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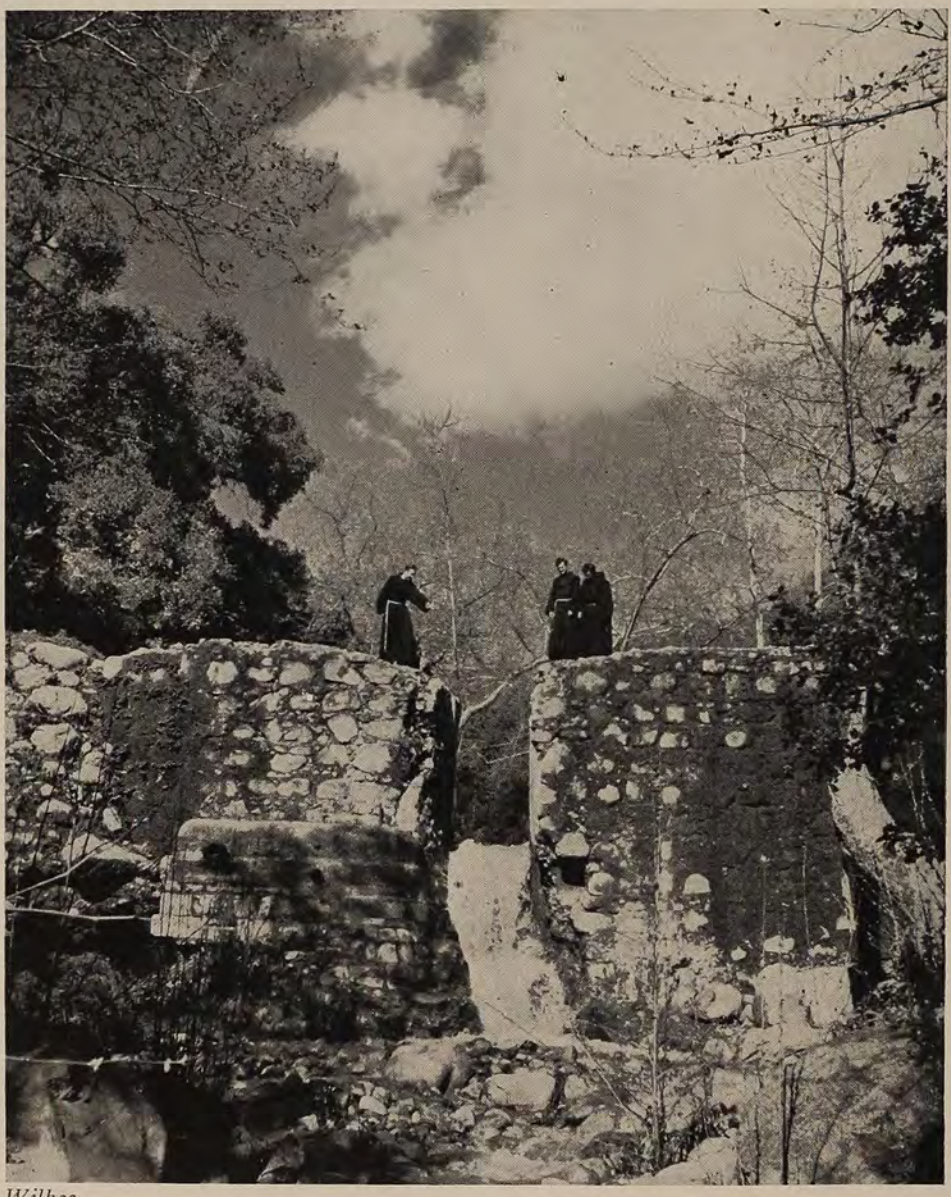


Wilkes

As a part of the original water system of the Santa Barbara Mission, this dam is one of California's famed historic landmarks, built in 1807 by the Indians under the direction of the Franciscan Padres.

The Santa Barbara Botanic Garden

REID MORAN, *Botanist*
Santa Barbara Botanic Garden

Santa Barbara Botanic Garden

Well over a century ago, when the West was still a wilderness, the fame of California's floral riches penetrated to the gardens of Europe; and California became known as a land of colorful flowers. Garden-loving Britons, always on the alert for new plant treasures, early sent collectors to this promising land, where they explored and collected, sometimes at the expense of great hardship. Through the efforts of these men, many California plants reached European gardens to become highly prized ornamentals.

As California became settled, it was natural at first that the few garden ornamentals should be those which the pioneer brought with him from his homeland; for a garden in the new land was not a garden without old familiar plants. But here, as elsewhere, exotics have remained in high favor. California plants were admired in Europe, where they were exotic. At home, however, either they were too commonplace to be noticed or they were admired as wildflowers with no thought that they could be tamed. Native plants were uprooted to make room for plants from the other side of the world. Only within the last twenty-five years have natives begun to be really appreciated at home.

The Santa Barbara Botanic Garden at Santa Barbara, California, is devoted entirely to plants native to California. Especially are those of ornamental value assembled here and used to show their horticultural possibilities. Thus the Botanic Garden demonstrates the value of native plants for gardens of California and of many other parts of the world.

Site of the Garden

Santa Barbara lies at the seaward base of the 4,000-foot Santa Ynez Range, which runs east and west, parallel with the coast. Offshore thirty miles to the south, the peaks of another east-west range stand above the sea to form the chain of four Channel Islands.

In Mission Cañon, in the foothills of the Santa Ynez Range back of Santa Barbara, is the Santa Barbara Botanic Garden. The boulder-strewn slopes of Mission Cañon support many fine old live oaks; and in the cañon bottom are maples and laurels, and along the stream, sycamores and alders.* Above the Botanic Garden, chaparral-covered slopes rise sharply to rugged La Cumbre Peak. The height of the foothills grants a broad vista southward over Santa Barbara and across the blue waters of the Santa Barbara Channel to Anacapa, Santa Cruz, and Santa Rosa Islands. On a clear spring day, the verdant islands seem close, yet inaccessibly remote and intriguing.

Mission Cañon is named from Santa Barbara Mission, built near the mouth of the Cañon by the Franciscan Padres in 1786. Included in the Botanic Garden are the old Mission Dam and

*Coast Live Oak, *Quercus agrifolia;* Bigleaf Maple, *Acer macrophyllum;* California Laurel, *Umbellularia californica;* Western Sycamore, *Platanus racemosa;* White Alder, *Alnus rhombifolia.*

Wilkes

Flowers and foliage of the Catalina Ceanothus (Ceanothus arboreus). Flowers deep blue.

Reid Moran

Flowers and foliage of Fremontia Mexicana.

Voight-Wilkes

The Island Trail, of the Santa Barbara Botanic Garden, passes between a great sandstone boulder and several Santa Cruz Island Ironwood trees, Lyonothamnus asplenifolius in full bloom.

Voight-Wilkes

Spring meadow of California poppies. Trees and shrubs of the Foothill Section border the Meadow and Arlington Peak (left) and the Santa Ynez Range rise in the distance.

parts of the open stone aqueduct which carried water to the Mission.

Most botanic gardens are located for convenience, with little thought for beauty of surroundings. But here the magnificant site suggested a botanic garden. In the beauty of its natural setting, the Santa Barbara Botanic Botanic Garden is perhaps unrivaled among the botanic gardens of the world.

Development of the Garden

The idea of a botanic garden in Mission Cañon came first to the late Dr. Frederic E. Clements, ecologist of the Carnegie Institution of Washington. But it was Mrs. William H. Bliss who made the vision a reality. In 1926, as a memorial to her father, Henry Blaksley, she bought the original tract of land and established an endowment fund for the maintenance of a botanic garden. Her friends, Dr. and Mrs. Elmer J. Bissell, undertook to administer and develop the garden; and under their hand during the next ten years, the chaparral slopes became a well-landscaped, but still naturalistic garden.

Since 1936 the Garden has been administered by a self-perpetuating Board of Trustees, with Mr. Maunsell Van Rensselaer serving as Director. It has continued a privately endowed insti-

Josef Muench

April Meadow of wild strawberry, Fragaria chiloensis.

