigated. Cuttings were grouped for treatment, 15 cuttings per group. One group received only the wax treatment; another group, Hormodin 3; a third group was treated with Hormodin plus the wax dip; a fourth group, Hormodin 3 and Fermate (ratio of 3 parts Hormodin to 1 part Fermate); a fifth group received the same treatment and then the wax dip. Untreated cuttings served as controls. When the wax was used in combination with the other treatments, the cuttings were first dipped into the "hormone" powder and then dipped into the wax. In using Hormodin and Fermate the 2 powders were thoroughly mixed, and then the treatment was made as in the case of Hormodin alone.



*Rooting response of cuttings of Catawbiense hybrids showing the increase in heaviness of rooting when subjected to the various wound treatments in combination with Hormodin 3.*

The Fermate was used to possibly serve 2 purposes: if this discoloration was caused or promoted by certain soil fungi, the Fermate would act as a fungicide, and also a certain boost in rooting has been observed with other species of plants when Fermate was used.

Very definite conclusions were drawn from these treatments. The Hormodin when used alone increased rooting by

nearly 20 per cent as compared to untreated cuttings. And an increase of 47 per cent was obtained with the combination of Hormodin and Fermate. The wax treatment proved to increase heaviness of rooting. Summarized results are shown in Table 2. It was felt that these treatments speeded callusing of the cutting, and the blackened areas were less common.

Table 2.—The Effect of Various Root Growth Regulators upon the Rooting Response of *Rhododendron maximum roseum*

(Cuttings taken November 12; final data recorded February 6)

Treatment	Average Rooting Score	Per Cent Cutting
Untreated .....	1.3	13
Hormodin 3 .....	2.5	40
Hormodin 3, then waxed .....	3.0	47
Hormodin 3 + Fermate (3:1) .....	3.4	60
Formodin 3 + Fermate, then waxed .....	3.8	60

#### *Comparison of Various Wound and Chemical Treatments*

An experiment was designed to compare various wound treatments when a series of root promoting substances, with and without the wax, was used. Shoots with vegetative buds were used and were cut approximately 1½ inches above the junction of the current season's growth and that of the previous year.

Cuttings of *R. watereri* Wils. were obtained in February. They were divided into groups (90 cuttings per group) and the slit, stripped, and sliced wound treatments were made. In order to subject the cuttings to the chemical treatments, each of these groups was again divided into 5 groups (18 cuttings per group). The following treatments were then made: (1) Hormodin 3 plus Fermate (3:1); (2)



Top: Comparison of rooting response of *Rhododendron maximum roseum* cuttings as influenced by the presence of flower or vegetative buds.

Bottom: Rooting response at end of 8 weeks of *R. watereri* Wils. cuttings subjected to the slit wound treatment and treated with Hormodin 3 and Fermate (3:1) or indolebutyric acid, solution immersion treatment 24 hours, 100 milligrams per liter, with or without wax.



Hormodin 3 plus Fermate, then waxed; (3) indolebutyric acid; (4) indolebutyric acid, then wax. A fifth group received no treatment and were thus used as controls.

Treatment with Hormodin and Fermate was used as previously described. Indolebutyric acid was applied, concentration 100 milligrams per liter, by

solution immersion for 24 hours. That is, the cuttings were placed in the solution in such a manner that the basal ends were submerged in the solution for a depth of 1½ inches. They were allowed to remain in the solution for 24 hours. The wax treatment was then applied.

Results are shown in Table 3. It is

←  
*Rooting response at end of 8 weeks of Rhododendron watereri Wils. cuttings subjected to the sliced wound treatment (top) and the stripped wound treatment (bottom). Chemical treatments were Hormodin 3 and Fermate (3:1) or indolebutyric acid, solution immersion treatment 24 hours, 100 milligrams per liter, with or without wax.*

Table 3.—The Effect on Rooting Response of Cuttings of *Rhododendron watereri* Wils. and *R. catawbiense* Roseum Elegans when Subjected to Various Wound and Chemical Treatments

Treatment	Average Rooting Score	Per Cent Rooting
Cuttings of <i>R. watereri</i> (Cuttings taken February 18, final date recorded June 1)		
Slit:		
Untreated .....	0.8	5
Hormodin 3 + Fermate (3:1) .....	1.2	17
Hormodin 3 + Fermate, then waxed .....	1.7	22
Indolebutyric acid .....	2.5	50
Indolebutyric acid, then waxed .....	1.2	33
Stripped:		
Untreated .....	0.8	22
Hormodin 3 + Fermate (3:1) .....	2.7	55
Hormodin 3 + Fermate, then waxed .....	3.0	50
Indolebutyric acid .....	1.8	39
Indolebutyric acid, then waxed .....	3.3	33
Sliced		
Untreated .....	1.1	11
Hormodin 3 + Fermate (3:1) .....	3.1	60
Hormodin 3 + Fermate, then waxed .....	4.1	66
Indolebutyric acid .....	2.3	33
Indolebutyric acid, then waxed .....	1.9	38
Cuttings of Roseum Elegans (Cuttings taken March 21, final date recorded June 15)		
Stripped		
Untreated .....	0.2	10
Hormodin 3 + Fermate (3:1) .....	2.1	40
Hormodin 3 + Fermate, then waxed .....	2.9	43
Indolebutyric acid .....	0.6	3
Indolebutyric acid, then waxed .....	0.4	0
Sliced		
Untreated .....	0.8	13
Hormodin 3 + Fermate (3:1) .....	2.2	58
Hormodin 3 + Fermate, then waxed .....	3.1	75
Indolebutyric acid .....	0.7	13
Indolebutyric acid, then waxed .....	1.1	13



easily seen that the stripped and sliced wound treatments were significantly better than the slit. Furthermore, a study of the effects of the various chemical treatments revealed that Hormodin and Fermate with wax gave best results. The three preceding illustrations show early rooting responses of these treatments.

From the above work the sliced and stripped wound treatments appeared to be better than the slit. The next problem was to make a further comparison of the sliced and stripped methods. Cuttings of *Roseum Elegans* were prepared in March, and the same chemical treatments as above were used.

Results showed the sliced wound treatment to give an average increase of 15 per cent rooting over the stripped. And the Hormodin treatment gave an increase of 40 per cent over the indolebutyric acid. Results for each treatment are shown in Table 3.

#### *Environmental Studies*

Possible factors of inhibition to rooting were considered by studies of the propagating environment. For many years the plant propagator has considered controlled environmental conditions for difficult-to-root plants, and it was felt that certain conditions might influence the rhododendron.

Controlled conditions of light, temperature, and humidity were provided by the refrigerated room equipped with fluorescent type daylight illumination of 26 foot candles. The lights were hung at a distance of 2 feet above the tops of the cuttings, and a daylight of 18 hours was provided. Temperature was held at 50 degrees Fahrenheit while relative humidity was from 90 to 95 percent. Bottom heat was regulated at 75 degrees.

To study the rooting response as in-

fluenced by variable conditions of light, temperature, and humidity a raised bench in the greenhouse was used. Bottom heat was provided as above. The greenhouse had a partial shade but no attempt was made to control temperature and humidity. During the experiment the day temperature was often above 90 degrees, and night temperature ranged from 65 to 70 degrees. Relative humidity was seldom above 50 to 60 per cent. No artificial light was provided, the normal daylength being approximately 12 hours.

Results were inconsistent; however, they showed an average percent rooting of the controlled conditions to be 39 per cent as compared to 16 per cent for the uncontrolled conditions. Since results were somewhat variable, more work should be done before recommendations can be made.

Another study of the environment as it affects rooting was carried out by changing the atmosphere of the rooting medium. This investigation had a two-fold purpose: to observe the possible protection given the cuttings by the wax treatment against oxygen and to discover if oxygen might be a limiting factor in root initiation. It has been reported that with many species of plants, increased oxygen concentrations in the rooting medium have proved beneficial. Observations by the author have shown that cuttings treated with the wax to develop roots in a shorter period of time than cuttings not waxed, and the idea was formulated that perhaps the Rhododendron did not need this increase in oxygen.

An experiment was designed using 3 metal propagating pans with a different oxygen concentration in each, designated as high, medium, and low. As observation had shown average rooting medium to have about 18 per cent oxy-

gen, a high concentration was considered to be 38 per cent and a low concentration to be 5 per cent. These pans were placed in the refrigerated room, previously described.

Nitrogen gas was used in combination with oxygen in order to maintain the desired concentration of oxygen. Hence, with a low oxygen concentration of 5 per cent, nitrogen was used in the quantity of approximately 95 per cent.

Cuttings of *R. maximum roseum* were prepared for this work in April. At the end of 8 weeks observations showed that 40 per cent of the cuttings in the high oxygen pan were rooted as compared to 28 per cent in the normal pan and 2 per cent for the low oxygen. A low concentration proved to be detrimental as most of the cuttings were dead at the end of 6 weeks. This work is of great interest and more investigations of a similar nature should be performed. Preliminary observations at the end of 3 weeks showed that 20 per cent of the cuttings in the high oxygen pan to have roots developing.

#### *Physiological Studies*

Certain physiological studies were performed in search for a possible explanation as to the reason wounded cuttings rooted heavier and at a higher per cent than unwounded cuttings.

It was thought that perhaps moisture uptake might be increased when cuttings were wounded, and that the increase in rooting might be due to a corresponding increase in water uptake. Measurements showed that cuttings wounded by the slit method absorbed more water than the unwounded cuttings; and both the sliced and stripped treatments showed a gain over the slit. The wax treatment showed little or no effect on moisture uptake.

Further studies of the effect of wounding revealed that respiration was increased by such treatments. The stripped and sliced treatments again showed a greater increase over the slit, and the slit treatment showed an increase as compared to the unwounded stems.

It was concluded that the beneficial effects in rooting obtained by wounding the cuttings might be explained by increased respiration and water absorption. That is, increased respiration caused greater activity in the cambium area of the stem, the area from which roots develop in the majority of plants; and increased absorption held the cuttings in a turgid condition. An explanation for the increase in heaviness of rooting often noticed by the wax treatment is not offered.

#### *Conclusions*

From the results of these investigations the following conclusions may be drawn:

1. The greatest concentration of tannic acid was found in the 1 year old stem, and there was no correlation observed between tannic acid content and ease of rooting.

2. Treatment with citric acid did not prevent the basal stem discoloration and did not improve rooting to be of practical importance.

3. Cuttings taken from 1 year old wood rooted heavier and showed an increase of 40 per cent rooting at the end of 11 weeks over cuttings made of 2 year wood. Treatment with Hormodin 3 did not improve rooting of 2 year wood. Flower buds proved to be detrimental to rooting.

4. Wounding the stem in combination with root growth regulators is beneficial to increased rooting per cent and to formation of a well distributed

root system. The sliced wound treatment proved to be better than slit and stripped methods.

5. A combination of Hormodin 3 and Fermate, 3 to 1 ratio, gave an increase in heaviness of rooting and showed an increase of nearly 15 per cent rooting over Hormodin alone; there was an additional increase in heaviness of rooting when wax was used with these treatments.

6. Hormodin 3 appeared to be better than indolebutyric acid at the concentration tested.

7. Controlled conditions of light, temperature, and humidity gave an average of more than 20 per cent in rooting over uncontrolled conditions but results were inconsistent. Additional work needs to be completed before recommendations may be made.

8. Enriched oxygen concentration in the rooting medium increased rooting response by 10 per cent over average concentration. Low concentration of 5 per cent oxygen definitely proved detrimental.

9. Wounding the stem increases moisture uptake and respiration.

10. The greatest rooting response in terms of both heaviness and per cent rooting was obtained when cuttings of 1 year wood without flower buds were subjected to the sliced wound treat-

ment, treated with Hormodin 3 and Fermate (3:1), then waxed, and rooted in a medium of half sand and half peat with a average atmosphere and under uncontrolled conditions of light, temperature, and humidity.

For the complete work, the reader is directed to *American Rhododendron Society Quarterly Bulletin*, October 15, 1952 and January 15, 1953.

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#### SELECED REFERENCES

1. Chadwick, L. C., and W. E. Gunesch. *Proc. Amer. Soc. Hort. Sci.* 34:607. 1937.
2. Doran, W. L. *Mass. Agr. Exp. Sta. Bul.* 382. 1941.
3. Eckstein, M. M. Unpublished thesis. Univ. of Md.
4. Kirkpatrick, H. *Amer. Nurseryman* 71:9. 1940.
5. Kruyt, W. *Med. Direct. Trinbow.* 7: 255. 1946.
6. Nearing, G. G., and C. H. Connor. *N. J. Agr. Exp. Sta. Bul.* 666. 1939.
7. Skinner, H. T. *Proc. Amer. Soc. Hort. Sci.* 35:830. 1937.
8. Skinner, H. T. *Proc. Amer. Soc. Hort. Sci.* 37:1013. 1939.
9. Skinner, H. T. *Plants and Gard.* 5:13. 1949.
10. Wells, J. F. *Amer. Nurseryman* 91: 16. 1949.
11. Zimmerman, P. W., and A. F. Hitchcock. *Contri. Boyce Thompson Inst.* 10:461. 1939.

# Have You Tried Small Trees?

CLARENCE E. LEWIS<sup>1</sup>

There has been a definite increase in the demand for small deciduous trees, not only by the home owner, but by the landscape man or woman who specifies what is to be planted. Just what has brought on this greater interest? Some of the reasoning is apparent. Many homes today are of one story, and others are only a story and a half, both necessitating a greater use of small trees in order to keep the home in scale with its surroundings. This type of structure is also evident now in new schools, office buildings, factories, printing firms and the like. Streets are often too narrow to accommodate the standard shade tree but especially well suited to trees that do not exceed a height of forty feet. If the homes on this street are also low then the need for small trees is doubly necessary. When houses are placed so close to the front walk (25 to 30 feet), that the front lawn area is limited, again the small tree is the answer to the tree planting problem.

There are many other reasons which I will briefly enumerate—small trees or groups of them are easier to maintain than masses of shrubs, and are often more effective. Outdoor living has encouraged the building of small terraces and consequently small trees are needed for shade, or to beautify them. The flowers and fruits of a tree against a blue sky will always intrigue anyone, whether they are students of art and nature, or otherwise. Yes, the reasons go on and on and most of them are logical in their demands for trees of smaller stature.

Before proceeding further it may be well to indicate my interpretation of a small tree. It is a woody plant that, under average home grounds growing conditions, (not a woodland or nature's conditions), does not exceed a height of forty feet. It is usually of a single trunk but clump growing species are also desirable for some landscape effects.

There are additional uses other than those already mentioned. A tree advantageously placed on the front lawn gives a feeling of depth to the home, or makes the home seem farther from the front walk or street. The form of such a specimen should be informal and with a more or less lateral branching habit. Trees with strong upright branching habits and such dense forms that they are bulky attract too much attention and defeat the purpose of the intended overall planting. The reasoning is that trees with lateral habits provide temporary interest and have enough openings to encourage you to look through to the home beyond. An upright dense form is like an exclamation point drawing the eye to it as an individual rather than to the well planted home that it is supposed to complement.

A painter or a photographer applies the same technique. He places a tree, overhanging branches, a gate, or something similar in the immediate foreground which gives you the impression that the main part of the picture has real depth, or he has created an illusionary third dimension.

Small trees with horizontal branches are indispensable to the small terrace

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or back porch. They not only cast the shade that is needed, but by placing them advantageously they make the distant garden, shrub border, or pool seem even more inviting. This advantageous position is in the immediate foreground. When the tree is in this location the person sitting in the porch or terrace has to look underneath its sweeping branches in order to see the landscape beyond. A wisely selected small tree in the right position makes all the difference in the world in how much people enjoy their garden or how pleasing the living area appears to those who view it from the garden or lawn area. The distant garden is the picture being framed and the terrace or porch is also framed for those who see it from the garden.

Foundation plantings willingly and generously accept small trees in order to make the house a home in its surroundings of trees, lawn and shrubs. If the home is blessed by having existing large trees, then it is often imperative that a Flowering Dogwood, a Sourwood, or some other comparable informal tree be used in the foundation planting, or closely allied to it. A house setting among large trees and with only shrubs around it looks like a lost urchin, but small trees may be added to the planting to make the home in scale with its surroundings, and a restful picture to those who see it from the street. Remember, you are not planting so that only your neighbors will approve your landscape—you, too, must live with it.

The shrub border can often use a small tree, and sometimes large trees, depending on the height and length of the border. The tree not only supplies a form contrast to the shrubs but a height that must be properly placed. It should not be exactly in the middle,

but either nearer the house or the distant end of the border. If you wish to have the border appear shortened, then the height should be near the distant end, but if the purpose is to make the border appear longer than it actually is then the tree should be near the house or living area end of the border.