Josef Muench

A handsome California box-elder, Acer negundo californicum, shades a portion of this inviting pool. The massive Blaksley Memorial Boulder stands in the background.

Flowers and foliage, one-third natural size, of Santa Cruz Island Ironwood, official tree of Santa Barbara County.

tuion, receiving no aid from any government source. But with the help of many private gifts and bequests, it has continued to grow. The area has been enlarged, the Experimental Nursery has been built, and the Blaksley Library and Herbarium building has been added. Furthermore, the Garden has broadened its program to include educational work, publication, and research. The organization is dependent for future growth on the support of private individuals.

Last fall a cooperative working rela-

Josef Muench

Information Center, Santa Barbara Botanic Garden.

tionship was established between the Botanic Garden and the University of California, Santa Barbara College. Under this plan there will be greater emphasis on research at the Garden. A small laboratory is being built for physiological and cytological studies. This laboratory and the other facilities

Dripless Lathhouse

Designed with sloping roof, diagonal purloins, and metal troughs to carry off excessive rainfall and eliminate dripping. A miniature moat on the outer edge of the foundation discourages ants and sowbugs.

Agave Shawii

One of the so-called century plants. This one bloomed in the Desert Section in the Spring of 1945. The over-all height is about 15 feet.

of the Garden will be used by the staff and students of the College.

A group of persons distinguished in professional fields give freely of their time as members of an Advisory Council. During this ten-years period of steady growth, the Garden has been especially fortunate in having the guiding hand of the noted landscape gardener, Beatrix Farrand.

Objectives of the Garden

The primary purpose of the Santa Barbara Botanic Garden is to encourage the use of native ornamental plants for roadsides, parks, and gardens. Promising native plants are tested in the garden and, if they prove of value, are incorporated into the landscape to show their horticultural possibilities. Mr. Roy Wells, Horticulturist, carries on experimental work to find the best means for their propagation. When a plant has been thoroughly tested in the Garden, information about it is published in an attractive illustrated leaflet.

The Santa Barbara Botanic Garden has other objects and interests as well. It encourages the conservation of the native flora, and is interested in any increase in knowledge of native plants. The Garden is an outdoor museum as well as a showplace, having a large collection of native plants in natural settings, labeled with common and scientific names, family, and native range.

The Santa Barbara Botanic Garden is free to the public; the library and herbarium are available to visiting botanists and horticulturists; and information on California plants is freely given to all who inquire in person, by telephone or letters.

Plan of the Garden

The general plan of the Garden has been adapted to the topography. From the rounded ridge to the east of Mission Cañon, the ground slopes away, at first gently to a broad bench of 5 to 10 acres, then more abruptly into the inner cañon. On this bench are the Information Center, Blaksley Library, and Experimental Nursery and the Meadow which in spring is the main attraction of the Garden. From this center an irregular pattern of trails radiates along the bench, down into the cañon, and up the slope into the Forest Section.

In some outlying parts of the Garden, the native vegetation has been left undisturbed. In the central part, though most of the beautiful old oaks have been left, the chaparral has been cleared to make room for a greater variety of natives.

A diversity of soils and exposures makes possible many plant communities in natural settings. The Garden is roughly divided into ten sections, averaging 3 to 5 acres each, and each devoted to plants of one type of habitat.

The Meadow planting is really an annual performance and is the outstanding feature of the garden each Spring. Sometimes it is a gay medley of California wildflowers; but usually it is planted to a single kind of flower, so that in the spring it is a beautiful solid mass of color. Some years the Beach Strawberry, *Fragaria chiloensis,* has been used and some years the Sea Dahlia, *Coreopsis maritima.*

In a dry, sunny spot on the rim of the inner cañon is a small Desert Section, with cacti, yuccas, and other desert shrubs and trees.

The undisturbed chaparral of Mission Cañon may be seen in several places in the Garden, notably in the upper part of the cañon and on its western slope. In addition, individual chaparral plants from various parts of the state are displayed in a Chaparral Section on the rim of the inner cañon

west of the Meadow.

In the Island Section are plants from the islands off the coast of southern California. The island flora includes several interesting endemic species, some of which, as shown by the fossil record, formerly occurred on what is now the mainland. Several island plants are of great horticultural interest.

The Ceanothus Section, after the Meadow, is perhaps the best know part of the Garden; for the genus *Ceanothus* has received special emphasis and study here. These flowering shrubs range from creepers to small trees with flowers varying from white to deep blue. The Garden's most important publication is the book *Ceanothus*, prepared in collaboration with Professor Howard E. McMinn.

Thus the Santa Barbara Botanic Garden is helping worthy California plants, long cherished in European gardens, to achieve their rightful place in gardens nearer home.

Sweetpotatoes in Japan

VICTOR R. BOSWELL[2]

Introduction

The Japanese farmer is one of the best in the world. Because of the scarcity of arable land, and the economic conditions in his country, he must be a good farmer or face severe malnutrition and ruin. Despite lack of most facilities and aids to crop production that are essential for the American farming system, the Japanese obtain high yields of crops of good quality. This is accomplished, however, at an almost unbelievable cost in human toil.

While assigned to the Agriculture Division of the Natural Resources Section of General Headquarters of the Supreme Commander for the Allied Powers in Japan in 1946 the writer had occasion to study production practices and requirements of the sweetpotato in Japan in some detail. Because the sweetpotato is Japan's No. 2 food crop (rice is No. 1) and because of its widespread culture in America a brief review of the crop in Japan appears to be of general interest to American gardeners and vegetable growers.

History

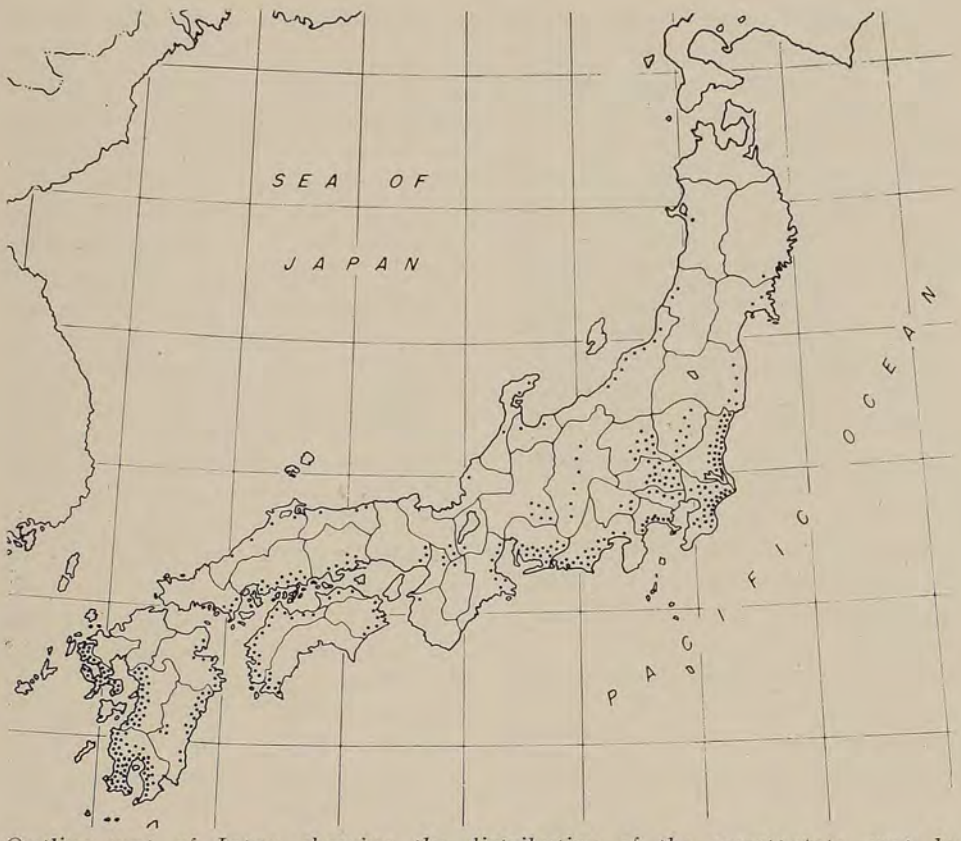
The accounts of Japanese students of the history of the sweetpotato differ as to when and by what route the sweetpotato was introduced into Japan. Dr. I. Namikawa, Dean of the College of Agriculture at Kyoto Imperial University, cited records to the effect that it was introduced into Kagoshima prefecture in 1705 from China. Another account, however, states that it was introduced to Kanko Island of the Ryukyu group from China about 1600 by one Sunagawa Muneya, but the exact date is not known. Later Sokan Noguchi, called the Potato King of Ryukyu, is said to have brought the sweetpotato to his village from China, and planted it at the place that is now Kitaya-mura in Nakasu-gun, Okinawa. There is a further story that the sweetpotato was carried to Shikoku from Miyazaki in 1692, which antedates the record of a gift of sweetpotatoes from King Shotei of Ryukyu, in 1698, to a feudal lord of Kagoshima who planted them on Tanega Shima. It is supposed to have spread from Tanega Shima all over Kagoshima and Miyazaki. Still another student of the matter claimed it was introduced into Japan about 1750 from China by way of Okinawa to Kagoshima. About the only consistent part of the whole story seems to be that the sweetpotato was brought to Japan from China, by way of the Ryukyus to southern Kyushu. If the Japanese students and historians can come no closer together than the above accounts, it is hardly likely that an Occidental critic of second-hand reports will come to any definite conclusion.

One account also says that in 1734 the sweetpotato was taken to the Kanto region (east central Honshu), and in 1788 to areas north of there. With no dates given, it is supposed to have been introduced by Haizaemon Ido into Shimane prefecture from Kagoshima, but presumably before it reached the Kanto area. Another story says it was taken to the Kanto area about 1800 by one Aoki.

The use of different names for the same plant, even an important crop plant, is common in many lands. In Kagoshima prefecture the sweetpotato

[1]Photographs by Victor R. Boswell, through courtesy of the U. S. Department of Agriculture.

[2]Principal Horticulturist and Assistant Head of the Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, Beltsville, Md.



Outline map of Japan showing the distribution of the sweetpotato crop by prefectures. One dot represents 2,000 acres.

is called KARA-IMO, meaning Chinese potato; in the Chugohu district it is called RYUKYU-IMO (Ryukyu potato); and in most of the rest of Japan it is called SATSUMA-IMO (Satsuma potato). This last name comes from the name of Satsuma, the feudal lord of Kagoshima who is supposed to have first popularized the crop in the island of Kyushu, the first one of the four main islands of Japan in which it was grown extensively.

Repeatedly in the history of Japan the sweetpotato has been the crop that has prevented widespread starvation during years of rice failure. Until now, however, the sweetpotato has been the "red-headed stepchild" of Japanese agriculture. It has enormous potentialities as a producer of food per acre, yielding up to 50 percent more calories on the less fertile upland than rice does on the more fertile low land. It produces 2.5 times as much "rice equivalent" per acre as barley and 3.0 times as much as wheat. It is unsurpassed by any crop in Japan as a producer of food per unit area of land. Lack of storage facilities and perishability of this crop are probably the main reasons why it is not grown more extensively. At the same time, the average Japanese regards the sweetpotato as one of the less desirable foods.

Table 1 shows the mean acreage, production, and yield per acre in Japan by 5-year periods from 1911 to 1945. This production is 2 to 3 times as great

as in the entire United States. Belated efforts are now being made to improve disease control and storage conditions in the hope of warding off severe hunger in the lean post-war years.

TABLE 1.—Average, Production, and Yield per acre of Sweetpotatoes in Japan[1]

5-year period ending	Average annual area grown	Average annual production	Average yield per per acre
1915	746,798	154,816,766	207
1920	770,992	169,996,430	220
1925	717,136	153,578,493	214
1930	653,772	139,055,030	213
1935	661,927	139,887,552	211
1940	690,504	150,107,320	217
1945	861,198	176,618,028	205

[1]Calculated from data of the Ministry of Agriculture and Forestry, Imperial Japanese Government.

Growing the Crop

Basically the procedures in growing the sweetpotato in Japan are similar to those followed in the United States, although details are very different. The farmer has much less efficient equipment and materials to use in his work, and the pressure for land imposes field practices that are quite unlike those in our own country.

Except in the southernmost parts of Kyushu and Shikoku, namely in the prefectures of Kagoshima, Miyazaki, and Kochi, plant beds must be artificially protected and heated if the plants are to be obtained early enough to produce a good crop. These warmest parts of Japan lie about 31½° to 33½° north latitude, and have temperatures similar to those of northern Florida and southern Georgia and Louisiana. The march of the seasons in the districts of the "outside" or Pacific side of Japan, from south to north, is similar to that in the United States, and the timing of the growing operations for the sweetpotato crop is also similar. The Japan Sea side is colder, wetter, later, and less suited to the crop. (See Figure 1.)

Plant Beds

Where artificial heat is necessary, manure or other hot fermenting organic matter is used generally because coal, wood, or charcoal are too precious to use for such purposes. Crude electrical heating installations, however, are increasing rapidly. In southern Kagoshima, in Oita, and in other places of volcanic nature hot wells and springs furnish ample hot water at low cost for heating the plant beds. (Figure 2.) If a good grade of stable manure, containing nitrogenous matter along with the bedding, is not available, night soil may be mixed with the straw that is trampled into the hotbed pit. The walls of the hotbed or coldframe are commonly constructed of poles of bamboo with rice or other straw to retain the contents of the bed (Figures 3 and 4) and to afford support for the cover and room for the growing plants. The beds are usually built entirely above ground with these materials, are about 6 feet wide inside measure and as long as necessary.

Despite the fact that there are considerable amounts of electric power in Japan and most farms have electric lights, very little use of electricity seems to have been made on farms for any purpose except for a very meager degree of lighting. Electricity, like many other valuable things that Japan has been producing for many years, apparently was considered too precious to justify making it available in quantity to farmers. On January 6, 1946, however, a broadcast from the Osaka radio station stated that the Ministry of Agriculture and Forestry was planning to make available in the spring, equipment for the installation of some 5,500 tsubos of electric hotbeds (enough to grow plants for 4,000 to 5,000 acres of sweetpotatoes) in the prefectures of Osaka, Kyoto, Hyogo, Wakayama, Nara, and Shiga. In Niigata, Chiba, and Saitama plain galvanized wire was observed strung on

light wooden frames, buried in the bed and connected to the power supply. Lack of insulation results in great power loss by "leakage." These heaters last only one season.

An interesting variant on the more or less standard method of propagation was observed in Okayama prefecture in a district of heavy summer rainfall, hot weather, and fairly heavy soils. There it is the practice to bed only about half as many roots per unit area of bed as is common in Japan, giving much space for the sprouts to develop in the bed. (Figure 8). Although there is little planting in Okayama before the end of June, the beds are made at the end of March, and about 3 months are allowed for the development of the sprouts. In this time sprouts 12 to 15 inches long develop slowly and are strong and firm. These are cut off a little above the soil of the bed and then planted horizontally and very shallowly on the very top of the ridge simply by pressing the stem into the wet soil and then pressing wet soil over it. The terminal 2 or 3 inches of the sprout is left out of the soil, and the several leaves at the nodes are not covered, or are only partly covered. The planting distances are essentially the same as elsewhere in Japan but the rows are generally closer than in the United States.

Bed area is measured in tsubos, 1 tsubo being equal to 35.586 square feet. Thus a square tsubo is approximately 6 by 6 feet, practically the same area as that covered by two standard hotbed sash in the United States.

In the milder southern half of the sweetpotato-growing area, the beds may be covered with oiled paper. (Figure 4.) Glass and cloth have not been available to the average Japanese farmer. The paper covers are effective in mild weather, but they are fragile. In the cooler sweetpotato districts, as around Tokyo and northward—even in Hokkaido—and during cooler periods in the southern districts the beds are covered with straw or rush mats (Figures 3 and 4). Before the sprouts emerge, rice hulls, straw, or leaves may be placed directly on the surface of the soil covering the mother roots to improve insulation and conserve heat. (Figure 5.) Whatever covers are available, or necessary, they are skillfully manipulated as by our own best plant growers. The beds are, of course, built in protected locations that are exposed to a maximum of available sunlight. Windbreaks and slopes are universally used to good advantage. (Figures 6 and 7.)