The uses of small trees are unlimited and vary with the imagination of each of those who plan their placement. Whether you live on a 50x100 foot property, or one as extensive as the city park, the small tree can make your home a more pleasing and restful place to live.

Clump forms of small trees can be the key plants for many plantings. The Gray Birch (*Betula populifolia*) is one of the most common examples. These multiple stemmed desirables, when accompanied by groundcovers, are all the plants that are needed to make some foundation plantings complete. This is particularly true of many single story homes, both small and extensive. The upright stems of a Gray Birch or Shadblow are effective with broadleaved evergreens, or in areas where drifts of Narcissus and other bulbous plants are used. Such formed trees add a certain spark to your plantings that make them enjoyed during the winter months when viewed from your picture window, or from "any old window."

Now that the need has been established and we know that the uses are unlimited, let's examine the various species and varieties. I have selected the following deciduous small trees and have given each a brief description in order to help you choose the one, or ones, best suited for your planting problem. Some trees, a few of which are evergreen, that are adapted to Coastal California below San Francisco and the warmer areas of Florida have

been included, but no attempt has been made to form an extensive list, or to make adequate descriptions. This article applies primarily to the lands east of the Mississippi River and above the Mason-Dixon line. It includes those trees purchasable in nurseries, a few being more difficult to obtain than others, but nevertheless obtainable.

*Acer palmatum*—Japanese Maple. A short trunked informal lateral branched tree whose umbrella-like head seldom exceeds a height of twenty feet. There are several variations but the species is the easiest to adapt to most home plantings.

*Acer carpinifolium*—Hornbeam Maple. Vase shaped to about thirty feet and with unlobed leaves.

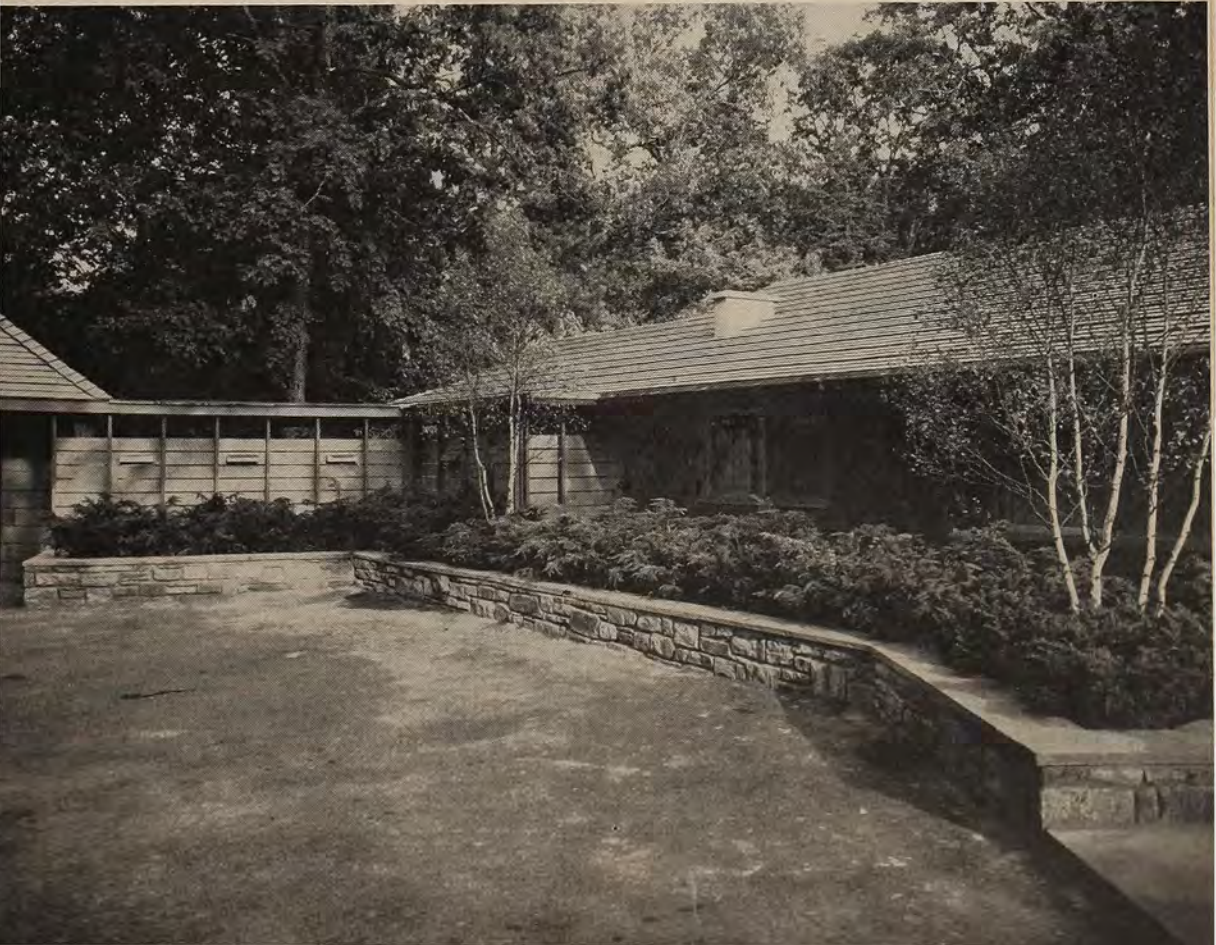
*The effective use of Betula populifolia clumps in contrast with low growing evergreens, displayed in House Beautiful's 1953 Pace Setter's Landscape.*  
Maynard L. Parker Photograph

*Acer campestre*—Hedge Maple. Oval to rounded head that that may attain a height of twenty-five feet. Possibility as a small street tree.

*Acer cappadocicum*—Coliseum Maple. A nicely shaped tree with a round umbrella-like head of clean 5-7 lobed leaves that does not usually exceed a height of 35 to 40 feet.

*Acer griseum*—Paperbark Maple. The cinnamon-brown peeling bark of this twenty-five-foot tree makes it interesting throughout the year.

*Acer ginnala*—Amur Maple. Grows with several main trunks to twenty feet and displays a fall color of brilliant scarlet. Could be used in place of gray birch, but will spread 15-20 feet if not restrained.



*Amelanchier laevis*—Allegheny Shadblow. Usually a clump-grower of several light gray, clean, stems that reach a height of thirty feet. The new foliage in early spring is bronzy and interesting in contrast to the white flowers. The species *Amelanchier canadensis* (Downy Service-berry) is a larger plant but often with the same shrub-like habit. It reaches a greater height than the Allegheny Shadblow, but either might be considered good alternates for the Gray Birch (*Betula populifolia*) because all have comparable growth habits.

*Cercis canadensis*—American Redbud. A thirty-foot tree with heart shaped leaves, and purplish pink pea-like flowers in early spring. The semi-coarse texture and open habit add to its desirability. The white variety—*alba*—is finding its way into nurseries.

*Cladrastis lutea*—American Yellowwood. Often listed as a large tree, but under cultivation the rounded head does not attain a height of more than forty feet for many years. The clean light gray smooth bark and its pendant white fragrant flowers of late spring make it welcome.

*Cornus florida*—Flowering Dogwood. A horizontal branching tree of interesting flowers, fruits, and fall color that rarely exceeds thirty feet under cultivation. This well known, highly desirable species also has good varieties—*rubra* (Red Flowering Dogwood), same growth habit but the flower bracts are from pink to rose-red; *pluribracteata* or *flora-plena* (Double Flowering Dogwood), often not as well shaped as species but white flower bracts that are as many as eight; *xanthocarpa* (Yellow Fruited Flowering Dogwood), a yellow fruit, often with a pink cheek; *pendula* (Weeping Flowering Dogwood), drooping or weeping habit but not

flowering as prolifically as the species.

*Cornus kousa*—Kousa or Japanese Dogwood. Similar to *Cornus florida* in its branching habit but usually not over twenty feet. The cream to white bracted flowers appear in June with the leaves which have a diffused red fall color. Older trunks show a mottled appearance adding to the interest of the tree. This plant will often flower in colder climates where *Cornus florida* has been tempermental.

*Cornus kousa chinensis* (Chinese Dogwood) is more difficult to obtain and differs in that the flower bracts are larger and the leaves and growth somewhat coarser.

*Crataegus phaenopyrum (cordata)*—Washington Thorn. A twenty-five to thirty foot tree valued for its colorful orange to scarlet fruits that persist into winter. It is, of course, thorny, but has an interesting twiggy growth on a head that becomes rounded. The list of Hawthorns is extensive but this is the one I have selected as the most outstanding of the group.

*Chionanthus virginicus*—White Fringe-tree. Producing fleecy fragrant white flowers in late spring on a height of twenty-five feet. It may become multiple stemmed or can be trained into a single trunk. The magnolia-like leaves appear late, causing some consternation as to whether it has survived the winter.

*Carpinus caroliniana*—American Hornbeam. Possesses a rounded head and several stems or can be trained into one main stem that has side branches of a lateral habit. "Ironwood," "bluebeech" or "muscle-wood" as it has been commonly called reaches a height of about thirty feet. The most interesting part of this native species is its smooth gray twisted or muscular appearing bark.

*Idesia polycarpa*—*Idesia*. An open quick growing tree of about thirty to thirty-five feet that has very attractive long panicles of orange-red to orange-brown fruits. It is questionably hardy as far north as New York City, although growing well in some situations on Long Island.

*Halesia carolina*—Carolina Silverbell. It is often more shrubby than tree-like to a height of about twenty five feet. It has a coarse and open effect and is valued for its white to pinkish-white bell shaped flowers in mid-May. There are better formed trees for small home planting, but it has something additional to offer with its quick growth and broad head.

*Koelreuteria paniculata*—Goldenrain or Varnish tree. A tree of about twenty-five feet with an umbrella-like head. The foliage is very unusual, with its broad fern-like appearance and a fresh bronzy-green in early spring. The wood is brittle, but the tree does well on poorer soils and shows a good display of small yellow flowers in early summer.

*Laburnum Watereri* (*Vossii*)—Waterer Laburnum or Golden chain-tree. A rather open appearing tree after many years and more wisely used in a garden or with other plants rather than as an individual specimen. Its long clusters of yellow pea-like flowers in mid-spring make it popular.

*Laburnum alpinum* (Scotch Laburnum) is more shrubby than *L. Watereri* and does not have as showy flowers. It has shown a tendency to be more compact than the Waterer Laburnum in Long Island plantings.

*Magnolia Sieboldii* (*parviflora*)—Oyama Magnolia. A broad-headed tree of some twenty five feet that is not as coarsely textured as some of the other Asiatic species. Its fragrant white

petalled flowers and scarlet stamens come in late spring and are produced for several weeks.

*Magnolia Soulangeana*—Saucer Magnolia. A coarse foliaged plant of about the same height and habit with large saucer shaped flowers in mid-spring. There are many good varieties varying in color from white, rose-pink to rose-purple and purple. This is more widely used than any others of Asiatic origin but its coarse appearance is often not well suited to small home plantings.

*Magnolia virginiana* (*glauca*)—Sweet Bay Magnolia. When grown as a clump in northern regions it rarely exceeds thirty-five feet and is just as effectively used in this form as gray birch. The persistent Rhododendron shaped leaves are green above and white beneath, emphasizing the creamy-white fragrant flowers of late spring or even early summer. The bark is sometimes subject to winter sun injury on its south side, particularly when the plant is grown with a single stem.

*Malus*—Crabapples. This is one of the finest groups of small trees, because they are hardy and there is an extreme variation in plant form—low spreading types to upright growers, vase forms, arching or round headed, and all sizes from eight feet to as much as sixty feet or more. The flowers and fruits are colorful and a sequence of bloom may be attained, with proper selection, for the period of late April or early May to late May and early June. The flowers vary from white to deep pink. The list is long, but I will list twelve crabapples that are good, and vary in form, flower color, and fruit color and persistence. The colors listed are for the flowers when they are fully open, and the heights are at maturity.



	Flower	Fruit	Height
Malus Arnoldiana	White	Yellow with red cheek	15'-20'
" atrosanguinea	Pink	Red and small	15'-20'
" "Bob White"	White	Yellow-orange, persists all winter	15'-20'
" "Dorothea"	Rose	Yellow—persists to early winter	20'-25'
" floribunda	White	Red or yellow	25'-30'
" "Hopa"	Rose	Orange and red	25'-30'
" ioensis fimbriata	Double light pink	Green, of little value	25'-30'
" "Katherine"	Double light pink	Red	15'-20'
" "Prince Georges"	Double light pink	No value	20'-25'
" Sargentii	White	Red	6'-8'
" Scheideckeri	Double light pink	Yellow	15'-20'
" Zumi calocarpa	White	Red and persistent	15'-20'

*Prunus serrulata*—Oriental Cherry. There are many varieties of this species, varying in habit, but all have brittle wood and are more subject to frost injury than the crabapples. The height is about twenty feet. Five varieties are:

"Amanogawa"—upright habit, flowers semi-double light pink.

"Fugenzo"—spreading with large double pink flowers.

"Kwanzan"—broad vase-like habit, large double pink flowers.

"Shirotae"—semi-upright—large pure white semi to double flowers.

"Washi-nioi"—broadly vase-like, fragrant single white flowers.

*Styrax japonica*—Japanese Snowbell. A very interesting lateral branched tree which attains a height of about thirty feet. It deserves greater usage. The bark is light tan, finely lined and smooth, sometimes having a tendency to loosen in a thread-like arrangement. The abundance of dark green average sized leaves partially conceal the fragrant white hanging flowers of early June. Like White Fringe, this too is slow to leaf out.

*Oxydendrum arboreum*—Sourwood or Lily-of-the-Valley tree. It is gracefully pyramidal and as it matures, develops a rounding to the top and the masses of outer branches. Its height is unfortunately listed as sixty feet and upward. The slow growth makes it a

small tree for fifty years or more, and even at this age it does not usually exceed thirty feet. The long peach-like leaves have a brilliant scarlet color in fall, and cuttings of them are excellent for indoor arrangements with Chrysanthemums and such berried specimens as porcelain ivy (*Ampelopsis brevipedunculata*).

*Betula populifolia*—Gray Birch. This tree of many stems was incorrectly named Gray Birch because its bark is actually white. The maximum height varies, but under cultivated conditions it does not usually surpass twenty-five feet. The leaf miner has caused serious damage in recent years, but if sprays of Lindane are applied to the foliage when the leaves are first fully formed in the spring and again six weeks later, the foliage remains intact. Do not wait too long before applying the first spray. Chlordane has also been effectively used but the spraying must be timely. This tree has improved many a planting and home with its white stems. It will continue to be planted in great quantities by the artistic landscape designer who realized its potentialities.

#### Additional Small Trees

*Maackia amurensis*—Amur Maackia (20' 25'). White summer flower and early interesting silver-green spring foliage.

*Rhamnus frangula*—Alder Buckthorn (15'). Excellent glossy green foliage.

*Parrotia persica*—Persian Parrotia (35'). Witch hazel like leaves on clean gray stems that become mottled on maturity.

*Viburnum Sieboldii*—Siebold Viburnum (25'). Large glossy leaves on a plant that takes drought graciously. Needs training to tree form.

*Syringa amurensis japonica*—Japanese Tree Lilac (25'). A quick growing small tree with a cherry-like bark and large thyrsi of white flowers in late June and early July.

*Euonymus europaea* — European Spindle Tree (20'). Vase-like form and producing brilliant dark pink valve-like fruits in the fall—subject to *Euonymus* scale — variety, *Aldenhamensis* — has good possibilities.

*Sorbus aucuparia*—European Mountain Ash or Rowan Tree (35'-40'). Valued for its brilliant orange-red fruits in late summer and early fall, subject to borer.

*Stewartia koreana*—Korean Stewartia (30'). Often shrubby, and upright habit, white flowers and yellow stamens in late June or month of July, interesting bark—like the planetree.

*Stewartia ovata (pentagyna) grandiflora* — Large Flowering Stewartia (25'). Similar to *Stewartia koreana* except the flowers have purple stamens.

*Franklinia (Gordonia) alatamaha*—Franklin Tree (25'). Often shrub-like, or with a short main trunk and clean gray smooth muscular upright branches—flowers are white with yellow stamens from mid-August until first severe frost, orange to red fall color.

There are still additional small deciduous trees that I had difficulty in elimin-

ating, but I believe this list represents the upper class of this category. A few small narrowleaved evergreens might also have been included but it was not possible to entertain them in this article.