The Ministry of Agriculture and Forestry recommends the bedding of 20 kan of roots per tan of land to be set with plants (1 kan equals 8.27 pounds and 1 tan equals 0.245 acre.) This rate approximates 13 bushels per acre, similar to common United States practice. The Japanese do not generally place the roots as closely in the beds as American farmers do, the recommended rate of bedding being 2 to 3 tsubo of bed space per tan of land to be transplanted. This is equal to 16 up to 24 standard sash (in America) for the 13 bushels of stock normally bedded for an acre. The closest rate of bedding approximates ours, but the average is somewhat lighter. It appears that this lighter rate of bedding is preferred in Japan in order to obtain longer and sturdier plants and to permit planting stock to produce more plants per unit of weight of stock. Scarcity of planting stock is a real problem in most parts of Japan because of the high losses from during storage, and because of the great demand for roots as food.

Whereas the American farmer rarely pulls plants from a bed more than three

times, and often less than three, crop specialists in Kyushu say that many Japanese farmers take sprouts as many as four times. This apparently is not a general practice. To the extent that it is followed, it again reflects the scarcity of planting stock; indeed, the scarcity of food and of everything else except manpower is everywhere evident in Japan.

The Japanese experiment station workers are aware of the disastrous effects of too late planting, as many farmers also are, but in Japan much of the planting is late. A very little crop is much better than none at all. Even if planting is greatly delayed the farmer must go ahead and do the best he can because he has little if any alternative. If however, late plantings are made merely in the interest of conserving seed stock (more plants from successive pullings), his smaller yields from the late plantings prove this to be a false economy.

In the United States most sweetpotato "plants," sprouts, draws or slips as removed from the propagating bed consist of entire sprouts that have been pulled from the mother root without disturbing it in the bed. In Japan the sprouts generally are not pulled from the root, but are cut with scissors an inch or two above the surface of the soil covering the mother root. This is done, the Japanese explain, to avoid carrying with the sprout to the field any black rot or other disease organisms that might be present on the mother root or on the bases of the sprouts. This procedure, furthermore, avoids wounding the mother root in the bed with its danger of encouraging decay, and avoids the danger of pulling out large masses of tissue at the bases of the sprouts which might interfere with or reduce subsequent development of other sprouts. The sprouts are allowed time to grow long above the soil and the mother roots usually are covered with a very thin layer of soil —barely covered.

Soils

Sweetpotatoes are grown only on "upland" soils; and upland in Japan might seem to many Americans to mean any land that is not under water much of the year—in contrast to rice paddy land. Much of the arable "upland" lies on very slight elevations in broad valleys or along coastal strips that would be considered lowland in America (Figure 9). Sweetpotatoes are very extensively grown on such soils of the Kanto Plain in Tokyo prefecture and adjacent prefectures. On the other hand, they are also grown on fantastic, terraced, steep montainsides in Nagasaki and other areas, from nearly sea level up to elevations of 1,000 to 1,200 feet. The rock walls supporting these terraces often are as high as the arable surface is wide; and when viewed from many points they appear even higher. Very striking terrace developments of great antiquity are located near Nagasaki and on the Shimabara Peninsula, where unbroken series of terraces extend up the mountainsides through several hundred feet in elevation.

Soils of light textures are preferred for sweetpotatoes in Japan, as they are in America, but there is generally so little choice of soil available to the Japanese farmer that he can not get what he wants. Even on soils that Americans would consider as originally far from ideal for the sweetpotato the Japanese farmer has obtained surprising results. If the general features of the terrain and the climate permit culture of the sweetpotato, a wide range of soils may be devoted it—especially since intense pressure has been applied by the Japanese government to increase

Figures 2 - 5, in the usual left to right.

Heads of two hot, flowing, wells and pipes carrying hot water by gravity to hotbeds. Water temperature at the wells is 60° C. Near Ibuzuki village, Kagoshima Prefecture.

Manure-heated sweetpotato propagating beds built of stakes, bamboo poles, barley straw and rice straw rope. The soil surface is covered rice hulls. Rolled-up straw mats lie about. Horikane village, Saitama Prefecture.

Electrically heated, hotbeds with sash covered with oiled paper facing the sun and straw mat structure on the north side. The rolled mats are for additional cover over the paper. Prefectural Experiment Station, Irumagawa, Saitama Prefecture.

Showing light covering of soil and heavy covering of straw mats in a manure-heated hotbed built of straw. Obukuro village, Saitama Prefecture.

its culture since 1941. Thus it is grown on alluvial soils as well as on the lighter, coarse diluviums, or marine terraces on the volcanic-ash plateaus, and on the sandy beach ridges that are so characteristic of many coastal areas of Japan.

The heavier soils, and manuring, often result in very heavy vine growth and rough, long roots that would be undesirable on American markets. The Japanese, however, have been unable to afford the luxury of concern over minor matters such as shape and skin color of roots. They must grow calories, as many as possible per acre. And it must be said that they do that very well. The average sweetpotato yields were around 215 bushels per acre, about 2½ times those of the United States, before World War II when circumstances for production were favorable. Despite some of the heavy soils used and the methods of production, the varieties developed for adaptability to those conditions generally have shapes that would be considered very satisfactory by a discriminating American buyer.

Fertilizers

Although the Japanese recognize the sweetpotato as life-saver because of its great productivity, it has long been the stepchild of Japanese agriculture. Before 1940 it was considered so inferior to rice and grain as food, or as a crop to grow for profit, that a little manure or compost, and some wood ashes was about all the fertilized ever applied directly to the crop. As Japan's last ill-fated military venture went from bad to worse, the importance of the sweetpotato soared as an emergency food crop. At the same time, however, commerical fertilizer became more and more scarce with the result that the sweetpotato still is not fertilized in Japan according to any officially recommended or consistent plan. There seems to be little reason for the differences in prefectural experiment station recommendations in different areas, and no agreement between recommendations and actual practice. The Ministry of Agriculture and Forestry recommendations, said to be based upon experimental evidence, are generally at considerable variance with verbal recommendations obtained from the prefecture experiment station specialists.

In calculating "fertilizer" applied, or needed by a crop, the Japanese appear to be accustomed to include not only the nitrogen, phosphorus, and potassium of commercial fertilizers but also the estimated amounts contained in the manure, compost, night soil, or any crop residues that are added. The composition and quality of the added manures and composts vary enormously, as does the composition of the mixed wood ashes used. In their efforts to obtain potash, which they know the crop needs, from such manures and ashes as they have available the Japanese generally apply incidentally more nitrogen and less phosphorus than American experience has indicated that the crop needs. One member of the Ministry staff estimated the average requirement as 80 kg. of nitrogen, 40 kg. of phosphorus, and 120 kg. of potassium per hectare. A supposed summary of experiments on "Amounts of nitrogen, phosphorus, and potassium for a crop of sweetpotatoes, per hectare, by prefectures" does not agree with with the above estimate, but shows an average of about 70, 70, and 120 kg. respectively for the prefectures in the northern districts, and about 60, 55, and 110 for those in the south. It is not clear how these experimental results were obtained, language limitations on Japanese-American inter-communication being what they are. It is strongly suspected, however, that those figures were based upon a limited number of trials in field plots of inadequate design and extent.

Fertilizer recommendations of experiment station workers on Kyushu were in essential agreement only as to quantities of manure or compost to be applied per acre, 3 to 5 tons. In sharp contrast to American practice this amount is laid down in the furrows before the ridges are built, and the soil turned over it without mixing it with the soil. Some stated that only 2 to 3 tons were being used by growers in recent years because of the shortage of manures and fertilizers, but none recommended more than 5 tons.