For areas comparable to coastal California and sections of Florida:

*Camellia japonica*—Common Camellia (40'). Many good varieties, but be sure to get one that makes a tree; many do not.

*Ceratonia siliqua*—Carob Tree (40'-45'). Rounded head, flowers red in spring, excellent glossy evergreen leaves.

*Jacaranda acutifolia*—Sharpleaf Jacaranda (40'-45'). Abundance of blue flowers in July—fine textured foliage.

*Eucalyptus ficifolia*—Redgum Eucalyptus (40'). Excellent brilliant red flower, round head.

*Schinus molle*—California Pepper tree (35'-40'). Excellent under dry conditions but somewhat messy.

*Delonix regia* — Royal Poinciana (35'-40'). Popular in southern Florida, brilliant scarlet and yellow flowers in the summer.

*Eugenia paniculata* — Brush-cherry Eugenia (40'). Excellent green foliage, often tinted bronze.

*Cassia fistula* — Golden Shower Senna (25'-30'). Long clusters of yellow flowers in the spring.

*Acacia decurrens dealbata* — Silver Wattle (40'-50'). This is one of the most reliable Acacias with its ball-like yellow flowers in early spring, and quick growth.

Explore your garden and home for the placement of one or more small trees; your outdoor living can be more livable and enjoyable because of them.



Earliest illustration of *Tradescantia virginiana*, from Pierre Vallet's "Le Jardin du roi très chrestien Loys XIII," Paris, 1624.

# Tradescantia

MARJORIE F. WARNER

The other day I saw modern named varieties of *Tradescantia* in a spring planting catalog: very neat, with full petals, and apparently free from the projecting leaves that sometimes obscure the bloom of the "wild" plant. But the weedy clumps of Spiderwort scattered among tall grass and lush weeds have a charm for me. The few, frail flowers in the midst of their ambushade have an indescribable brilliancy, and we may well realize how they caught the eye of a "Virginia" colonist or traveller, who took them home to "that painfull and industrious searcher, and lover of all natures varieties, Iohn Tradescant." This first definite introduction from Virginia was fitly named for him.

Through Tradescant's generosity it was soon and rapidly distributed to lovers of plants. In 1621, "Phalangium de Virginea [sic]" appeared in the *Catalogus* of René Morin of Paris, and the Robins must have had it in their Paris garden about the same time, because Kaspar Bauhin in Basel got it from there in 1622. His *Pinax theatri botanici* (1623, p. 520) notes the receipt of "Allium sive Moly Virginianum" from Georgius Spörlinus (Georg Sperling), who had sent it from the garden of Jean Robin in the year 1622, under the name "Phalangium Virginianum." In the following year a catalog of the Robin Garden was printed, with the title, *Enchiridion isagogicum ad facilem notitiam stirpium . . . in horto D. D. Joannis et Vespasiani Robin*" (Parisii, 1623), where this plant is given as "Phalangium Americanum flore violaceo Trades-

campi [sic]," thus recognizing its source. About this time, or possibly earlier, a specimen that bloomed in the Robin garden was drawn by Pierre Vallet, "Brodeur du Roy," who published it in his *Le jardin du roy très chrestien Loys XIII*, which is not dated, but has a dedication signed January 10, 1624. As many of the new plants first figured here were undoubtedly drawn some time before the issue of the volume, we can have no idea how early Robin received this from Tradescant, but at any rate we know the first illustration of the Spiderwort appeared in Paris some five years before the plant was described in England, in Parkinson's *Paradisus* (1629, p.152-153.)

Parkinson's work is so familiar and the French sources so little known that 1629 is often taken as date of introduction for this plant. Mordant de Launay, who ought to have known about its early introduction in France, wrote in *Bon Jardinier* for 1813 that the "Ephémérine de Virginie (*Tradescantia virginica* [sic])" was introduced to England in 1629 by John Tradescant. And more recently, the erudite Scottish gardener, R. P. Brotherston, in *Journal of Horticulture* (3rd ser., v.49, p.548, 1904), gave its date of introduction as 1609, obviously a typographical error, probably for 1629, though if 1619 had been intended, it would not have been so far wrong.

No one has found the exact date, but it is thought the Spiderwort was brought back by someone whose expenses were paid by Tradescant as a passenger with Captain Samuel Argall,

who went out to Virginia about 1617. No specific documents are cited, but the idea is entirely reasonable, as Tradescant's "Phalangium" appeared so soon afterwards in several European collections. Tradescant himself throws no light on it. His *Catalogus* of 1634 (printed by R. T. Gunther in his *Early British botanists and their gardens*, Oxford, 1922), lists "Phalangium virginianum tradescanti," but he had probably had it continuously; while "Phalangium virginianum flore albo," listed in his accessions for 1633 (Gunther, l.c., p.333), may have been a fresh acquisition, although it seems to me unlikely that it was an altogether new plant.

Some early citations indicate the color of the flower, but all of them refer to *Tradescantia virginiana*. The plants first flowering in the Robins' garden were blue, being described in their *Enchiridion* (1623), and in Vallet's *Jardin du roy Loys XIII* (1624), as "flore violaceo." In his *Catalogue* (1636) of the Jardin royal des Plantes Médicinales, Guy de la Brosse gave both "flore violaceo" and "flore albo." It seems likely that the white form occurred in some of the first material brought from America. René Morin's *Catalogus* of 1621 gives "Phalangium ramosum flore albo" following his "Phalangium de Virginea," and la Brosse's "flore albo" may have come to the Jardin des Plantes, as did the major portion of its original collection, from the garden of Jean and Vespasien Robin. The color variations noted by Vorstius (Adrian van Voorst) of Leiden, in his *Catalogus Plantarum horti academici Lugduno-Batavi* (1633, p. 252), are "flore caeruleo" and "flore violaceo."

The rose-colored or "red" flowers were first noted, I think, by Parkinson

in his "*Theatrum botanicum*" (1640, p.418), where he described the flower of the Spiderwort as "of a deepe purplish blewe colour, whereunto may be added of later knowledge one with a white flower, and another with a reddish or Carnation." The last may have been one of the typically rose-colored species, and could have been a later introduction, though I think "pink" or "reddish" blossoms are sometimes, though not often, found in colonies of the common *Tradescantia virginiana*. But in my own unscientific observation, white Spiderworts are frequently found, though usually singly or in small clumps, in colonies of the common blue, and may not always have been noted either by the original collectors, or later gardeners.

References to this plant are almost innumerable, and few need comment. A historical puzzle was posed by Sebastian Killermann in *Naturwissenschaftliche Wochenschrift* (n.s., v.8 (v.24), p.195-200, 1901). He discovered a breviary of the period between 1550 and 1574, with a flower he identified as *Tradescantia virginica* [sic] on its illuminated binding. I would not dare to say this plant could not, in some way or other, have entered Europe in that period, but it seems unlikely; and moreover, the figure on the illuminated cover is not, to my eye, a good representation of our common Spiderwort. One cannot be sure about such stylized figures in decorative art, but in this case it seems to me the resemblance is too slight to serve as evidence. However, we cannot merely flout Killermann's idea, because he was usually accurate, and made some good contributions to plant history.

The Spiderwort illustrates several factors in nomenclature: the urgent need of a vernacular name; the attempt

to fit the new plant into existing botanical classification; the use of real or fancied resemblances or properties as descriptive characters; and the custom of honoring distinguished personages. As the plant was first known to the English, the vernacular name, Spiderwort, was probably adopted at the outset. It never occurred to me that it had anything to do with spiders; but it may have been suggested by the cluster of fuzzy stamens, faintly resembling a curled-up spider. The German "Spinnenkraut" was probably a direct translation from the English, although it might have been from the Latin "Phalangium."

"Phalangium" was Greek in origin, formerly used for an ancient plant thought to be a cure for the bite of a venomous spider called "Phalangion." It was ready-made for the new Spiderwort, which must have been sent out under it. "Phalangium" occurs in the early French publications, and is mentioned by Bauhin in his *Pinax* (1623, p.520), though he chose to call it "Allium sive Moly Virginianum." "Allium" suggested relationship with the Lily family, but "Moly" was a Greek name for an unknown plant mentioned by Homer and the subject of botanical speculation throughout the ages. Parkinson, in his *Paradisus* (1629, p. 152), calls it "Phalangium Ephemerum Iohannis Tradescanti. The soone-fading Spiderwort of Virginia," and the word, "Ephemerum," also from the Greek, was later used as its generic name. It was appropriate to the transiency of the flower, and the French adopted "Ephémérine, and later "Ephémère" as vernacular names. Tournefort, in his *Institutiones rei herbariae* (Ed.2, v.1, p.368, 1719), assigned to it the technical name, "Ephemerum Virginianum."

It was usually associated with Tradescant. The *Enchiridion* (1623) of Jean and Vespasien Robin entered it as, "Phalangium Americanum, flore violaceo Tradescampi," the last being a purely typographical slip. La Brosse gave two forms, "flore albo" and "flore violaceo," followed by "tradescanti," in his *Catalogue* (1636, p.83) of the Jardin royal des Plantes médicinales. But it was not until 1726 that the generic name, *Tradescantia*, was published in the "*Flora jenensis*" (1726, p.48) of Ruppium, who cited both Tournefort's "Ephemerum Virginianum," and Parkinson's "Phalangium ephemerum, Virginianum." The spelling, *Tradescantia virginica*, as quoted several times in this paper and not infrequently used by early authors, is purely a synonym for *Tradescantia virginiana* L.

I have not tried to follow the Spiderwort in its travels through Europe, which must have been rapid. Many of our native American plants did poorly in European gardens; the climate of England and the region around Paris lacked the sunshine needed by some of our native Virginians; and on the other hand, some less luxuriant species thrived and blossomed abundantly when transplanted from Paris to Rome. But the Spiderwort was comparatively tough, and not too selective in its native habitat, and as it was easy to propagate, it spread in British gardens and, possibly distributed through the Robins in Paris, it was soon found in the botanical gardens of the Continent. As was natural, "Phalangium virginianum" was listed in Hoffmann's *Florae Altdorffinae deliciae hortenses* in 1660, and in Elsholz's *Flora Marchica* in 1663.

# Ferns As A Garden Hobby

RALPH C. BENEDICT<sup>1</sup>

The American Fern Society has reached the ripe age of sixty years; it was founded in 1893 with nineteen members. Two of our present members date from that first year, and are honored as our sole remaining "Charter Members." Dr. Campbell E. Waters, of Washington, and Miss Elmira E. Noyes, of Norfolk, Virginia. It is pleasant to report that our Society's quarterly, the *American Fern Journal*, still receives and publishes sprightly contributions from these pioneer members. Miss Noyes has recently sent in her report of "*Sixty Years in the American Fern Society*," which is due to appear sometime this year. One of the first things the early Fern Society did was to publish a printed journal as a better means of communication among members than correspondence. This became the *Fern Bulletin*, controlled and edited by Willard Nelson Clute. At the approach of the twentieth volume of the *Fern Bulletin*, Mr. Clute signified his intention of discontinuing it. Members of the American Fern Society in 1910 initiated the first issues of the *American Fern Journal*, which was adopted as their official organ after two issues and it has been managed and edited by and for the Society ever since. The *Journal* is now in its forty-third volume, with a total of over five thousand pages dealing with fern lore covering a wide variety of phases: gardening, natural history, conservation, distribution, taxonomy, economic aspects, *et al.*

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It is issued as a quarterly with a minimum of thirty-two pages per issue, but sometimes with a good many more. Dr. Conrad Morton, Smithsonian Institution, is Editor-in-Chief.

So much for the barest background. Who are members of the Society? What are their general and special interests? What are the qualifications for membership? How does an interested person go about joining? Does the Society offer anything of value to the beginner in fern interest? Perhaps the best approach in answering these questions will be to start with the last.

From its start, with a bare score of members until now, when it numbers over five hundred, I believe ferns have been a real hobby to most if not all the members. Hobbyists are never happier than when interesting others to adopt their specialty. While, with the gradual increase in numbers, the Society's membership list, which is revised and published every two or three years, had tended to become too much an impersonal list of names and addresses, steps have recently been taken to place the information of the well-informed at the disposal of the beginner. The first or second *Journal* for 1953 is due to carry a list of expert members named as "information centers" to whom others may send specimens for identification. This list of about thirty names, includes some qualified to identify ferns from any part of the world, as well as others, whose spheres of knowledge cover single states or continuous groups of states. It is expected that this list will be

amplified until there will be no part of the country without some nearby member on call to help.

In general, the officers of the society have always been on call, and the pages of the *American Fern Journal* are always open to queries, even simple ones, the answers to which may be of interest to any appreciable number of members. While the pages of the *Journal* offer regularly articles which are chiefly of interest to the technical botanist, even some of these are written in a style which robs them of the stiffest terminology and makes them fairly intelligible to the reader with no botanical background.

Of the total membership a fair proportion consists of professional botanists associated with colleges or scientific institutions, but, without any exact analysis, I believe a much larger proportion has entered the Society purely from a non-technical, hobby interest, as lovers of nature, collectors, who found fern leaves the *ne plus ultra* for variety, beauty, and ease of preservation. Among these are garden lovers who may have begun with a shady back yard corner where some native fern species added more beauty than any available flowering plant could contribute. Many members have gone from such amateur beginnings to

*The ingenuity of Dr. Benjamin A. Allison transformed an abandoned cellar, which had been used as a dumping grounds for generations, into this inspiring fern garden.*





achieve proficiency and authority, with extensive collections of growing ferns, as experts on the species of some given area, and even to the extent of finding and describing hitherto unrecognized or "new" species.

Besides the development of information centers, the members of the American Fern Society always enjoy field get-togethers to which interested visitors are welcomed. During 1952, such a meeting was held as an extended tour, starting in Vermont, touching New Hampshire, and then, returning to Vermont, enjoying the fern richness of this "fernland of the north" as Teall has called it, through north and south valleys, to Mansfield and over Smugglers' Notch, to Lake Champlain. Into New York, the travelers stopped on the shores of Lake George, climbed Whiteface at sunset, past the Fulton Chain of Lakes, and reached the Clark State Reservation at Jamesville, New York, where the rarest fern in the United States, the hart's tongue, enjoys stringent protection as a ward of New York State. The tour ended at Ithaca, in association with the convocation of the American Institute of Biological Sciences. The Society held a meeting for the presentation of papers, and a field trip in the Ithaca region.

A full account of the trip is scheduled for publication in the *American Fern Journal* in an early issue. A "guesstimate" of the total species and other significant types met would run upwards of sixty or seventy. With experienced fern students as leaders of each part, what an opportunity for learning ferns had those participants who began their fern study and Society membership in connection with this trip! For 1953, three similar trips are in prospect, touching other areas, plus several one-day-visits to fern gardens

or sanctuaries, and a final visit in the fall to a commercial fern grower who raises some hundred species and has been in the business for fifty-five years. Details of these trips may be obtained from the author at Pilot Knob, New York. A six day field trip will be the highlight of this year's tours. It will be made August 30 to September 6, through northern Michigan to precede the American Institute of Biological Sciences meetings at Madison, Wisconsin. Details of this excursion may be obtained from Mrs. Kathryn E. Boydston, Fernwood, Route 3, Niles, Michigan.

The *American Fern Journal* has dealt with house plant ferns as one of its interests.

Application for membership should be sent to Mr. M. D. Mann, Jr., Treasurer, American Fern Society, 625 Locust St., Roselle, New Jersey, accompanied by \$5.00 for a sustaining membership, or \$2.00 for general membership.

It is time, now, that the phase of fern interest stressed in the title of this paper, "Ferns As A Garden Hobby" received its due attention. It is probable that every Society member who does not live in an apartment, who has any sort of a back yard, has some of his fern friends in a shady corner. From such a start, the fern enthusiast is likely to find excuses for encroaching more and more on areas formerly devoted to flowers. The few species of the shady corner grow to a score, and may then double, re-double, and double again. Such a multiplication was the actual course with Mr. Mann's back yard garden at Roselle, and Mrs. M. grieves that the area for flowers is still further threatened. The last reported total of different kinds was over one hundred and fifty, and Mr.

Mann is the proud possessor of an effective "robot greenhouse," a fluorescent-lighted box kept in his cellar where he carries on the intriguing and fascinating process of raising potential thousands of fern plants each winter, with an actual production which mostly finds its way into the gardens of other members of the Society.

But a shady yard or wooded area is not a *sine qua non* for a good fern garden. The Edward D. Thurstons of Sharon, Connecticut, took an acre of sunny meadow and transformed it into the most favorable situation for the widest variety of ferns I have ever seen. Lath shading, supported by two-by-fours, and a close planting of thick hemlocks as a windbreak have provided perfect conditions for some of the lushest fern growth, and with an arrangement which makes the acre a bower of beauty.

The Thurstons had previously carried out a very ambitious project which also involved a good-sized collection of native hardy fern species. Following a fall exhibit of these plants before the Millbrook Garden Club in the fall of 1937, they assembled and forced into early leafage a collection of some sixty species, and exhibited these under the auspices of the Millbrook Garden Club at the International Flower Show in New York City. Their experiences in the preparation of this exhibit were described in the No. 3 issue of the *American Fern Journal* for 1939, in association with two articles on raising ferns from spores by other authors.

An abandoned cellar, of an old New Hampshire house, used as a dump for generations, was rehabilitated and transferred into a beautiful fern garden by Dr. Benjamin R. Allison, practicing physician of Hewlett, Long Island, year-long lover of his fern gar-

den. He has described the garden and its development with great enthusiasm and interest in a recent number of *New Hampshire Profiles*, entitled "Why Not Grow Ferns?" Dr. Allison includes in his article six rules for the beginning fern gardener: (1), find your own ferns yourself; (2), you will need good reference books, preferably well-illustrated ones which will help in identification; (3), you have to learn some of the "lingo"; (4), you will have to study the fern's "anatomy" and learn a little about its sex life; (5), learn where to expect to find certain ferns; and, (6), join the American Fern Society. Dr. Allison joined in 1950. His article ends: "If you are lucky enough to live in New Hampshire the year around, you will have great fun watching the ferns unroll in the Spring, then pass on to the fruiting season. If you can spend but a short vacation with your ferns, you will enjoy thinking about them all winter."

One of the most notable of hardy fern gardens is the pride of a year-round New Hampshire resident, Harold Goddard Rugg, just retired as Librarian of Dartmouth College, after serving that institution since 1906. Mr. Rugg's garden occupies a five acre tract on the edge of Dartmouth. With some open space, and botanic-garden variety of woody plants and flowering types, the natural shaded portions furnish the setting for one of the richest collection of well-grown plants of native and introduced species, including not a few from far off cooler parts of the earth. Some of these are rare varieties and hybrids of native species, including an *Osmunda* plant which has been described as a hybrid between the Royal-Fern and the Interrupted-Fern, and named in honor of Mr. Rugg, *Osmunda*  $\times$  *Ruggii*). Incidentally, Mr. Rugg

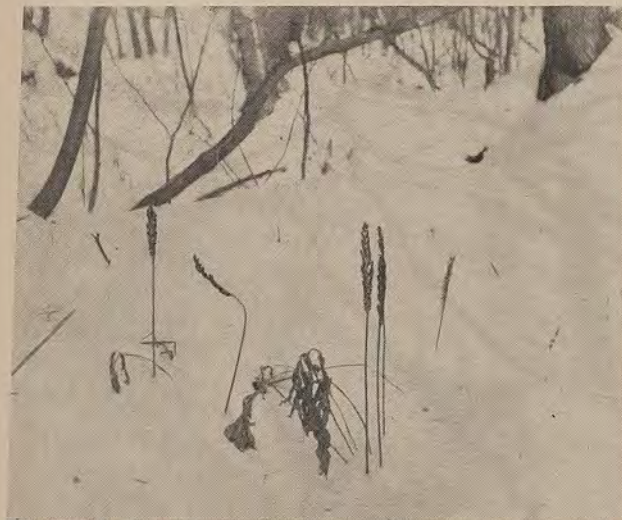
has been designated as one of the chief "information centers" for the western New England states, and was one of the leaders of the Society fern tour through Vermont last summer.

It should serve as a good conclusion for this account to present briefly some recommendations regarding the selection of appropriate species with which to start a new outdoor fern garden

*Top: Left, the Sensitive-Fern shows its fertile leaves even during the winter. These leaves, beadlike in appearance, have given this fern the name of Bead-Fern. It is not really sensitive, except to early frosts. Right, Fiddleheads of the Ostrich-Fern, shipped in from Maine and sold on Madison Avenue in New York City. They are also sold in cans.*

*Bottom: Left, the Polypody, a common eastern inhabitant of rocky slopes. It can beautify a garden similarly at all times of the year. Right, Hart's Tongue, photographed in June when the young leaves were just unrolling and last year's leaves still green but prostrate.*

*All illustrations accompanying this article were made from photographs furnished by the author*



venture. The selection will, of course, vary according to the part of the country concerned. Four major areas probably constitute a fairly satisfactory division for the United States and Canada: northeastern and north central, including the adjacent Canadian areas; southeastern, but Florida practically an added area in itself; northwestern; and southwestern, including Texas. Texas, it should be noted, can boast one hundred and twenty different species within its borders, being surpassed only by Florida, which with its southern tropical part, can list over one hundred and fifty species, with almost unlimited additional possibilities of further introductions from other tropical areas. Our northwestern states and the Canadian Pacific provinces to the north, with their copious rainfall, are a paradise for what is probably the lushest of fern growth in the whole country, and adapted in addition for the introduction of many English species and varieties which do not thrive in the drier atmosphere of other parts of the United States.

While full concurrence is given to Dr. Allison's first rule for the fern gardener, quoted earlier, this rule may be relaxed, as he agrees, after a good assemblage of species has been installed. For the benefit of its members, the American Fern Society has assembled a list of dealers in different parts of the country who can be recommended for their stock and their services.

As to an actual selection of appropriate species, a short list has recently been prepared for the *American Fern Journal* covering the northeastern regions. The species included are such as may be expected to grow well in an average back yard garden, with reasonable care.

The list has been designated "The

ten best ferns for northeastern gardens," but it may be noted defensively in advance that there are sure to be disagreements with some of the choices. Perhaps the objections will be met by the addition of the few "alternates" which are named as supplements.

1. Marginal Shield-Fern. *Dryopteris marginalis*

2. Interrupted-Fern. *Osmunda Claytoniana*

3. Royal-Fern. *Osmunda regalis*

4. Goldie's-Fern, or "Giant Woodfern." *Dryopteris Goldiana*

5. Ostrich-Fern. *Peteretis Pennsylvanica*

6. Christmas-Fern. *Polystichum acrostichoides*

7. American Maidenhair-Fern *Adiantum pedatum*

8. Sensitive-Fern. *Onoclea sensibilis*

9. Lady-Fern. *Athyrium Filix-femina*

10. *Dryopteris erythrosora*, A Japanese species for which I know no widely used common name; literally however, it is "red-dotted fern."

Alternates:

Fancy-Fern. *Dryopteris intermedia*

Male-Fern. *Dryopteris filix-mas*

Cinnamon-Fern. *Osmunda cinnamomea*

Variegated Lady-Fern. *Athyrium Goringianum pictum*. Another Japanese entry.

Berry Bladder-Fern. *Cystopteris bulbifera*

As indicated above, I am sure the above list will bring out comments in the *American Fern Journal* of disagreements with some of the selections. Furthermore, I believe we may be sure that similar lists, appropriate to the other regions of the country will also be forthcoming.

# Daffodil Section

ROBERTA C. WATROUS, *Editor*

## *Miniature Daffodils*

There is no doubt that the smaller daffodils have increased greatly in popularity in recent years. Some critics imply that admirers of the so-called miniatures like them simply because they are small, and do not apply other criteria in judging them. Although this may have been true in the past, because of the limited amount of material available, a more critical attitude is in order now that more and more hybridizers are turning their attention to this type of flower. Some of us believe that miniature daffodils can be judged just as dispassionately as the larger ones, but that all the points of excellence need not and should not be the same as those used in judging larger show varieties.

With the hope that readers of this Section will cooperate by reporting their opinions of the varieties with which they are familiar, a list of miniature daffodils has been compiled. In commenting on these varieties, let us see if we can agree on how the various standards used in judging daffodils should be applied for miniatures. First, color: In small daffodils as in larger ones we value clean whites and clear, bright yellows and reds. Delicate cream, straw, and primrose tints are also admired, and a hint of pink is welcome. But dinginess or streaks should not be tolerated in small flowers any more than in large ones. Second, Substance: here, too, we can follow the standards established for larger flowers. Especially to be avoided are flimsy perianths. Next, Form: It is in this characteristic that the widest departure from large-flower standards will be al-

lowed. The impression of smartness we get from a large flower of perfect form and balance may be enjoyed on a smaller scale, but some features not always admired in larger flowers may seem acceptable, even attractive, in very small ones—for instance reflexed perianths or narrow and twisted perianth segments. Delicacy and jauntiness are qualities that seem more appropriate to small flowers than to large ones. Stems should be strong enough to support the flower without bending. Length of stem and the relation between length of stem and size of flower depend on where the flower is to be used. For plants grown in rock gardens or in pots for use indoors very short stems with comparatively large flowers may be desirable. For use in garden borders, for naturalizing in semi-wild conditions, or for cutting a longer stem (possibly at least three times the larger dimension of the flower or cluster) seems essential. Although a height of twelve inches is usually considered the limit for miniatures this seems over-generous; perhaps a separate category of "intermediates" is needed. As for the flower, shape as well as measurements must be considered: a flower with narrow reflexed or drooping perianth does not seem as large as one whose perianth segments are wide and flat.

In the list that follows the height, name of breeder, date of registration, and parentage are given, so far as available. As the heights are taken from various printed sources some inconsistency is to be expected. Notes on parentage are given in the hope that they will inspire amateur hybridizers



*Water H. Gannaway Photograph*

*Narcissus Flomay*

to go and do likewise. Surely work with the small species is the most rewarding field for small-scale hybridizers.

Additions to the list, as well as comments of all kinds, will be gratefully received.

Ia: Charles Warren, 5" (Unknown origin, introduced 1948; form of *Narcissus pumilus*); Sneezy, 4" (Alec Gray; *N. asturiensis* × *obvallaris*); Tanagra, 5-6" (Gray, 1946; *N. asturiensis* × *obvallaris*); Wee Bee, 5" (G. Zandbergen-Terwegen; sport from *N. nanus*).

Ib. Apricot, 12" (de Graaff, 1898); Bambi, 6" (Dutch origin, 1948); J. B. M. Camm, 5" (W. Backhouse, 1884); Rockery Beauty, 4-6" (W. J. Eldering, 1928).

Ic: Alice Knights, 8" (Barr & Sons, 1905); Rockery Gem, 9" (R. A. Van der Schoot, 1930); Rockery White, 6" (G. Zandbergen-Terwegen, 1936; from *N. nanus*); W. P. Milner, 9" (W. Backhouse, 1890).

IIa: Goldsithney, 8" (Gray, 1949); Marionette, 4" (Gray, 1946); Mustardseed, 3-4" (Gray, 1937); Nor-Nor, 9" (G. L. Wilson, 1941); Pepper, 12" (J. C. Williams, 1933).

IIb: Seville, 10-14" (P. D. Williams, 1908); Strongbow, 7" (G. H. Englehart, 1899).

IIc: Angie, 8" (Gray, 1948; *N. dubius* × a IIIa).

II or III (?): Picarillo, 4" (Mrs. G. Anley; *N. watieri* × *pumilus*); Tweeney, 6" (Gray; a large IIa × *N. watieri*).

IIIa: Belle Chinoise (A. M. Wilson, 1930).

IIIb: Elizabeth Ryan, 7"; Fairy Circle, 12" (The Brodie of Brodie, 1913); Lady Bee, 10" (Barr, 1929); Picador (P. D. Williams, 1910); Ruby, 10" (Sir Charles H. Cave, Bt., 1907);

Xit, 5-6" (Gray, 1948; *N. watieri* × a large IIc).

IV: Kehelland, 6-8" (Gray, 1946); Pencrebar, 6" (Unknown origin, 1929).

Va or Vb (?): Auburn, 9-12" (D. Blanchard; Goldbeater × *N. triandrus aurantiacus*); Johanna, 9" (W. Backhouse).

Va: April Tears, 6" (Gray, 1939; *N. jonquilla* × *triandrus concolor*); Dancing Fairy (S. S. Berry, 1937; *N. triandrus albus* × Bernardino); Hawera, 8" (W. M. Thomson, 1938; *N. jonquilla* × *triandrus albus*); Kenellis, 8" (Gray, 1948; *N. triandrus* and *bulbocodium*); Phyllida Garth, 9-12" (Gray, 1948); Raindrop, 4" (Gray, 1942; *N. dubius* × *triandrus calathinus*); Sennocke, 4" (F. R. Waley, 1948; *N. triandrus* × *bulbocodium*); Trimon (A. W. Tait, 1899; *N. triandrus albus* × *bulbocodium monophyllum*).

Vb: Arctic Morn, 6-8" (Gray, 1949); Cobweb, 10" (Gray, 1938); Dawn, 11" (Englehart, 1907; *N. triandrus* and a Poeticus?); Frosty Morn, 6" (Gray, 1941); Ivory Gate, 9-12" (Gray, 1949).

VIa or VIb (?): Golden Chimes (Berry, 1937; *N. jonquilla* × *cyclamineus*); Jack-be-Nimble (Mrs. K. L. Reynolds, 1939); Jack-be-Quick (Reynolds, 1939; Lady Hillingdon × *N. cyclamineus*).

VIa: Chicopee, 5" (E. C. Powell, 1946; *N. obvallaris* × *cyclamineus*); Estrellita, 12" (G. E. Mitsch; Mite × Malvern Gold); Golden Cycle, 6" (H. G. Hawker, 1916); Minicycla, 3" (A. M. Chapman, 1913; *N. minimus* × *cyclamineus*); Mite, 4" (Booth); Tête-à-Tête, 4-6" (Gray, 1949); Cyclataz × self).

VIb: Beryl, 8" (P. D. Williams, 1907; *N. cyclamineus* and a Poeticus);



*Water H. Gannaway Photograph.*

*Narcissus April Tears*



Fairy Wings (G. S. Crouch, 1938; *N. cyclamineus* × *poeticus*); Little Witch, 9" (Mrs. R. O. Backhouse, 1929); Perconger, 10" (Gray, 1941).

VIIa or VIIb (?): Kidling, 6" (Gray; *N. jonquilla* × *juncifolius*); Larkelly, 10" (P. D. Williams, 1930); Yamolf, 4" (Gray).

VIIb: Beebop, 5-6" (Gray, 1949; *N. rupicola* one parent); Bobbysoxer, 7-8" (Gray, *N. rupicola* one parent); Cora Ann, 10-12" (W. F. Mitchell, 1939); Flomay, 4" (Gray, 1946); La Belle, 6" (Barr, 1937; *N. juncifolius* and a *Poeticus*?); Lintie, 7-8" (Barr, 1937; *N. Juncifolius* and a *Poeticus*?); Orange Queen, 7-9" (Cartwright & Goodwin, Ltd., 1908; form of *N. odoratus*?); Peaseblossom, 4" (Gray, 1938; *N. juncifolius* × *triandrus albus*); Pipers Barn, 8" (Gray, 1947); Sea Gift, 6" (Unknown origin, 1935); Sun Disc, 6" (Gray, 1946; *N. rupicola* one parent).

VIII: Halingy, 6" (Gray, 1948; Scilly White one parent); Shrew, 2-3" (Gray; *N. canaliculatus* × *minor*).

X: Cyclataz, 6" (Tait, 1932; *N. cyclamineus* and *Soleil d'Or*).

XI: Elfhorn, 4" (Gray, 1941; *N. bulbocodium* hybrid); Nylon, 4" (D. Blanchard, 1949; *N. bulbocodium romieuxii* × *bulbocodium monophyllus*); Pango, 8" (Gray, 1949; *N. dubius* × a IIIa).

*Winning Varieties in Specimen Classes, Fourth National Capital Narcissus Show, Chevy Chase, Md., April 18-19, 1953.*

Best flower in show and best vase of

three stems: Chinese White. Second-best flower in show: Blarney.

Award winners by classes:

Ia: Gold-digger, Burgomeister Gouverneur, Counsellor, Lord Nelson, Irish Luck, Royalist; Ib: Sincerity, Anjou, Straight, President Lebrun; Ic: Beersheba, Robert Berkeley, Gaza, Chastity, Milo, Mt. Hood.

Ila: Tinker, Velveteen, Aranjuez, Crocus, Rustom Pasha, Rosslare, Copper Bowl; Iib: Fedora, Green Island Grayling, Menton, Carnalea, Flamenco, Monique, Coverack Perfection, Rose of Tralee; Iic: Dunlevy, Hera, White Duchess, Silver Bugle; Iid: Binkie.