Field culture

Sweetpotatoes are grown on ridges generally 24 to 30 sometimes as much as 36 inches apart in Kyushu and in other districts where the more friable soils occur. On the heavier or wetter soils the ridges must be a little farther apart to permit building them as high as is required to effect proper drainage for the plants. In most districts the

ridges are somewhat higher than is the common practice in the light soils in the United States because the summer rainfall is about two to three times that of the American districts—30 to 48 inches from June to September, inclusive. The ridges are built by hand tools anywhere from 10 to 12 up to 16 inches high, depending upon the requirements of the particular field. One specialist of the Ministry stated that ridges were built 24 to 28 inches high, from furrow to crest. This statement seems erroneous, and may be the result of differences in language and units of measure. Normal settling and weathering under heavy rains reduce the original ridge height a variable amount, depending again upon the soil; but the tops of the ridges are not dragged down of flattened as they often are in America. In the light, volanic-ash plateau soils of Kyushu and the Kanto district the ridges are but 7 or 8 inches high.

Plants of medium size, according to our standards, are normally set 12 inches apart in the row, with smaller plants set somewhat closer and larger ones a little farther apart, all ranging from approximately 10 to 15 inches. No data have been noted to support the effectiveness of this practice, and on the basis of American experiments it appears of dubious value.

Planting times correspond roughly with those American districts having comparable climates, although there is a tendency to later planting in Japan because sweetpotatoes generally follow grain crops. In the south where grain harvest is relatively early, they usually are not planted until after the grain is harvested. In districts where the grain can not be harvested before time to plant sweetpotatoes, and this applies to much of the country, sweetpotatoes are transplanted between the grain rows before harvest. The terrible pressure upon the land, the essential rapid succession of crops and constant occupancy of the land are responsible for this. In the southernmost districts the grain fields are generally planted with the rows much closer together than in the northern districts where harvest comes after sweetpotato planting time. Sweetpotatoes may be set in alternate middles if the grain rows are close, or in every middle if the grain rows are 2 or more feet apart (Figures 10 and 11). If the grain is harvested in time, as in southern Kyushu, or if no grain precedes sweetpotatoes they may be planted as early as May 15, but most planting even in Kyushu is done in late May or early June. Farther north planting is successively later, mainly mid-June to late June if sweetpotatoes are not preceded by grain. When the crop is transplanted between the grain rows, it is set 3 to 4 weeks before grain harvest. The Japanese are trying to breed very rapidly-growing varieties that will make good yields when planted after grain harvest and that can be harvested in early October before time for grain planting. They are having some measure of success as is shown by the yields of their new varieties.

Harvesting

As in America, the recommended time of harvest is soon before killing frost, in order to protect the keeping quality of the roots by avoiding the harmful effects of too low temperature. And, as in America, many farmers tend to dig too late, either in trying to get bigger yields by letting the crop grow as late as possible, or purposely letting the frost kill the vines so that harvesting will be less difficult. Efforts are made to complete harvesting as quickly as possible if the plants are

frosted, but it is said that much harvesting continues for as long as a month after frost. All harvesting is done by hand, as is practically all the working of the crop.

On farms having a horse or cow (on the average there is less than one horse or draft cow per farm in Japan) it is customary to cut the vines near the hill before frost, pull them from the soil, and ensile them in small concrete pits 4 to 5 feet in diameter and 6 to 7 feet deep. The more tender parts of the vines are occasionally used for human food in the form of greens. In the later years of World War II some tens of thousands of tons of sweetpotato leaves and petioles were air-dried, ground, and incorporated into various food products for their nutrient and "filler" value. The product was nearly black and of very unappetizing appearance.

The Japanese often harvest the hills intact and store the clumps of roots without separating them. This is done to avoid any wounds that would afford entrance for decay organisms.

Regardless of whatever may interfere, it is essential that sweetpotato harvest be completed in time to prepare the land for sowing winter grain at the proper time. The slowness with which the poor Japanese farmer is compelled to work his land by primitive hand methods is a very serious obstacle in the whole production scheme. Many grain fields are planted so late that they make poor yields, and in turn, many sweetpotato fields are planted so late that they make poor yields. The pressure both upon the land and upon the farmer is almost unbelievable.

Storing

Good storage facilities are probably Japan's most critical need in connection with this crop at present. As mentioned in connection with plant beds, fuel is very precious, so that thus far none has been spent in protecting sweetpotatoes in storage, either for food or for seed. Even as early as January it is common for losses or heavy food consumption to deplete supplies to the point that shortages of seed stock in the spring are clearly foreseen. It is recognized that losses from rotting are heavy, and there is often so much fear of heavy loss and insufficient seed stock that movement of sweetpotatoes from one district to another virtually stops. In the Tokyo area, sweetpotatoes for food are about all gone by January 1.

As would be expected in a temperate climate, temperatures are generally too low at harvest time for proper curing of the roots without artificial heat. There are thus heavy losses in storage although the storage temperature range is usually kept close to 55° F. in the common storage places that are available. Without artificial heat temperatures near 55° F. can be maintained in the cooler districts only in "caves" dug into the hillsides or in deep excavations where the water-table is low enough to permit their use. In the moderately cold sections, such as middle Honshu, a soil cover of 6 to 7 feet will maintain a temperature of 12 to 15° C. (53° to 59° F.) if the cellar entrance is well insulated and the structure is well managed. An air vent to the surface is provided, regardless of the depth of the structure. In the north it is customary to tunnel back into a steep hill whatever distance is necessary to obtain a safe temperature of 12° to 15° C. On well-drained plains storage tunnels are run from a shaft about 20 ft. deep, dug in the alluvium without cribbing of any kind.

In southern Kagoshima and Miyazaki the roots keep reasonably well in field pits in the well-drained volcanic-ash soils when covered with only a

Figures 6 - 9, in the usual left to right.

Typical straw-mat windbreak surrounding hotbed yard. The concrete beds are unusual in Japan. Prefectural Experimental Station, Chiba City, Chiba Prefecture.

Typical hotbed yard in the sunny lee of a village sheltered by a dense grove. The row crop in the foreground is barley. Horikane village, Saitama Prefecture. Wide spacing of mother roots in the hotbed yields more and sturdier plants than close spacing. This spacing is nearly a foot apart, wider than is usual. Prefectural Experiment Station, Okayama City, Okayama Prefecture.

Typical terraced plain. Near Ibuzuki village, Kagoshima Prefecture.

couple of feet of soil. Pits, usually slit trenches about two feet wide and six feet long, are dug to a depth of three to four feet. Roots are placed in the pit to within about 15 inches of normal ground level, then straw and finally soil are mounded well over the trench to a height of a foot to a foot and a half. Frequently, but not always, pieces of large bamboo stems with the nodes punched out are inserted as ventilators. They are placed at an angle of 45 degrees or less and the upper end of the tube is cut at an angle so as to prevent rain from falling into it. Little rain falls during the storage season. In this district roots keep well in these pits through February, up to bedding time if the crop is free of disease.

Black rot is generally distributed over the sweetpotato districts and is said to cause an average loss of about 33 percent of the stock that is carried clear through until bedding time. In the northern districts no attempt is made to carry eating stock past mid-December because of the heavy losses that usually occur. Really suitable facilities for storing large quantities are not available. Some Japanese experiment station workers have said that in the absence of black rot they lose only about 5 percent of the roots under the storage conditions described, but this is believed to be exceptional. There is a question as to whether all the differ-

ences ascribed to presence or absence of black rot are properly explained. Differences in temperatures during harvesting and handling may result in great differences in black rot damage although a similar spore load of the black rot organism is present in each case.

Even as far north as Tokyo sweetpotatoes are stored in common pits in the soil (Figure 12), but losses in that territory run high after the first of the year.