IIIa: Chungking, Spring Beauty, Mangosteen, Granville; IIIb: Blarney, Hardy, Misty Moon, Franz Liszt, The Governor, Picador, Crenver, Lough Areema, Grey Lady; IIIc: Chinese White, Portrush, Silver Salver, Silvermine.

IV: Cheerfulness, Inglescomb, Daphne, Camellia, Mary Copeland.

Va: Rippling Waters, April Tears, Pearly Queen, Niveth, Moonshine; Vb: Silver Chimes, Dawn.

VIa: Le Beau, March Sunshine; VIb: Beryl.

VIIa: Aurelia, General Pershing, Golden Sceptre, Tunis × *Jonquilla* seedling, VIIb, Golden Perfection, Trim, Chérie.

VIII: Martha Washington, Sparkling Eye, St. Agnes, Hermanii, Geranium, La Fiancée.

IX: Cantabile, Sidelight, Actaea, Eifina.

X: *N. jonquilla simplex*, *N. juncifolius*, *N. gracilis*, *N. triandrus albus*.

# Rooting Azalea Cuttings

E. J. KRAUS

It has been stated frequently that cuttings of deciduous azaleas are notoriously difficult to propagate. This is true under certain circumstances but not particularly so under other conditions for certain species and clones. Also it has been said that, although rooting the cuttings is not too difficult, getting the cuttings to break into new growth and continue development imposes very great difficulty.

Because of these statements, the results of certain experiments tried in 1952, may be of interest to others who may wish to try the method involved.

On May 25, 1952, the following kinds of cuttings were taken. These were (a) 3 clones of *Rhododendron mollis*; namely Anthony Koster, Alphonse Lavalle and an unnamed pink form, (b) a double flowering form of *R. nudiflorum* and (c) a selected large flowered clone of *R. occidentale*, originally brought in from its native habitat.

After taking, the bases of most of the cuttings were dipped lightly in Hormodin No. 2 then inserted in an out-of-doors cutting bench containing a mixture of one-half peat moss and one-half sharp, river sand. The benches had hinged wooden frame covers over which a light-green tinted plastic had been stretched.

At the time of taking the cuttings the flowers on the bushes from which they came had just faded, the cuttings themselves were still green to their bases and had just begun to harden slightly.

After firming the sand and peat moss mixture following planting, the bed was

watered thoroughly, and the covers closed down. Frequent waterings were given during the summer. There was very slight wilting at any time. Although the bed was equipped with a heating cable buried in the rooting medium, it was not connected, no bottom heat being necessary.

By August 28 all the cuttings had rooted well. On this date they were taken up and transplanted to 2 x 2 x 3 inch plant bands, held in greenhouse flats. The clump of roots on some of the cuttings nearly filled a band, but there was ample room to fill in around the roots with a mixture of soil and peat moss. After transplanting, the entire flat of cuttings was watered well and again put under cover on the benches. None of the cuttings had formed terminal flower buds while in the rooting medium. Cuttings taken later, on July 5, did do so. Some of the cuttings pushed out a few tiny terminal leaves but none made any appreciable growth. At present, the first week of February 1953, all the cuttings are still fresh in appearance and are beginning to start growth from the terminal buds and a few of the lateral buds near the tip.

In contrast to the cuttings taken on May 25, others were taken on July 5, when the bases of the new shoots were beginning to turn brown and felt woody to the touch. A number of cuttings were taken from the same clones as already mentioned, treated the same way and inserted in the rooting medium of the benches. Of these, many withered and died during the ensuing days and weeks; a few of them finally formed

terminal flower buds which were pinched out as soon as they could be manipulated. Despite the removal of the terminal buds, the cuttings continued to die, and from time to time were pulled out of the cutting beds and discarded. At present, early February 1953, less than 2% of the original cuttings taken on July 5, 1952, remain alive. The latter have a few small roots on them. They resemble cuttings handled in a similar manner in 1951. Of these latter about 1% finally grew during the summer of 1952.

From these experiences it would appear that several types of deciduous azaleas can be rooted and started into slight growth the same season they are taken; provided that the cuttings are taken early in the season, and can be gotten into slight vegetative growth as soon as possible, instead of allowing them to produce terminal flower buds. If they do form such flower buds such buds should be removed at as early a stage of development as they can be nipped out.

While not a deciduous form, another experience may be of interest. This pertains to the *macrantha* Azalea. In the garden there are three seedling forms which are distinctly dissimilar in growth habit, hence they have been designated as clones A, B, and C. A is vigorous, tall growing and bears semi-

double rose pink flowers of the petaloid type. B is prostrate. After nearly 4 years in the garden it is still not more than 4 to 6 inches tall and bears single salmon pink flowers in great profusion. C is intermediate in growth habit and has single salmon pink flowers. Wishing to secure additional plants of clones A and B, cuttings were taken from them on May 25, 1952. Of these cuttings one-half of each lot were dipped in Hormodin No. 2, the other half untreated. All were then put into the rooting medium. On August 28 the cuttings were taken up to be transplanted. All the cuttings of clone A were equally well rooted, whether they had been dipped in Hormodin powder or not; those of clone B which had no Hormodin No. 2 applied were well rooted; those which had had the Hormodin applied had produced no roots, the leaves were yellowed and fell from the cuttings as they were lifted from the sand.

Apparently there is a decided difference in sensitivity of azalea clones to this growth regulating powder. Before using any one of the various so-called rooting compounds too extensively, it would be well to determine the degree of sensitive to any particular root inducing compound to be employed.

# Choice Begonias For Window-Gardening

STANLEY SPAULDING, *Editor*

## *Five Eastern Introductions*

While the choice of eastern *Begonia* originations is nowhere near as wide as those from the west, some interesting varieties have been raised in this part of the country. Since I am partial to the Rex Begonias, I have been very interested in growing *rex cultorum* Solid Silver, an origination of Mrs. W. D. Nisbet of Brooklyn, Connecticut. The large, slightly serrated, pointed leaf is "solid silver" with a red underside; the stems are dark red; the flowers are a beautiful pale pink in large clusters. It is a compact upright grower and thrives in the southeast corner of the sun porch. It is a worthy member of a Rex collection and is very effective when placed between two dark red varieties such as King Edward and The Black Knight.

From the same hybridizer comes a most attractive plant called Orange Dainty. The leaves are rhomboid-elliptic, medium green, five or six inches long with raised veins, and are similar in quality to those of *dichroa*. The beautiful soft orange flower start from the tips of the branches in early spring. While it is not a real trailer, it is a very graceful grower with the branches growing down and out practically horizontally, and shows itself to very good advantage placed on a side shelf of my old-fashioned woven wire plant stand in front of a southwest window.

A distinct addition to the list of trailing Begonias is Shippy's Garland from Mrs. Bess L. Shippy of Florida, formerly of Lockwood, New York. The leaves of this variety closely resemble those of *glaucophylla scandens*,

which are ovate, smooth, light green, deeply veined, with a slightly ruffled edge, and up to five inches long, but the stems are stiffer; therefore some of the branches may grow upright while others may trail; my specimen has the asymmetrical balance made popular by flower arrangers. Its crowning glory is the four months of bloom, from December to April, with clusters of beautiful large deep coral rose flowers, edged white, suspended from every tip. The five-petalled female flowers are especially handsome with their three-keeled ovaries, one of which is larger and more colorful than the other two. Need I add that everyone who sees this variety wants it. Mrs. Shippy's Marie B. Holley is the maple leaf type with leaves similar to but more deeply lobed than those of *Richardsiana*. The staminate flowers with their two petals bloom simultaneously with the pistillate flowers, which have five petals and a three-lobed ovary. Unlike many of the white flowered Begonias, which generally prefer an east window, this variety thrives in a sunny position in the south window and has borne flowers continuously from October through April.

A cross of *Boweri* × *Sunderbruchi* by Percy I. Merry of Needham, Massachusetts, in February, 1952, has produced some very promising seedlings. A selected specimen, Merry 52-1, not yet named, bears very stiff seven-lobed olive green leaves about three inches long, with dark brownish green streaks extending from the white hairy margins toward the depressed light green



*Percy I. Merry Photograph*

*Begonia 'Shippy's Garland'*

veins. The many pink flowers rise, like those on *Sunderbruchi*, in great profusion from the rhizome. At present all the plants of this cross are husky, full of flowers, and compact, larger than *Boweri*, but much smaller than *Sunderbruchi*, with the good qualities from each parent. If the leaves do not grow much larger as the plant grows to

maturity and the manner of growth remains the same, it should be a very desirable variety for the small home.

The begonia lover will enjoy growing all of these varieties.

RUTH PEIRCE MERRY,  
Needham, Massachusetts

*A contribution from the American  
Begonia Society.*

# Recent Advances In Horticulture

FREEMAN A. WEISS, *Editor*

Of all the amazing developments of the last decade in the field of chemical aids to agriculture the one evoking most general acceptance seems to be the chemical control of weeds, especially by selective lethal action, for we have long had poisonous chemicals that can destroy vegetation in toto.

The organic gardeners will, of course, have none of chemical fertilizers, not even those furnishing the essential trace elements which might be lacking in the lushest compost, as various commercial planters discovered when they first attempted to cultivate mucklands. Firm in the belief that an attack by fungus diseases and insect pests is only a manifestation of faulty nutrition of the plant, specifically due to lack of organic matter in the soil or the presence of poisonous chemicals, the devotees of this cult are reluctant to use fungicides or insecticides for protection against these enemies. It is different with weeds, which are loved only by God and children of pre-gardening age. Even in soil managed according to the best tenets of organic gardening, such persistent interlopers as chickweed, crabgrass, and others must surely grow, for how could they pass up so rich an opportunity to flourish and multiply?

This writer has not personally seen any organic gardeners using 2, 4-D to rid their lawns of dandelions, but he suspects that any convincing demonstration that *some* chemicals poison only *certain* plants, leaving others apparently unscathed, would appeal to them as a better way of eliminating weeds than the use of shovel and hoe.

To be sure, the results obtained with the selective herbicides have not always equalled the claims made for them and, when mishandled, they have sometimes damaged other plants than the despised lawn weeds. Only Athena, however, was born mature and perfect in all her parts, so why should we expect the same of a mere weed-killer? Nevertheless, notable improvements have been made in the efficiency and convenience of applying the 2, 4-D type of herbicides. First their killing power was increased and their range of effectiveness was broadened by formulating them as esters, or "organic salts"—in this case compounds of 2, 4-D acid with organic alcohols and amines, and by including trichloroacetic acid (2, 4, 5-T) which is particularly effective against woody plants. Next the dangerous drift of vapor, which often resulted in damage to neighboring and cherished plants, was greatly lessened by producing a variety of esters of low volatility. Even so, the right selection of herbicide for any particular purpose must be made from the variety of products now offered, but in an impressive range of agricultural and horticultural applications the hormone type of weed-killers have made the difference between economical crop production on the one hand, or abandoning the land to weeds on the other.

There are also some important developments in other selective weed-killers, for example, isopropyl phenyl carbamate (IPC), the herbicidal action of which is practically the antithesis of that of the 2, 4-D compounds. In other words, it is chiefly toxic to weedy an-

nual grasses and much less so to non-gramineous plants, as beans, beets and onions. Unlike 2, 4-D it is applied to the soil and exerts its action on the tiny seedlings as soon as germination occurs. Another group of herbicides having similar properties is composed of the alkali salts of trichloroacetic acid (which you may have used on occasion to destroy warts!). City dwellers confronted with the annual problem of crabgrass eradication from lawns, and farmers whose fields are invaded by such aggressive and persistent weeds as wild oats and quackgrass, will know how little help to them are the herbicides of the 2, 4-D type which are innocuous to grasses, and how welcome one would be that reverses this selectivity. In this category also are the crabgrass specifics that have been familiar for several years but still leave something to be desired in efficiency. These are phenyl mercury acetate (PMA) which is the active ingredient of the much publicized Scutl, and potassium cyanate, which is marketed under such designations as P.C. 80. They are effective to a considerable degree provided applications are begun early enough and repeated often enough, but are prohibitively expensive for application on a field scale. On the other hand, IPC and its 3-chloro derivative have found commercial applications in the control of crabgrass in cotton, wild oats in sugar beets, and noxious annual grasses in pastures.

It might be expected that neither plant growers nor chemists would be satisfied with herbicides that do only half a job, effective against either grasses or broad-leaved weeds but not both. The weeds themselves seldom observe this selective pattern of invasion. To meet the demand for one-shot weed-killers an extensive research project has

been carried out on maleic hydrazide (MH) once it was found that this compound had remarkable properties of inhibiting the growth, flowering, and setting of seed of all kinds of plants, coupled with negligible hazards to animals and minimal tendency to build up toxic residues in the soil. MH is the basis of the herbicides that have been publicized as "chemical lawnmowers." Where it is desirable to curtail the growth of grass (and other weeds) as a long fence, roadsides, garden paths, and shrub borders, the use of maleic hydrazide has proved practicable and economical with no serious disadvantages. It has much more than paid its way when used to slow down the growth of grass in the lane-separation strips and banks of modern highways, where mechanical mowing was becoming an expensive chore.

The use of maleic hydrazide as a "growth-stopper" is distinctly not advised as yet as a substitute for the lawnmower on lawns where smooth appearance is an important requirement. It is practically impossible to apply it so evenly that the growth of grass is uniformly checked, and repeated applications will weaken the root growth of the grass to an extent that top growth, winter survival, and resistance to weed invasion may all be adversely affected.

There are a number of other developments in herbicides that are still in the experimental stage. One of the new compounds that has reached the stage of commercial availability is sodium 2, 4-dichlorophenoxyethyl sulfate as used in Crag Herbicide. It is a non-selective type as far as a differential effect on grasses and broad-leaved weeds is concerned, but is selective in a different sense, in that it can be used on deep rooted, estab-

lished crop plants to destroy the host of annual weed seedlings that appear with the first warm weather of summer. An example is the destruction of such weeds in a strawberry or asparagus bed. It remains practically on the surface of the ground, hence does not reach the deeper roots of the established plants, but it does a good job of eliminating the pernicious "little fellows" which are often so numerous and so intricately associated with the crop plants that mechanical removal is difficult and costly. As this material is

effective chiefly on very young seedlings it is best applied just before the weeds are expected to appear or just after cultivating the soil and before a new crop of weeds can get started.

Readers wishing to inquire further into this subject will find the book *Weed Control*, which was reviewed in January, 1953 number of this Magazine, very helpful. An article on Grass Herbicides in Today's Agricultural Economy, by Roger M. Blouch, in the January, 1953 issue of the *Scientific Monthly*, is also very timely.

## Concerning Isolomas

PEGGIE SCHULZ, *Editor*

Window gardeners who enjoy introducing novelty plantings into their indoor gardens would do well to look into the possibilities of growing Isolomas. Colorful foliage, distinctive growth habits, and gay flowers are all traits that help make them worthwhile house plants and greenhouse subjects. These tropical plants belong to the GESNERIACEAE and are closely related to Achimenes. Much confusion has resulted in nomenclature and you will find them listed under *Tydea*, and *Kohleria* in many instances. Only recently have botanists given the go-ahead on the use of the name *Isoloma* to cover the entire genus. And I must say, it simplifies matters considerably.

There are about fifty species of these herbaceous plants and they grow from spiraling rhizomes or thickened, scaly, rootstocks closely resembling Achimenes tubers. Like many allied Gesneriads they can be safely tucked away during the winter months and revived in the early spring. Some, however, can be treated as perennials and kept in

constant growth. I have a plant of *I. hirsutum* that has never had a dormant period in three years. Of course the old stalk is somewhat bare in places near the soil line but so many new stalks constantly appear that they make a camouflage for the denuded portions of the older stalk.

Due to their extreme brittleness, the rhizomes often arrive from dealers in a broken condition. If this should happen to any you receive be sure to save all the pieces as each one is a potential plant-maker. Isolomas prefer a friable soil. One that has been found satisfactory for Gloxinias or African-violets is recommended. However, this mixture has proven to be a good one: Equal parts of rich loam, sand, leaf mold, and peat moss. I have had the best luck with Isolomas when I started the rhizomes in small flats of vermiculite or sand and later transplanted them into individual pots. I found that if the rhizomes were planted directly into the prepared growing mixture they were apt to rot away before good top



growth showed. After planting moisten the growing medium slightly and set the flat in a warm place. In a greenhouse they could be hastened into growth by applying bottom heat to the flat. Rhizomes planted in early spring often show signs of top growth in about two weeks. Those planted in January or early February are slow about pushing their top-knots into sight, and should be watered sparingly to avoid decay. As soon as flecks of green show, give a more generous watering and bring into the light. Transplant these rhizomes into individual 3-inch pots when the stalk is about an inch tall.

Isolomas grow rapidly and appreciate bi-weekly feedings of any reliable fertilizer, if it is not given in the excess. When the plants are about three months old buds begin forming in leaf axils and on some varieties a heavy cluster of buds form at the top of the plant. The buds on *I. hirsutum* are so well coated with red hairs that they resemble minute balls of fur tucked in leaf axils. Some species and varieties are protected with a covering of silvery hairs. The flowers are tubular, five-petaled, flecked, or spotted so heavily in some varieties that they appear nearly striped.

Like most tropical plants Isolomas grow to perfection in a humid atmosphere. Increase humidity in the window garden by setting the potted plants on dishes filled with moistened sand or pebbles, by slipping the potted *Isoloma* into another pot lined with damp sphagnum moss, or by setting plants atop wooden blocks in a water-filled trap. Smaller plants grow and bloom beautifully in a terrarium but they have to be kept cropped constantly to fit into such a space. These plants must have humidity of forty to fifty per cent

before they will favor you with flowers instead of dried and blasted buds.

During the summer months Isolomas can vacation outdoors under shrubs or in a lath house and the plants will prosper and produce many offsprings.

Watering requirements approximate those of the African-violet. And of course, if water is spilled on foliage, the plant should immediately be taken out of the sun to prevent burned and marred spots on leaves.

Isolomas, like most all vegetation, have their enemies. Mealy bugs, the cottony little spots that sometimes appear in leaf axils and on undersides of leaves can be routed by touching them with alcohol on a cotton swab. Thrips and red spider can be controlled by spraying occasionally, according to directions, with D-X Aero-Spray. This product is sealed in a low pressure bomb and pressure from a thumb is all that is needed to release the spray. There are several other sprays on the market that will also make short work of pests that choose to live on Isolomas or other Gesneriads.

Isolomas are easy to propagate. The tops of the plants can be nipped out, set in moistened sand or vermiculite, in a fish bowl or other covered and ventilated container and they soon take root. Individual leaves can be handled like African-voilets or Gloxinias and rooted in water or any other medium that has been proved satisfactory. They are slower to strike root from single leaves than from heavier cuttings.

Sturdy, flowering plants, can be produced in about a year from seeds. The seed is sown on any partially sterilized medium, or vermiculite, covered, ventilated, and placed in a warm spot. If the seed is fresh, germination will take place within two weeks. By the end of a month most of the late comers should

have put in an appearance and the top of the planting will be well dotted with green. When the little seedlings have four good leaves they can be safely pricked out and potted in community pots or, if space is no object, individually into "thumb" pots. They will be ready for 3-inch pots when they are about five months old. An east or tempered south light is desirable but fluorescent lights suspended above the plantings will produce very healthy erect plants. Sixty-eight would be a desirable temperature for these plants but if precautions as to supplying additional humidity are observed some varieties are quite at home in the average living room.

After plants have finished blooming, water may be withheld and the pots stored in the basement or some other cool, dry spot. When cared for in this manner, the soil they are resting in should be sprinkled with water about once a week. If allowed to become too dry the rhizomes dehydrate and disappear. Rhizomes can also be stored in sand or vermiculite in a ventilated box or jar with holes punched in the lid.

If they have been left in their original pot they should be knocked out and examined before planting time. Plants that have had good care during the growing season grow many additional rhizomes and these can be broken apart and planted separately or the entire root ball may be left intact and repotted into a 4- or 6-inch pot, depending on how rapidly the root system expanded. It is usually safest to wait until spring to separate them but with care in handling they can be divided any time of the year.

*I. hirsutum* (Syn. *I. erianthum*): This is the species most commonly grown. The ovate, fleshy, dark green leaves are edged attractively with

deep red. The plant stems, petioles, peduncles, and buds are heavily haired. And this plant isn't stingy with its flowers! The light red bells are marked with deeper red in the petals and the flowers are produced over a period of six weeks to two months. When several plants of different ages are growing in the same pot the planting will show some flowers at most any season of the year. Single plants grown from rhizomes started in late February or early March can be expected to produce flowers from May until mid-June or early July. Many large greenhouses that stock Gloxinias also have a few pots of this species for sale and they can usually be purchased for about fifty cents a pot.

*I. amabile* (Syn., *Kohleria semanii*): This is a favorite among Gesneriad collectors. The soft green leaves are thinner and more fragile appearing than those on some of the other *Isolomas*. Veins are purplish brown and this color is diffused into the leaves. Flowers are deep rose outside shading into a soft pink interior and the throat and petals are dotted with wine flecks. Many growers let this *Isoloma* trail over the edge of the pot and use it as a hanging basket planting.

*I. bogotense* (Syn. *I. pictus* or *Kohleria picta*): Leaves on this plant are marbelized silvery-green and well grown specimens sport a heavy flush of brown. The lower part of the flower is yellow dotted with red and the upper portion is bright red.

*I. ceciliae*: This is one of the most choice of all the genus. Leaves are green stained with brownish patches and flower buds are encased in downy hairs. As the bud elongates it turns into a blush pink tube and the flower face and throat are deep rose. This

plant is not quite so rapid a grower as are other species.

*The Standard Cyclopedia of Horticulture*, by L. H. Bailey, lists two other species but I have not been able to find them listed by a dealer nor have I found a private collector who has grown them.

*I. ocellatum*: Green leaves, tubular red flowers whose petals are marked with white and black dots.

*I. jaliscanum*: Downy leaves and scarlet flowers.

The *Dictionary of Gardening*, by The Royal Horticultural Society, lists twenty-nine *Isoloma* species and hybrids. Surely this must be an indication that these are favored pot plants in other parts of the world.

*A contribution from the American Gloxinia Society. A review of Mrs. Schulz's new book "Gloxinias—And How To Grow Them" appears in this issue of The National Horticultural Magazine. Ed.*

## A Book Or Two

*Reviews in this issue were prepared by: Freeman A. Weiss, Frederic P. Lee, Victor R. Boswell, B. Y. Morrison, and the Managing Editor.*

*Year Book of the Rose Society of Ontario, 1952.* Arthur J. Webster, Editor.

An interesting feature is "The Clearing House," devoted to appraisals of recent (since 1947) introductions of rose varieties by a group of 15 contributors from various localities in Ontario. There is also a Rose Analysis, in which rose varieties are rated for different purposes or qualities, such as exhibition, bedding, autumn blooming, fragrance; likewise the relative popularity of varieties in the different types of roses—H. T., Climbers, Polyanthas—is shown. Valuable for its information on the performance of roses where the winters are generally on the severe side, but the summer climate (together with good rose culture) is conducive to the production of really fine roses.

*The Rhododendron Handbook, 1952.* Editors N. K. Gould and P. M. Synge. The Royal Horticultural Society, London, England. 1951. 331 pages, not illustrated. \$3.25 post-paid.

When the British Rhododendron Association was converted during the War into the Rhododendron Group of the Royal Horticultural Society, the Association's Yearbook published annually from 1929 to 1939 became the Rhododendron Group's *Handbook* published by the Society on a quinquennial basis, first in 1947. This is the second quinquennial edition. The *Handbook* covers not only the true Rhododendrons but also the Azaleas.

On the whole the various editions of the *Handbook* (and its predecessor Yearbook) have been uniform as to

content: a list of Rhododendron species with British hardiness and merit ratings, identified by series and subseries, and described by height of plant and color of flower; a list of synonyms among Rhododendron species names; the collection numbers of Rhododendron species collected by Forrest, Farrer, Kingdon-Ward, Rock, Ludlow and Sheriff, Hu, and McLaren and in cultivation in Great Britain; a list of hybrid Rhododendrons and Azaleas in the nursery trade with color of flower and British hardiness and merit ratings; a list of newer Rhododendron hybrids and parentage and name of raiser or exhibitor and date; and a list of Rhododendron crosses alphabetized by names of parents.

The Rhododendron Group is suspending activities and winding up this year. On the assumption that the Royal Horticultural Society will continue the *Handbook*, possibly suggestions for the next quinquennial edition are permissible: Expansion on an extensive scale to make the lists of deciduous and evergreen Azalea hybrids in terms of adequate; color references in terms of the Society's own Horticultural Colour Chart; extending the distinction between hybrid groups and hybrid clones, whenever possible, to the list of hybrid Rhododendrons and Azaleas available in the nursery trade; more detail as to height and other habit aspects of hybrids, as to time of bloom of species and hybrids, and as to type of flower and flower cluster; greater attention to Dutch, Belgian, and German hybrids.

The *Handbook* has been a bible for many Rhododendron growers and breeders in our Pacific northwest where cultural conditions are similar to those in England. The *Handbook* is also a worthwhile aid to their kin in other regions of the United States. How-

ever, the Azalea grower can obtain considerably more information from the comprehensive *Azalea Handbook* published last year by the American Horticultural Society and limited to the plants of the Azalea Series among Rhododendrons.

*Gloxinias—And How To Grow Them.*

Peggie Schulz. M. Barrows and Company, Inc. New York. 1953. 128 pages, 28 illustrations, 4 in color. \$2.95.

For the reviewer, concerned with format, typography, design, etc., (also contents) he wondered upon opening the opus why so much space was reserved under the First Printing date-line on the copyright page. As he closed the book, on conclusion, an hour or so later he was not only ashamed of those long legged tree-like things amongst which he sat but he had the format puzzle solved. It was the sole anticipation of a very smart printer—he knew that there would be a second, third, fourth and so on printing and all of the efforts on his part would be to add the new date line to his plate and start the press rolling.

Mrs. Schulz has done what appears to be a completely thorough job on the culture of Gloxinias. She treats their history, species, modern fluorescent lighting as an aid to the basement grower, propagation, diseases, even sources of supply for the popular plant and the problems and their solutions for the greenhouse and commercial grower.

The paragraphs on colchicine read almost in a philosophical realm of the metaphysical and should incite all readers to research this subject—the current literature is voluminous.

An interesting ending tells of other members of the GESNERIACEAE Family

that are charming as house plants. These are certainly lesser known today and the reviewer feels sure will bestir most of us to make a try with them.

Amazingly, throughout the entire book one can find any number of elective ways for culturing this plant—which is good for all readers wherever Gloxinias may be grown. It leaves the grower with several ways in which to reach the ultimate goal of successful flowerings to be reached in the fashion most pleasing and adaptable to the individual plant's habitat and its tender's whims. The colored and black-and-white illustrations are very good.

To those of you familiar with *The National Horticultural Magazine* and with Mrs. Schulz' section on the GESNERIACEAE, you will find the same delightful easy reading verbiage in her book. By all means grab a copy of the First Printing while it may still be available.

*The Rhododendron Yearbook 1953, No. 7.* Editors N. K. Gold and P. M. Synge. Royal Horticultural Society, London, England. 1952. With one colored and 43 line illustrations. \$2.40 postpaid.

The 1953 number of the Rhododendron Yearbook continues such customary features as reports of the discussions of the meetings of the Rhododendron Group, reports on exhibits at the British Rhododendron Show, and descriptions of various well known Rhododendron gardens. One of the gardens this time is the Royal Botanic Garden, Edinburgh, Scotland. Not only its plantings but its work in the introduction of species and early hybrid Rhododendrons over the past century and a half is related. Others are the gardens of Sir John Ramsden at Muncaster Castle in western Scotland and

the garden of E. H. M. Cox on the east coast of Scotland.

Leading articles cover notes (first installment) on Rhododendron species and hybrids by the late Lionel N. de Rothschild, very early flowering hybrid hardy Rhododendrons by Frederick Street, propagation by tip grafting by J. S. Yeates of Palmerston North, New Zealand, and propagation by stem cuttings by Joseph S. Wells of Bridgeton, New Jersey. Two briefer articles concern the trial garden of the American Rhododendron Society of Portland, Oregon and the 1952 show of the Tacoma, Washington, Rhododendron Society.

*George Forrest, Journeys and Plant Introductions.* Editor, Dr. J. MacQueen Cowan with the assistance of the staff of the Royal Botanic Garden, Edinburgh, and E. H. M. Cox. Royal Horticultural Society, London, England. 1952. 252 pages with 110 illustrations, 5 colored, and a map of the country covered by Forrest. \$5.00 postpaid.

George Forrest was not a gifted or voluminous author like his fellow plant explorers Wilson, Farrer, and Kingdon-Ward. In fact he could rarely be induced to write of his work save incidentally in letters to his family and the sponsors of his journeys. This volume fills the gap by a brief account of his journeys (from 1904 until his death in 1932) in Northwest Yunnan, China, and southeast Tibet. These journeys took place in the deep valleys of the Salween, Mekong, Yangtze, and eastern branch of the Irrawady and the high mountain ranges between these rivers, an area of around 50,000 square miles.

Forrest's collections of Rhododendron (309 new species) were the finest of all in quantity and quality. His *Prim-*

ula with 40 odd new species and his Gentians came next. These with his collections in some 58 other genera, are fully described along with Forrest's comments and surrounding incidents. The excellence of illustrations, many Forrest's own, and the writing itself afford much pleasure. The book is both an interesting, as well as valuable, contribution to horticultural literature on plant explorers and their introductions.

*Manual of the North American Smut Fungi.* George William Fisher. The Ronald Press Co., New York. 1953. 343 pages, 136 halftone illustrations. \$8.75.

A book about the smut fungi by George Fischer carries about the same degree of authenticity that the name Webster does on a dictionary. This is strictly a taxonomic work and a very thorough one, covering 22 genera and 276 species (without splitting!) of smut fungi, occurring on species of 242 host genera. It is profusely illustrated with reproductions of photographs showing the gross morphology and the microscopic details of most of the smut species treated. This feature distinguishes the present work from its American predecessors in this field, Clinton's monographs of 1904 and 1906, and Zundel's "*Additions and Corrections*" of 1939. Another important innovation is the index to smuts based on the genera of hosts they infect. A second key is based on the morphology of the sorus and of the spores without the use of germination characters. As an exemplary contribution to the taxonomy of a large and economically important group of fungi this work is outstanding.

*Vegetable Growing.* James Sheldon Shoemaker, John Wiley and Sons, Inc., New York. 1953. 515 pages, illustrated (2nd ed.). \$6.00

In his second edition of *Vegetable Growing*, an unusual and very popular text, several significant changes and additions have been made. The overall length of the book is not materially greater than that of the first edition, but in effect its content has been appreciably expanded.

The general organization of the work in 15 chapters remains unchanged except that certain material on insects and diseases found in the last chapter of the first edition has been broken up and placed in the respective crop sections along with other specific data and directions revealing to each crop.

The expansion of information and bringing it up to date through 1951 have been effected mainly by dropping out some of the less significant details of the first edition, replacing them with newer and more significant material. Some condensation has also been effected without omission of salient facts in order to add newer or more significant information. The list of publications cited has been tripled to more than 450.

Special attention has been given to variety classification, bringing the variety lists as nearly up-to-date as is possible. New problems or difficulties in production that result from changing circumstances have been dealt with in some detail. New sections have been added on coated seeds, and on herbicides. A short section on tampala has been replaced by one on zucca melon. The author's treatment of research findings and their applications reflects wide familiarity with the recent as well as the older vegetable research and practice.

Most authors of books on vegetables or other groups of crops devote the first few, or even several, chapters to such general and background information as history and geography of the "industry," botany of the crop involved, climate, soils, principles of fertilization, irrigation, soil management, propagation, and pest control. The author, however, except for the opening chapter on seed production, proceeds directly with the details on each of the numerous vegetables included. By dispensing with those general chapters, and by use of an economical style, he has been able to pack into 515 pages also an unusual number of relevant facts, significant statements, interesting oddments and helpful bits of know-how not commonly encountered in most text books in this field. With few exceptions, information on the genetics of vegetables is not included.

Designed primarily as a text for students who will have received elsewhere some knowledge in such related disciplines as soils, botany, plant pathology and entomology, emphasis is directed to the production and management problems of the individual crops. For the reader or student possessing some reasonable elementary background on plant production it is an unusually exhaustive reference and guide.

*Introductory Mycology.* Constantine John Alexopoulos. John Wiley & Sons, Inc. New York. Chapman & Hall, Ltd., London. 1952. 482 pages, 187 figures. \$7.00.

Horticulturists have not originally been wont to study mycology—the science of the fungi—except in its applied phase which deals with the diseases of crop plants that some fungi cause. But horticulturists are all biologists in some degree, most of them

are perennial students, and all of them live in a world in which the activities of fungi play an increasingly recognized part. In the words of the author, "With the discovery of antibiotics, with the recent strides in the genetics and the biochemistry of the fungi, and with the realization of the role which fungi play in the causation of allergies and parasitic diseases of man, the need for a textbook written on the elementary level has become greater \* \* \* for some knowledge of mycology is now not only necessary to the biologist in general, but is becoming a part of the cultural background of every educated and well-informed individual."