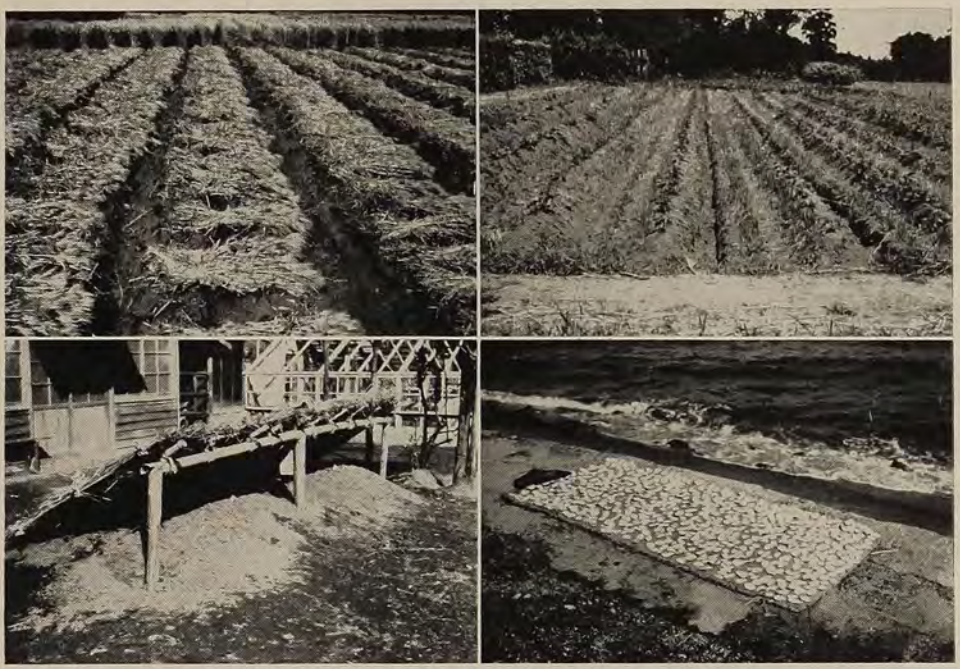
Sun-Drying

From 1941 to 1944 the Japanese government annual collections of sun-dried sweetpotatoes, in metric tons, amounted to 162,000, 135,000, 159,000, 134,200, according to the Ministry of Agriculture and Forestry. The airdry weight of this product is, on the average, about one third of the fresh weight of the roots. The above figures thus represent about 16,000,000 to 19,000,000 bushels annually of fresh sweetpotatoes, approximately 10 percent of the crop in recent years. Since an unknown amount of this dried product is consumed by the growers as stock feed, and sold through private channels instead of to the goverment, the quantities actually dried must considerably exceed the amounts stated above; a total of 20,000,000 to 25,000,000 bushels dried is not improbable.

In Japan, sweetpotatoes are sun-dried as a means of preservation, to reduce the bulk of material to be stored or handled in trade, and to obtain a product better adapted to industrial or stock-feeding purposes than are the fresh roots. The chief use of dried sweetpotatoes is for the manufacture of alcohol, both industrial and potable. The quality of the latter is considered low by Americans and Japanese alike. The second greatest use is for starch manufacture, the third is for stock feed, and human food is fourth, according to information from Japanese sources.

The only preparation of the roots for drying is thorough washing and then slicing them 3 to 4 mm. thick by means of ordinary household knives or by simple hand-power rotary slicers. The slices are spread in a single layer on rush mats or bamboo trays and placed in the sun on beaches, walls (Figure 13), roadways, ditch-banks, roofs, door-yards, or any open place. As drying progresses, the load from two or more mats may be combined on a single one in order to release some of the mats for new loads of freshly cut slices, and to reduce the number of mats that need to be handled in drying a given quantity of product. Care is taken to avoid packing or piling the pieces in any manner that would retard drying. To protect the material from bad weather the trays are temporarily piled in the dwelling house or any available shelter. Exposure out of doors is continued every fair day until the pieces become brittle, usually about a week. They may then be placed in straw bags holding 10 kan (82.7 lbs.) each, in either the unbroken state or finely pounded to a meal or powder. Generally the material is bagged without crushing it, although some claim that when it is pounded finely it is less subject to insect infestation.

The work of drying begins as soon as other work and the weather permit after harvest and continues as long as the weather is suitable and the roots hold up in storage, or until the quantity to be dried is finished. In the region about Tokyo little or no drying is done after the end of December, but it continues later farther to the South. In Southern Kyushu drying still was in progress in early February. There is very little rain in winter to interfere



Figures 10 - 13, in the usual left to right.

Freshly harvested barley drying between—and on—rows of sweetpotatoes transplanted in the barley 3 to 4 weeks earlier. Prefectural Experimental Station, Chiba City, Chiba Prefecture.

Grain stubble and sweetpotatoes immediately after removal of grain. Sweetpotatoes were set in alternate middles of close rows of grain. Chiba Horticultural School, Matsudo City, Chiba Prefecture.

Thatched shelter over sweetpotato storage pit. The white spots atop the ridged earth are the upper ends of long bamboo "tubes" within which themometers are lowered to the level of the stored roots. Prefectural Experiment Station, Chiba City, Chiba Prefecture.

Raw sliced sweetpotatoes drying on straw mat atop seawall of Kagoshima Bay. Kagoshima Prefecture.

with these operations, there. The Kanto Plain and southern Kyushu are the districts in which the greatest quantities of sweetpotatoes are dried.

In addition to the drying of raw potatoes for industrial and stock-feeding purposes, limited quantities are prepared for human food by first boiling the thoroughly washed roots. They are then cooled and allowed to "set" for a day to become firm. From this point on, they are sliced and dried essentially as described above. The cooked potatoes dry in much less time than the raw ones, requiring only about 2 days of good weather.

The drying of some 20,000,000 bushels or more sweetpotatoes annually is handled entirely as a home enterprise within the individual homes of the country. No evident precautions are taken to protect the drying product from dirt or other contamination, trays often being seen on the very roadways

where animals and vehicles pass frequently. There is little or no standardization of quality.

Varieties

American varieties of sweetpotato that had been tried in Japan prior to 1946 were not adapted to the conditions of Japan and the desires of the Japanese. They are reported to be too susceptible to disease and too low in yield. On the other hand, the varieties developed by the Japanese to suit their conditions and desires appear rather outstanding in productivity. In appearance, particularly color, and in their low total solids, some of them would not suit American requirements but there is no doubt of their adaptability to Japan. None of their varieties have highly colored flesh and most are white or nearly so. Some of the salient characteristics of several of the more important varieties are briefly stated below, according to information supplied by the Japanese specialists.

GENGI. Short spindle shape; light reddish brown skin; nearly white flesh is tinged with yellow; flesh medium high in starch and solids; reported by some to have some resistance to black rot, but not so reported by others.

GOKOKU. Nearly ball-shaped; brown skin; nearly white flesh tinged with yellow; flesh low in starch and total solids. Said to have a weak resistance to "black spot." Is a favorite in the Kanto District because of its high yield.

NORIN 1. Tapered thick spindle or conical shape; skin reddish brown; flesh nearly white but tinged with yellow; flesh medium in starch and total solids. Said to be weakly resistant to black rot, strongly resistant to "black spot," and moderately resistant to nematode.

NORIN 2. Ball-shaped on some soils, nice chunky shape on the volcanic-ash soils; skin ivory; flesh nearly white; medium in starch and total solids. It is strongly resistant to nematode, a good keeper, but rather late. Better adapted to the more southerly districts.

NORIN 3. Short spindle shape; skin ivory; flesh nearly white tinged with yellow; medium high in starch and total solids.

NORIN 4. Long spindle shape; reddish-purple skin; light yellow flesh; low to medium in starch and total solids. Very fast-developing, being adapted to the short season between grain crops in middle Honshu or in regions of relative short season elsewhere. Strongly resistant to nematode.

OKINAWA 100. Cylindrical shape; skin light red; flesh light yellow; very low in starch and solids (like Jersey), but popular because it is a very high yielder. Develops rapidly and said to be somewhat resistant to black rot; highly resistant to "black spot" and nematode.

TSURUNASHIGENGI. Short spindle shape; skin light reddish brown; flesh yellowish white; starch and solids high. Weakly resistant to nematode.

In the early spring of 1946 several of the best Japanese and American varieties were exchanged through the military and agricultural authorities. Some of the Japanese sorts have proven resistant to fusarium wilt under American conditions. The Japanese claims for resistance to nematode are of special interest in America but have not yet been verified under our conditions.

Disease

Black rot, caused by the organism *Endoconidiophora fimbriata,* called *Ceratostomella fimbriata* by some workers, is consistently reported as the worst disease of sweetpotatoes in Japan. It causes losses of about a third of the seed stock that farmers try to

carry through to bedding time, and largely determines the length of period of availability of the crop for food over most of the territory in which the crop is grown. In the Kanto District the crop must be largely eaten or dried by the end of the year, or else is lost.