This book aims to give "an insight into the importance of fungi to man and into the structure, life history, and classification of fungi in general" without "the innumerable details and exceptions which make the study of fungi so fascinating for the specialist, but so bewildering for the beginner." It primarily stresses morphology, but presents the subject in easy conversational terms with a minimum of technical vocabulary. There is an extensive glossary however. The diagrams of the structure and the life cycles of fungi are excellent.

*House Plants. Everyday Questions Answered by Experts.* Edited by F. F.

Rockwell and Montague Free. With Introduction by Helen Van Pelt Wilson and Esther C. Grayson. Garden City Books, Garden City, New York. 1953. 159 pages, illus. \$1.50.

Aside from the Introduction, which presents the requirements of house plant culture in general terms, this book is a revision and extension (with reference to house plants only) of the well known book, *10,000 Garden Questions*, from the same publishers. Questions

that are commonly asked by home gardeners, and answers in terms that all gardeners understand, on the names, habits, culture, propagation and troubles, are given for most of the plants adapted to indoor use. Easy to find the plant of your special interest if you know any name for it at all, and the information given leaves the house plant culturist with little need for anything more than the experience of applying it.

*A Handbook of Crocus and Colchicum for Gardeners.* E. A. Bowles. D. Van Nostrand Company, Inc., London, England, 1952. 222 pages with 32 illustrations, 12 in color. \$6.00.

Mr. Bowles' *Handbook* is the authoritative horticultural work on Crocuses and Colchicums. George Maw's comprehensive and magnificent Monograph of the Genus *Crocus*, published in 1886, has been long out of date and costly.

This new edition of the *Handbook*, while a revision of the original 1924 edition, has been almost completely rewritten. Following introductory chapters on the cultivation and botanical characteristics of Crocuses, Mr. Bowles gives a chapter each to the Spanish group, the eastern species flowering in the autumn without leaves, the autumn species flowering with leaves, the saffron group, the vernus group, the imperati group, the eastern reticulate species, the aureus group, the annulate Crocuses, and the miscellaneous spring flowering species.

Similarly a general discussion of Colchicums is followed by chapters on *Colchicum autumnale* and its allies, *cilicicum*, *byzantinum*, and *speciosum* and its varieties, the tessellated species, the garden hybrids, and the small flowered species.

Miscellaneous features are a chapter on two genera closely related to Colchicums, *Bulbocodium* and *Meren-dera*; critical bibliographies on Crocuses and Colchicums; and a discussion of the nomenclature of *Crocus vernus* by Mr. B. L. Burtt. Both format and presentation are similar to the author's well known *A Handbook of Narcissus*.

Few genera among the bulbs contain so many hardy species and varieties blooming over so many months of the year as do the *Crocus* and *Colchicum*. The familiar Crocuses of early spring are only part of the *Crocus* and *Colchicum* picture. A serious minded gardener will find the *Handbook* both comprehensive, scholarly, and interesting. It will be of great help in understanding and growing the many species and varieties in these two genera.

*The American Rose Annual, 1953.*

Edited for the American Rose Society by R. C. Allen, assisted by Margaret R. Snyder. Harrisburg, Penna., 1953. 279 pages, illustrated. To members only.

This is a particularly interesting issue for in addition to the usual quota of articles for the beginner who has to be reached apparently through the emotions, there are several very worth while articles that will never raise an emotional quiver. The articles on rose breeding, Mr. Thompson's "Looking Forward," a title that does not tell of the interest in species that may be the points of new departure, Mr. Brownell's "Forty Years of Rose Research," "Chromosome Numbers in Rosa" by Morey and Wessig, Dr. Lawrence's "History and Nomenclature of the Fairy Roses" while not strictly in this category touches the borders none the less, Morey's "The Bourbon Rose," and Jenkin's "Rose Research Project"



all invite the closest reading and thought.

For the person who is concerned with cultural matters there is the inevitable review of troubles, neatly put and with little modicum of hope, false hope that is. There are also reports from various parts of the country with differing climates and degrees of success. The only trouble with these reports is that you probably will not find your climate there. The Reviewer did not find his.

If you do not belong to this Society, you should.

*The Book of Shrubs, 6th Edition.*

Alfred Carl Hottes. De La Mare Company, Inc., New York, New York. 1952. 438 pages with 190 illustrations. \$2.00.

*The Book of Shrubs* is probably the best known small popular volume on deciduous and evergreen broad leaf shrubs for the general gardener or home owner, particularly in the north-eastern part of the United States. The author is a former professor of horticulture at Ohio State University and presently associate editor of *Better Homes and Gardens*.

Many important genera of shrubs are dealt with to varying extents. Brief non-technical descriptions are given of outstanding species in the genus, their uses, soil preferences, pruning and transplanting requirements, and propagation, together with helpful critical comments. In a few instances horticultural varieties are mentioned, as in the case of Fuchsias, Weigelias, and *Philadelphus*, but not, for example, in the case of Camellias, Azaleas, or Rhododendrons except for a few Catawbiense hybrids.

Many special topics are compactly treated, as foundation plantings, soil acidity, transplanting, pruning, propa-

gation, hedges, and insects and diseases. There are lists of shrubs by color of flower, color of fruit, color of foliage, color of twigs, and autumn color; height; suitability for shade, seashore, far south, city conditions, and dry and wet sites; and hardiness.

The sixth edition adds some shrubs for the Gulf states and California. The *Azalea* and *Fuchsia* texts are rewritten and other substantive revisions have been made.

*The Book of Shrubs* does not stand alone in its general field. Among its several competitors *Shrubs and Vines for American Gardens* by Donald Wyman, horticulturist of the Arnold Arboretum, published in 1949, is an equally readable and a more comprehensive and informative treatment of the subject, although somewhat more expensive in price.

*An Introduction To Statistical Science In Agriculture.* D. J. Finney. John Wiley and Sons, Inc., New York, 1953. 179 pages. \$3.75.

An aid to the efficient planning of agricultural resources and production, setting forth general statistical principles and concentrates on their application in solving agricultural problems. Dr. Finney, a lecturer in the design and analysis of scientific experiment at the University of Oxford, has been engaged in agricultural research and teaching in England, the United States, and abroad for many years.

*The Years In My Herb Garden.* Helen M. Fox. The Macmillan Company, New York, New York. 1953. 185 pages, illustrated. \$3.95.

This is a very personal book and one that is enhanced in value by that very fact. It has the further value in this case of having been written after many

years of gardening, after other books written perhaps under more urgency of gardening and experiment.

It has the still further virtue of a clear statement of what the author intends to put in it, as clear a limitation of the field as has been the pleasure of this reviewer to read for years. "It has not been my intention to write a complete herbal, but—" This is just what the author has done and delightfully, persuasively doubtless for many, though not for all.

The pictures are charming, both those from the new garden at High and Low and the old garden in Foxden. The portraits of plants are nicely posed and placed. The pictures of other herb gardens varied enough to hold any interested reader's attention and the plans intriguing particularly in the somewhat limited planting lists. Except for one garden in California, and one from Missouri, all the gardens shown and planned are eastern and really northeastern. At the very end, there are four pages of recipes, no more, for which some readers will feel regret, some relief!

This is by far Mrs. Fox's best book and one looks forward with something more than anticipation to her promised volume on Le Notre.

*The Royal Horticultural Society's Dictionary of Gardening.* Edited by Fred J. Chittenden assisted by specialists. Oxford University Press, Amen House, London, England, 1951. 4 vols., 2316 pages with numerous line illustrations. Large crown 4to., printed in double columns. \$31.50 postpaid.

*The Dictionary of Gardening* is a British encyclopedic work on plant species in cultivation and some of the plant hybrids and forms long estab-

lished and widely grown. Some 41 specialists assisted the editor including a handful from the United States. Work is underway on a supplementary fifth volume that will list subsequently introduced species and recommended garden varieties of the principal kinds of plants that are constantly being improved by hybridization and selection.

The *Dictionary* has as its basis George Nicholson's *The Illustrated Dictionary of Gardening* published between 1884 and 1888 and long out of date. The comparable publications in our country are Liberty Hyde Bailey's the *Standard Cyclopedia of Horticulture* published in 1917 in six large volumes and the recent one volume revised edition of his *Manual of Cultivated Plants*.

The *Dictionary of Gardening* was edited by Frederick James Crittenden, technical advisor and editor of the Royal Horticultural Society. Crittenden's editorial work on the *Dictionary* extended over the period 1939 until his death in 1950. Mr. P. M. Syngé and Mr. W. T. Stearn completed the *Dictionary*.

In the main the *Dictionary* is arranged alphabetically by genera. Each genus has a description of its characteristics accompanied by cultural directions, a key to its species, and a listing of the species with brief descriptions of each species and of some hybrids. Plant families are also listed alphabetically with a brief description of the family and references to the more important genera within the family. Interspersed are many articles of a general character on diseases, pests, fertilizers, and miscellaneous horticultural subjects.

The *Dictionary* is one of the great horticultural works of this generation. It is of immense value to gardeners in

the United States with due allowance for differences in requisite cultural conditions outside the Pacific Northwest.

*A Flora of Santa Barbara.* Clifton F. Smith. Santa Barbara Botanic Garden, 1952. 100 pages, illustrated. \$1.50.

This is a very useful flora for local use in the area studied. It deals only with "the vascular plants growing without cultivation in the vicinity of Santa Barbara." This means of course those many exotics are included, some that escaped, some planted but untended.

For the causal gardener it will seem a dull book, but do not be confused. It is excellent and no one who has not attempted a similar project can possibly imagine the work that piles up mountain high before so simple a volume can be born.

*The Gentle Kingdom of Giacomo.* Evleyn Wells. Doubleday and Company, Inc., New York, New York. 1952. 375 pages. \$3.95.

A novel about the flower growers of California.

*Cyclamen Persicum: Its Natural and Cultivated Forms.* Walter C. Blasdale. Stanford University Press. Stanford, California, 1952. 49 pages, illustrated.

Readers of this Magazine will recall Prof. Blasdale's contributions on the subject of *Cyclamen*, various species. This booklet adds to what he has already written and will be a welcome addition to our files, as it must be for any one who is concerned with *Cyclamen* in any other than a purely commercial fashion.

*Hydrazine.* Charles C. Clark. Mathieson Chemical Corporation, Baltimore, Md. 1953. 133 pages, with graphs and diagrams.

The versatile chemical which this book describes has a composition somewhat akin to that of ammonia, but it enters into vastly more different compounds. It first came into industrial prominence early in World War II as a fuel for rocket planes. By now it has given rise to about 50 classes of organic compounds, with numerous varieties of each, and the list is still growing. These have found applications in the manufacture of dyes, plastics, textiles, rubber, antiseptics, and pesticides. Of greatest interest to horticulturists, however, is the new plant-growth-stopper, maleic hydrazide, known for short as MH. Recent developments in chemical control of weeds and of the growth of lawn grass by the use of MH are discussed elsewhere (see p 167). The present book is for chemists rather than horticulturists and seems to cover about everything that was known of hydrazine and its compounds up to 1950. There are over 150 literature citations.

# The Gardener's Pocketbook

*Notes from Pass Christian, Mississippi*

One of the first camellias to open in this garden where the collection is still small, is Appleblossom, assigned to *Camellia saluenensis*. It was very deliberate in making up its mind to grow and flourish but seems now to be entirely at home. If it had no other virtue here, its very long blooming season is greater than that of any other *Camellia* grown here. The first flowers opened in late October and the final flowers fell the third week in January, with a good garden show effect through December and January. It is true that the flowers are small, pitifully small if one compares them to the flowers of some of the largest varieties of *C. japonica*, but they are large enough and so much more numerous on the plant that they make a better garden plant than some of the *japonica* varieties. The flowers are sweet-scented and those with keen sense of smell insist that the odor is pervasive on warm days. The flowers stand a few degrees of frost with impunity, just how many has not been recorded, but as is the case with most *Camellia* sorts a gray day after the freeze will temper the injury.

Blooming now for the first time this year is *C. fraterna* which is probably only a collector's item, nasty phrase. The bush here as yet is rather thin with slender shoots and twigs and nodding their white petals. Here again for the buds that show pink before they open for the perceptive nose, is a delicate scent.

Many are the varieties of *C. japonica* that have commenced to make the mid-season flowering the delightful risk that it always is, when a single frosty night can spoil all that is open especially if the warm sun shines on the moistened

flowers the next day. There is no intention of making a catalogue of favorites or that much more precarious business a list of the "ten best," as if any one could! But the longer one sees *Camellias*, the more he appreciates the variations that may appear on one and the same plant. In the neighborhood is a fine old plant of *Elegans*, commonly if erroneously known as *Chandleri* and by the even less careful as "chandelier" [sic]. This varies not only in color pattern but in the degree of doubling, and has given rise to variations that appear to be fixed by grafting from the single scion that started the whole business. In the garden here, the original is represented by a plant in which there is almost no white mottling. There have been added a white form and *C. M. Wilson* which is pink with some white on the margins.

B. Y. M.

## *Rosa mutabilis*

In this remote spot it is not possible to look up as many reference works as one might wish, but *Hortus II* passes this plant with the remark "A confused name, plants so listed are probably referable to *R. gallica* or *R. setigera*." It is many a year since the writer has seen the former but the plant grown here under the "confused name" has not the slightest resemblance to *R. setigera* or any of its offspring that he knows and no resemblance to *R. gallica* as he recalls it, a not altogether reliable reference to be sure.

Of course there is the off chance that the plant purchased under this name is not *R. mutabilis*! This would be a delightful out for all of us, but it grows like a China rose, with many-flowered open panicles of bloom and the typical

habit of starting new shoots from the eyes of the stem that bears the flowers long before the flowers are over. One wonders how nurserymen ever find buds mature enough and dormant enough to do their budding.

The flowers are single, about two inches across, with widely flaring petals, that do not make a symmetrical flower though the bud is tight and neat enough. As the sepals part, the petals show a fine almost lacquer red color and the flower opens the first morning a finely orange-tinted pale pink rose, the second day the color is a deeper pink but with still a hint of orange and copper, the third day, usually the last, the flower is a deep rose red with the bronze tone almost hidden. The plant is too new for the writer to be able to report at this time if seed is set, for most of the heads have been picked off and all encouragement is given to keep the flowering continuous. The colors are vivid enough and the flowering abundant enough to make this a showy thing in the border.

The foliage is good, not as leathery or as dark as in some of the other China roses, but so far entirely healthy and lasting. What the ultimate height of the bush will be, is also unknown now, but it probably could be controlled as for any other freely branching rose. When our bush is really large enough, it will be used for cutting making a delightful foil for any of the more solid things now in flower. In a great white urn-shaped vase combined with *Lilium longiflorum*, and sprays of *Salvia farinacea*, or the lavender of *Duranta* or even the drooping flowers of *Buddleia Lindleyana*, it would be fine even if not the center of interest itself.

B. Y. M.

#### Re *Oxalis*

Now, at the end of April the leaves on *O. Bowieana* show all the signs of

maturity, those of *O. hirta* which was figured in the last issue under the name of *O. fulgida*, a name no longer used for this plant, a little shabby. *O. brasiliensis* is still flowering and has been for almost a month with erect heads of three to five dull rose flowers not enlivened by a colored eye. *O. variabilis* which bloomed well but not abundantly, with large clear rose colored flowers with a greenish yellow eye, the blossoms sitting almost tightly on the leaves is also showing signs of ripening its roots for the leaves are yellowing in the oldest members. The species common in all gardens in these parts and generally looked upon as a great nuisance, is now making a particularly fine show. In the rough grass under pecans trees it dots the green with its pale pink flowered heads and in garden borders where it has to compete with ground covers like *Liriope*, ivy, and *Rhodea* it makes a charming shower of pink blooms. One only wishes that the color were purer and stronger. The plant was identified for me as *Oxalis martiniana* for no one here seems to know what it is nor whence it came.

Of the *Oxalis* grown here, three are South African: *O. Bowiei* Lindl., *O. variabilis* Jacq. which must now be called *O. purpurea* L. according to Mr. T. M. Salter and *O. hirta* which probably accounts for the early ripening off of the foliage.