Bichloride of mercury is not used to control surface infection with black rot in Japan as it is in America. The Japanese say they have a better method: Hot water treatment for 40 minutes at 47°-48° C. The method is so troublesome and fuel is so scarce that farmers have not used it generally and its proponents have had hard work to popularize the method. Progress is being made in extending its use by inducing farmers to reheat the family bath after use and before it has cooled appreciably, thus conserving fuel. The roots in this case are treated in the bathtub. Still the Japanese pathologists contend that their method is better than bichloride of mercury. They claim that the hot water treatment kills organisms beneath the surface of the roots and they have some data to support their claims. Bichloride of mercury is simple to use and it seems likely to effect a far greater degree of control than is likely to be realized by the hot water method. However, the Japanese are a surprising people. They successfully make use of many methods that seem impractically laborious to us.

Fusarium wilt is known in Japan, but most workers that were questioned stated that it causes no particular trouble. The varieties most commonly grown are not characterized as resistant; but if they are not resistant Fusarium must be virtually non-existent in Japanese soils. In many localities sweetpotatoes are grown year after year in the same soil, with only a winter grain crop alternating. It is probable that the varieties in question may be more resistant than the Japanese realize, or it may be true that their methods of soil management keep the pathogen under control. Both of these factors may be effective.

The Ministry's sweetpotato specialist has listed the following disease-causing organisms as common on the sweetpotato in Japan: *Helicobasidium mompa, Sphaceloma batatas, Cercospora batatae, Corticum centrifugum, Alternaria* sp., *Thielaviopsis basicola, Phoma batatae,* and *Sclerotinia sclerotiorum.* He has also listed the following diseases which are fairly common or serious on one crop or another in the United States, as being uncommon in Japan: *Plenodomus destruens, Phyhatotricum omnivorum, Actinomyces ipomoca, Pythium ultimum,* and *P. scleroteichum.* By omission of Fusarium from the latter list, it would appear that the organism is well known although it is claimed that it causes no serious damage.

In addition to the above, the Ohara Institute lists several other organisms that affect sweetpotatoes in Japan to some extent, as follows: *Sclerotium bataticola, Diaporthe batatatis, Rhizopus nigricans, Pythium spinosum, Botryodiplodia bataticola, Fusarium solani, Fusarium solani* var. *eumartii, Fusarium batatatis, Fusarium semitectum, Fusarium orthoceras, Giberella saubinettii, Cylindrocarpon didymum, Cylindrocarpon radicicola, Trichoderma lignorum,* and *Monilochaetes infuscans.*

Concerning Hardiness

Robert S. Sturtevant

From a laymen's view-point, the relative hardiness of this or that is based in part on the keenness of his desire to grow a certain shrub or flower and we are similarly interested in the extent to which we will fight drought, poor drainage, or the wrong soil in achieving success. As a landscape architect I can afford but rarely to recommend anything that is not hardy year in and year out under the neglect of the average home owner *but* as a gardener success just once in a decade may become a treasured memory or the object of continuing efforts.

Thus hardiness (or success) is almost a necessity for the commercial grower in any one locality and within the bounds of his accustomed habits of propagation in the open or under glass and it is a most variable quality under the skilled care of the clever gardener who, with concentrated interest, may select a favored spot, nourish, pet, and shelter his single specimen.

In nature there is grim competition and hardiness enters into many other environmental conditions that effect not only successful growth but even more the power of regeneration on the fringes of habitats. It is not every year by a long shot that we find a carpet of the native white pine seedlings, nor even then in the vicinity of every bearing tree. I have seen forty year-old healthy white pines, cone-bearing at Orton Plantation (N. C.) grown with camphor and camellias BUT I doubt if seedlings will develop short of the foothills. Again the red-bud is not an unusual specimen around Boston and yet of a hundred seedlings planted twenty years ago none have bloomed, a good half died the first winter, the last survivors kill-back periodically. This was largely straight lack of hardiness and yet in Tennessee with a big native red-bud that seeded regularly there has been one thicket of seedlings in eight years and only a few survivors due perhaps to a hard freeze in the seedling state but more likely to a prolonged drought.

A collected Carolina rhododendron, if planted in the spring, may thrive in Massachusetts but succumb if planted in the fall. In Nashville, it may die of drought if spring planted and appear to live if early winter planted though it is fated by the limestone soil.

Hardiness is unmistakable when the first frost catches a tomato or shrubby heliotrope; it is less clearly the trouble with a pansy or snap-dragon that in vigorous growth may pull through a New England winter with a heavy snow cover.

Many a flower of early spring is caught by a freeze both North and South. A peach bud may be actually frozen by extreme cold or caught in full bloom and no fruit result and hence lack hardiness as a crop. In its lovely flowering forms, however, its beauty of bloom in one year out of five may justify the space it takes. I have seen few flowering peaches in New England; it is probably not commercially hardy, but after a period of mild years the success of a few courageous experimenters may lead many to try it. I actually doubt if it will be caught more frequently than the beautiful magnolias or even the Flowering Dogwood which is a sparse native.

Recently the American Iris Society

conducted a questionnaire on growth—tender, slow, unreliable, satisfactory. This included, of course, only about thirty of the leading varieties and there were very few reports of actual tenderness. Even then they were balanced by favorable reports from practically the same localities. There are relatively few iris species of known tenderness, apparently as few as named varieties despite scattered failures in many a garden or part of any one garden. It is clear that failure to bloom is frequent in some localities, actual failure to live rare among the iris.

If some such similar questionnaire were applied to camellias or roses, fuchsias or begonias *and* if we could link a reasonable success with some far more common shrub like abelia or althea, pyracantha or blue hydrangea —all border line cases of hardiness there would a real guide to many an ardent gardener who has not dared attempt some reported impossibles.

Camellias, e.g. frequently still bloom after a drop to 24, 18, of even 8 degrees; in Trees and Shrubs of the British Isles, 31 degrees of freezing was not fatal. How continued any of these temperatures can be and the plant still live we just do not know. A Society such as this with a wide spread of members and interest is in a key position to report a modicum of success with camellias or what you will and one such report including a group of border line plants generally considered tender may encourage dozens of other trials and add a whole new outlet for gardeners in any one locality.

Lilacs and peonies, it is generally known, are not reliably hardy far north and become less and less satisfactory with heat. The Bearded Iris dislikes both extremes and may perform poorly in a narrow band subject to unseasonable freezes—perhaps the same band where the Japanese Cherries suffer. Members of the Rose Family may be at home in Florida or Manitoba, certain daffodils also. We have gradually come to realize these broad limitations in growing the most popular of shrubs or flowers or the most sought-after fruits and berries but we still seek in vain for guidance either on the less popular or above all on the species that we have come to associate with indoor culture or certain climates.

The gardenia, the camellia, many a rose, fern, bamboo, or palm has just not been tried or at least not reported on in many a locality. That is where you may help many others.

We have come to value and use freely certain flowering trees in certain localities, with increased information one sees them over wider and wider areas, first as mere specimens and gradually in greater quantities. For many years the Arnold Arboretum has been a leader in such recommendations —other institutions follow suit. Undoubtedly we owe the popularity of the Flowering Crab to this source. Originally rare (except the native) even around Boston you now see them among the azaleas of Mobile or Charleston or with the spireas and viburnums in Minnesota. A plant of mimosa has proved relatively successful at the Arnold Arboretum for probably twenty years but as I drive I see few mimosas north even of Washington. An institution must be slow to recommend but you as an individual have no reputation to maintain. I would like to see reports on flowering apricots and peaches, cherries and crepe myrtles, on evergreen magnolias or mimosas, on all these things that in leaf or bloom are so showy as to bring you to halt when you are speeding through the countryside.

Nashville, Tenn.

The Crocus

Agnes C. Darrow

As a amateur gardener, with the problem of shade from forest trees to cope with, I have been forced for many years to find plants and bulbs that will thrive and bloom without much sunshine. The logical result of this condition was a spring garden and the earlier you can have flowers bloom, the more fun it is. This means Spring-flowering bulbs and wild flowers. Of all those with which I have been successful through the years, the crocus has given the most joy and has been the most interesting.