Paymaster-Captain Salter, working in herbaria but more importantly in the field for 11 years, published in 1944, "*The Genus Oxalis in South Africa*" A Taxonomic Revision, in the *Journal of South Africa Botany*. It is a model of taxonomic diligence and restraint but offers little to whet the curiosity of the gardener whose interest is inflamed by the Author's beautiful line drawings.

Concerning *O. Bowiei* there is only one line: "This species has been cultivated as a border flower in England."

Both *O. purpurea* L., that was *O. variabilis* Jacq. the name under which our plants were purchased, and *O. hirta* L. are what the author prefers to call "group species" into which are put all the species of other authors that the writer believes to be variants of the type. These include variations in flower color, leaflet shape, the degrees of hairiness chiefly. His field observations seem to warrant his conclusions, but as he himself says repeatedly, in his book, the whole genus needs much more study in the field and in cultivation to be sure that the variants are variants and nothing more. If the white and yellow colored flower forms of *purpurea* are as handsome as the rose colored flower we have here, they must be splendid. His form "C"—"Corolla pale salmon fading to yellow and then white in drying" is reported from two localities only but from a gardener's point of view seems worth a collecting trip. No mention is made as to whether or not the species is free-flowering, but there is no suggestion that it is not if the weather and other conditions are favorable, so cultural practices here must be worked out for better flowering, perhaps even some modification to offset "our" weather.

For the last species also, *O. hirta* L., one finds reported the same sort of variables. *Hirta*, however, is caulescent, and here again the gardener would like most to know and see the best of the rose-colored forms, the few whites and yellows.

B. Y. M.

#### *Food Production in Hawaii*

The land area of the Territory of Hawaii comprises 4,089,840 acres,

seven and one-half per cent of which is in cultivated crops. Forest reserves amount to 1,211,535 acres.

The Hawaiians consider that home grown vegetables are low in minerals, and also in vitamins, so frozen peas, beans, asparagus, broccoli, spinach and brussel sprouts which are shipped from the Mainland may be purchased in Honolulu. Cattle and sheep graze on 1,533,000 acres. There are 220,380 acres in sugar cane, 70,723 in pine-apples, and 47,000 in diversified crops. The livestock consists of 54,400 of swine, 30,000 head of beef cattle. There are produced 3,707,000 dozen chicken eggs annually.

#### *Soil Characteristics*

The newcomer to Honolulu is impressed by the reddish brown to red soils which may be seen on the hillsides and slopes. They reminded the writer, when in Brazil, of Marbut's and Glinkas' descriptions of some of the soils in Brazil.

They are reported by the Hawaiian Sugar Planters' Experiment Station to be strikingly deficient in available calcium, the pH values ranging from 4 to 8, and to respond to nitrates—the organic matter content being very low—superphosphate and to some extent potash. Upon examination when wet by the finger test they are not sticky, yet are very fine in texture, being similar to artists' modeling clay or colloidal clay.

They are characterized by the freedom with which water escapes or penetrates through them, causing much loss of water from irrigation canals and ditches. The writer discovered that such may be stopped by spraying the bottoms and sides of reservoirs, laterals and irrigation ditches with a latex.

The flat lands upon which vegetables are produced are black in color, affording evidence that they allusively supported grasses.

Honolulu gardeners grow carrots throughout the year. It has been found, however, that they do best in soil temperatures ranging from 56-72 degrees, or at higher elevations, where the soils are warmer. Also, that best results are derived when the seed is planted in January and the crop harvested in March or April. They are poor in color if the soil is not well drained.

Local commercial fertilizer and cultural practices should be followed. The fertilizer is placed in bands, two inches to the side and one inch below the seed. The plants are thinned to a distance of one inch apart in the row.

The production of bananas is interesting. It should be noted that they are rather delicate, and that they ripen best when the bunches are green. Insects are most damaging to the fruit if it is permitted to soften on the bunch. It should be cut before the fruit bunches begin to change color. Each tree produces one bunch of bananas in its life time. If the tree is tall it is cut down and the bunch removed before it begins to change color. It is considered to be the best practice to hang the bunches in a screened place, or cover each bunch with cloth, such as cheese cloth. It is lowered gently by the use of a forked stock, thus protecting the fruit.

The production and marketing of sugar cane in Hawaii is a huge and interesting industry. One million tons of sugar are produced here annually. About 10 million tons of cane is moved from one million acres of land to sugar mills annually. This is accomplished by the use of huge units which are

powered with Diesel motors. This crop is irrigated in Hawaii.

Sugar cane matures in 22-24 months. When a crop is cut it grows again from the roots. This growth is called the ratoon crop. From two to four of these ratoon crops are obtained from each normal planting of seed cane. Seed cane stalks are from one to three feet in length. This is cut and planted by machinery. The pieces are covered with one to three inches of soil. When full grown, the stalks are 15 to 20 feet in length.

There are several large sugar cane plantations in Hawaii. The average size is 8,000 acres. Each plantation is a complete community with its homes, schools, churches, playgrounds, medical facilities, theatres, independent merchandising and several businesses. Commercial fertilizers are used by sugar cane growers. They are applied in solution by means of a helicopter.

Repetitions are made as the appearance of the plants indicate that plant food is needed by them.

The pineapple industry is one of the two leaders in Hawaii. Pineapples are produced on 70,900 acres of land on the Islands. Its output is valued at one hundred million dollars annually. It is a remarkably delicious fruit when properly ripened. Eighty-three per cent of the nation's supply of pineapple products are produced in Hawaii.

It is not grown from seeds for very few have seeds. It will grow roots from fruit when it is buried in the soil. These plants fruit in 18 to 24 months. They do not produce additional fruit. The mature plants range from 2 to 4 feet in height. Every part of the plants is utilized, nothing is wasted. The shell is ground and dried for use as pineapple bran for feeding livestock. The leaves of the plant are returned to the

soil. The writer however, ground them finely, added latex and pressed the mixture into lumber. This is not attacked by termites or other insects, fungi and bacteria.

The Dole Pineapple Company is the largest food canning factory in the world, having  $37\frac{1}{4}$  acres of floor space. A maximum of  $8\frac{1}{2}$  million cans of pineapple can be stored here. It is thoroughly modern and mechanized throughout. The 41 Ginaca Machines remove the shell and core, also cut off the ends which leaves the fruit in cylindrical form. The cylinders move on conveyors to the timers. The timers discard all fruit that does not meet the Dole high quality standards.

The cylinders now go through slicers. These are sorted by packers and placed in cans. Inspectors check the quality of the fruit and the grading.

Fifteen minutes only, are required for a pineapple to be processed after it reaches the factory. It is graded mechanically and moved to the cannery on two 48 inch conveyors. A maximum of 175,000 pineapple an hour are conveyed to the cannery.

The preparation of the land for the crops begins six to eight months before it is planted. The fields are plowed and harrowed until the surface is broken up into good tilth. At the last plowing the soil is fumigated by organic chemicals, such as DD and others.

Since much of the soil is rolling to hilly, soil terracing and contour cropping have to be practiced.

The crop is planted in rows. When the plants are about three feet in height, the soil is hidden from view by the leaves. Weeds are removed by use of chemical sprays, mulch paper and by tillage machinery and hoes. The commercial fertilizers are applied in solution alongside the rows. This is done by machinery.

When the fruit is harvested, a mechanical harvester, drawn by a truck has a conveyor belt which extends horizontally into the field about thirty feet. The conveyor belt carries the fruit, which is placed on it by laborers, to a moving bin. The bin is so arranged that it may be replaced by another one when it is full of fruit. The bins or boxes of fruit are taken to the plant from the field. Here the fruit is dumped on conveyor belts which take it to the desired location for processing.

M. M. McCool

#### *Two New Roses Win Award*

All-America Rose Selections marks its Fifteenth Anniversary with the announcement that two magnificent new roses have won its coveted All-America Rose award for 1954. This award is the highest honor in the flower world. To reach this top, the brilliant new winners competed against the best new rose introductions of the United States and Europe. After two years of rigid testing in twenty different trial gardens, they proved their superiority over all the other roses entered in the All-America trials. The new titleholders are:

LILIBET, a dawn pink floribunda, and

MOJAVE, a warm apricot-orange hybrid tea.

These two new roses are the proud results of more than six years work by hybridizers who discarded thousands of seedlings in their search for varieties worthy of the A.A.R.S. award.

The new holders of the horticultural "Oscar" are the 38th and 39th varieties to be named to the Royal Family of



Roses since the inception of All-America Rose Selections fifteen years ago. The first announcement of the All-America award was made in 1940 followed by an annual award each year since with the exception of 1951. In that year, none of the roses entered in the trials was able to meet the high standards set by the A.A.R.S. Instead of announcing a winner, the National Rose Jury picked the ten best All-America roses named up to that time.

The All-America title is the most important honor which can be awarded to roses in this country. The two winners were placed under test in 1951 in competition with most of the world's other important new varieties. Test plants were grown in each of the twenty A.A.R.S. trial gardens which are so located as to provide the greatest variation of soil and climate conditions.

During the two year testing period, each plant was carefully checked on some thirteen different points under a uniform gardening system. These include hardiness, disease resistance, fragrance, flower form, color, and other characteristics which were closely watched and scored by qualified judges. At the end of the testing period, the total scores were submitted to the National Rose jury which compiled data from all twenty of the trial gardens.

In its fifteen years, All-America Rose Selections has made marked progress toward its goal of creating higher standards for roses in general and safeguarding the public by developing varieties which will produce outstanding results in any section of the country.

LILIBET, is an enchanting dawn pink floribunda which commemorates the childhood nickname of Queen Elizabeth II. Soft pink masses of flowers combined with vigorous, well-

formed foliage, make Lilibet a model rose.

At a distance, Lilibet appears as a uniform rose pink, but closer inspection reveals shadings of several clear pink tones. Before the calyx breaks the buds are Empire red, but rapidly turn to pink as the petals unfold. The plant blooms continually. Buds are uniquely high centered and symmetrical, opening into well formed blooms.

Occasionally flowers are borne singly, but the characteristic "cluster bouquets" of the floribunda are the major feature. The fragrance is spicy and pronounced.

Lilibet has fine leathery foliage with better than average disease resistance. Leaves are bronze green when new, turning to a deep glossy green.

MOJAVE derives its name from the rich bright colors of the Painted Desert. The dominating color of this hybrid tea is a glowing apricot-orange which is highlighted with warm tints of nasturtium red, scarlet and vermilion. Its luminous color becomes more intense under artificial light.

The richly colored bud of Mojave is long and slender, producing a large double flower of about 25 petals which have a pleasant fragrance. Nearly every bloom is borne singly on a long straight stem, making it ideal for cutting. The plant is tall and upright, covered with large glossy, handsome foliage. True orange colored roses are very rare indeed and Mojave is the finest orange colored garden rose offered to the public.

Both of these magnificent new All-America roses will be available to the public for planting in the fall and will lend their color and charm to gardens throughout the United States in the following season. They may be obtained next fall and spring from all leading

nurserymen although supply during the first year is limited.

L. RICHARD GUYLAY

### *Aechmea Filicaulis*

The pineapple, the most widely known member of the family BROMELIACEAE, sets to a certain extent the pattern for the general appearance of most of the others. This is a more or less cup-shaped, tight cluster or rosette of hard narrow leaves, from the center of which arises the inflorescence. The pineapple with a few close relatives is in so far an exception as the whole inflorescence swells up into a globe-shaped fleshy "syncarp," resembling a fruit.

Most of the Bromeliads have upright flower spikes or panicles, frequently covered with colored bracts which contrast brilliantly with the colors of the flowers or of the ripening fruit capsules. Best known among those with drooping flower panicles are probably the *Billbergias* some of which are exceedingly handsome. However, the *Aechmea* shown in the accompanying illustrations is undoubtedly unique, not only in this particular genus but also in the whole family, since its panicles are suspended on wire-thin stalks to a length of 5 to 6 feet. They present a truly spectacular sight when encountered in the jungle forests of Northeastern Venezuela, where in October-November 1951 it was the privilege of the writer to see them in their full glory.

The plants usually grow attached to the bare trunks or branches of high trees—most commonly near the 3,000 ft. level of the coastal mountain range (cordillera costanera)—, and the bright red, horizontally extended bracts supporting each whorl of flowers, as well as the relatively large pure white flowers themselves (on some indi-

viduals with blue calyces) are very conspicuous. The flower including the calyx is 2 inches long. The calyx is  $\frac{3}{4}$  inch long. When one sees them for the first time high over one's head, slightly swaying in an updraft and with the thin supporting stalks almost invisible, they suggest butterflies rather than flowers.

This species was first described in 1864 by Griesbach as *Billbergia filicaulis* and has since been known only from herbarium specimens. As far as known to the writer, the plants collected in the fall of 1951 by the writer and his companion, Mr. Mulford B. Foster of Orlando, Florida, were the first to be introduced into cultivation, while the accompanying photograph—taken in February 1953 in the greenhouses of the Montreal Botanical Garden—shows one of the first two plants of this species to flower in cultivation.

The first flowering of a new plant under controlled greenhouse conditions offers, of course, a valuable opportunity for observations which cannot be made in the natural habitat and which complement the information so far available. One of these was the interesting fact that the long inflorescence of *Aechmea filicaulis* develops only very slowly, 6 to 7 weeks being required from the time it is first seen to emerge from the center of the leaf cup before the first flower opens. Thereafter, flowers open intermittently 1 to 5 or more at a time, without any apparent sequence as to location on the panicle, and over an additional period of 8 to 9 weeks. The first flower is likely to open somewhere in the middle of the panicle, followed by others near the beginning and near the tip. Sometimes no flowers at all open for several days. Each individual flower lasts for only one day. The 5 ft. panicle of one of our plants carries 78 buds.

Individual plants of *Aechmea filicaulis* vary in leaf color. Some are bright red, some are entirely fresh green and some are dark green with red shadings. Apparently this difference is not caused by light or shade, since three plants at the Montreal Botanical Garden—one each of the above three types—have maintained their original coloration also in their offsets, in spite of the fact that they are growing side by side under identical conditions.

Because of its long hanging flower panicle *Aechmea filicaulis* is best grown in hanging baskets, and tightly packed Osmunda fiber serves very satisfactorily as a supporting medium. Its habitation in the "cloud forest," where a daily shower is the rule even during the so-called dry season (October-February), suggests liberal daily spraying

or syringing. The leaf cup of the plant and its leaf bases should be kept filled with water which is important with all epiphytic bromeliads of this growth type. We have observed furthermore that a once weekly spraying with a completely soluble, highly diluted complete fertilizer (1 teaspoon per gallon of water) results in increased vigor of growth and a much greater readiness to flower. Actually, this procedure merely represents a lesson learned from nature, since the daily jungle shower brings with it dust from the atmosphere as well as dissolved bird droppings and other matter from the upper branches of the trees, therewith amounting in fact to a mild daily feeding. One should further realize that these plants do not inhabit the dark depth of the jungle but seek light in the crowns of the trees. Growing them in hanging baskets





*Interior and exterior views of the new aluminum lath house at the Los Angeles State and County Arboretum.*

makes it possible to suspend them near the roof of the greenhouse, where light conditions are more favorable for them than on the greenhouse bench.

H. TEUSCHER

### *Lath Houses of Aluminum*

About three years ago the Los Angeles State and County Arboretum was instrumental in trying a new type of Lath House.

A local company was ready to go into commercial production of aluminum lath house and was awarded the bid for its construction by the County of Los Angeles at our Arboretum.

Since the construction of that first house, others have been installed at such institutions as Rancho Santa Ana Botanic Garden, Desert Botanic Gardens, U. C. L. A., Huntington Botanic Gardens, University of California, Berkeley; Fresno State College, Los Angeles County Fair Grounds, as well as at a number of commercial nurseries and private collections.

Over a period of three years many advanced ideas and improvements have been incorporated into the construction, yet it was a simple matter of

moving our old unit and attaching it to two new units recently installed. Our new house consists of one unit 40'  $\times$  120' long, 8' high plus another unit 30'  $\times$  60' and 12' high. Expansion room has been provided to later attach another 40'  $\times$  120 foot unit.

Details of construction may be seen through the accompanying illustration.

In essence the aluminum alloy used is durable against various adverse climatic conditions and withstand heavy winds. Maintenance of these houses is almost nil. They are easy to install, light in weight and always neat in appearance. Double adjustable roof panels are available for easy regulation of light control.

Initial installation cost compares favorably with similar houses constructed of wood and the subsequent maintenance is very greatly reduced.

Besides the standard 10'  $\times$  10 foot clear span units, there also are manufactured similar prefabricated package units for domestic use ranging in sizes from 6'  $\times$  8' to 10'  $\times$  12' in two foot increments.

R. J. SEIBERT

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