The crocus belongs to the Iris Family which includes freesias, gladiolus, ixia, blue-eyed grass, tigridia and a good many more. It is not a bulb but a corm a structure composed not of scales but is a solid substance. The plants are stemless with the leaves coming in sheaves directly from the bud on the corm. This latter when mature is covered with fibrous coats which vary in number and thickness and are usually brownish in coloring. The flowers which in many cases develop before the leaves, are funnel-shaped and erect with a long tube, though this is much longer in some than others. There are six floral segments, equal or nearly so in size, which we speak of as petals and which together form the perianth. There are three stamens, attached to the inner surface of the perianth. In the center rises the pistil with its three-cleft stigma, sometimes further divided. The whole is a simple structure, with the beauty that so often characterizes simplicity.

The crocus must have proper soil conditions in order to thrive. It does as well in shade as in sun, but it must have moderately light, even sandy soil that can be dry in summer. Never plant them in heavy wettish soil. It must always be well drained.

My crocus have grown for years in woods soil with an annual supply of leaf mold. After the ground is frozen (so that the seedlings won't be disturbed) rake off the fallen leaves and put back about an inch of pure leaf mold. When they flower in the Spring, they are much prettier coming up through the dark leaf mold than through the uneven scattered leaves and they get all the nourishment they need although bonemeal may be added at times, without harm.

Now, where is the best place to plant them? Never in the lawn. It is not natural and since crocus make their growth and increase through the help of the foliage the grass can never be cut until this has ripened and disappeared. Many people have planted this way in the past and then wondered why they "lost" their crocus in two or three years. On small places there are four ways to use them. First you can make broad irregular groups of them toward the front of the perennial border. You can plant them in "drifts" two or three dozen or more at the edge of shrubberies on under trees. Don't put them *under* the shrubs as they need light and air. You may use them as an edging for a bed or border, but it should be an irregular edging and not a straight, narrow line. Finally, some of the smaller species are fine in the rock garden. If you have a larger place, then the best location for them is on a sloping bank whether it has sun or shade.

Because the crocus is a corm and not a bulb, you should plant it more deeply than you might think from its size. The

tulip bulb to increase dies and forms several new bulbs about the axis; the narcissus splits but remains with its smaller bulbs about the old mother bulb. The crocus after flowering and growing, withers but produces one or more new corms on *top* of the old one. As this process continues, the corm will eventually come closer and closer to the surface, which is the reason it should not be planted shallow. It is also the reason why crocus have to be lifted after a number of years unless they are first planted at least five inches deep and have had leaf mold added to the bed each year. In deep planting, the annually produced roots have a tendency to hold the corm more firmly in place.

When I have to transplant to increase my stock, because of over crowding, or because the corms are no longer flowering well, I do it always immediately after the flowering and always try to lift, divide and reset, the same day. In this way it is easy to see where to plant them in relation to other growths and there will be enough subsequent rain and sunshine to develop them fully so that they will flower the following year. When one buys new corms, they arrive in the Autumn and should be planted as soon as possible so that there will be ample time for deep rooting before Winter. Autumn-flowering sorts are best planted in July or August.

The crocus has some enemies, mice rabbits, squirrels and chipmunks all eat them. If you do not wish to get rid of the enemies, you must protect the crocus. When planting in the Fall, I always cover the groups with screen mesh wire until the ground is packed. I have found that this keeps out, even the chipmunks. Naptha flakes put on the ground saves them in the summer if you find evidence that the enemies are at work, and in early Spring when rabbits like to eat the leaves, and blooms, because they are so hungry, always put out cabbage and lettuce leaves among the crocus, every night. Rabbits prefer them to crocus!

Years ago, I knew only the so-called Dutch crocus in tones of purple or blue, both plain and striped. I knew nothing about the species or wild crocus. From what I have seen in the gardens of most amateurs, this still seems to be the state of affairs, so I am making a plea for a much more wide spread use of species crocus and for several reasons. They bloom earlier or in the Autumn. They are very hardy. They have smaller flowers of more varied shapes. They are very graceful in their habit of growth, they last longer in bad weather, in snow or rain, and best of all they propagate themselves both by corm and seeds.

There are seventy-five or more species of crocus. They come from all parts of the Old World Temperate Zone: from Portugal, Spain, Italy, France, Greece, Palestine and Turkey. From the Caspian Region to Asia Minor is the home country of the greatest number of the species. They are found also on the Balearic and Ionian Islands and they grow high up on the Alps, in the Pyrenees and in the Caucasus. The Autumn-flowering species are not to be confused with the Colchicums which are some times called autumn crocus, but which belong to the Lily Family and are quite a different affair.

The so-called Dutch crocus are hybrids. They are mostly the result of crossing *Crocus vernus* with *C. moesiacus* according to some authorities. They were developed mostly in the Netherlands, hence the name. They are very beautiful and now come in many named varieties, some of which are of great

size. If carefully chosen, they will give a blooming period of two to three weeks after the species are mostly gone. They definitely belong in any Spring garden but just as definitely should be preceded by the species!

The earliest of my species is *C. Imperati.* This year, 1947, after the warm weather in December and January, it began to flower on January 30. It was then covered with snow for a month, but other buds opened by March 5. It is a lovely thing, the outer segments fawn color flushed or marked with violet, the inside warm red purple.

The next to bloom were *C. Sieberi,* a clear blue lavender and *C. Tommasinianus* lavender or gray without. About twenty years ago I bought a dozen corms of each of these. Since then they have been divided and reset have increased and seeded themselves until a hillside, 25 by 125 feet is completely covered with groups of them. In Februray or early March it is a solid sheet of lavender. This year it was still a mass of lavender after more than a thousand flowers had been picked. Of the two, *C. Tommasinianus* is by far the more prolific.

C. Tommasinianus Whitewell Purple is a variety worth having. It has many small red purple flowers and is lovely in a mass.

C. Olivieri from Greece, is a very deep clear orange. The foliage is dark with the usual white band. It is also very early and bears many flowers to each corm.

C. aureus is another orange one, with dozens of small bright flowers. It multiples rapidly and is very hardy.

C. chrysanthus Dorothy is a lovely yellow feathered with bronze and its flowers last a long time, even with Spring rains. This year it began on March 22 and continued in bloom for three weeks.

C. chrysanthus E. P. Bowles is a good yellow variety, a pure buttercup yellow. The flowers are fairly large with a very smooth texture. Many flowers come from each corm.

C. Susianus called Cloth of Gold, is a bright yellow with brown on the outside. It bloomed late this year, but it is supposed to be one of the earliest.

C. Fleischeri is a very unusual species. The white petals are narrow and pointed and the anthers are a brilliant scarlet. It bloomed profusely from March 22 to April 8.

C. Weldeni is white shaded with blue, free flowering and its white form *C. Weldeni albus* differs merely in being pure white.

C. biflorus the Scotch crocus, looks like *Weldeni* but is larger.

C. biflorus Parkinsoni is a small but quite a nice flower, the inside of the petals white, but the outside marked with purple stripes. It flowered in late March.

C. chrysanthus Large Warley White is a very beautiful large cream colored flower, half a dozen to the corm. It bloomed in early April.

C. versicolor picturatus sometimes called Cloth of Silver, is white, also with stripes on the outside of the petals. It began to bloom in the latter part of March and continued for several weeks. It seemed impossible that so many flowers could come from one small corm. It is one of the best for the rock garden.

C. etruscus has flowers of very good form, and of a beautiful shade of lavender. It continues in bloom for more than a month and is particularly worth while.

C. chrysanthus Quaintness is of primrose hue feathered with light purple.

C. vernus Vanguard is a very large and a very beautiful variety blue-lav-

ender inside and gray on the outside. It is a fine addition to any collection whether large or small.

These are only a few of the many species that I have grown and the dates of blooming are of this year (1947). Other years they have been three weeks earlier. All of these species I have found to be hardy, interesting in their forms and colors; of rapid increase and free blooming. They may not be precisely those that you might want for your garden, but they are excellent. If you need Autumn-flowering species, try *C. sativus*, the saffron crocus of deep lilac with lighter shadings and orange stigmata or *C. speciosus* in violet blue and many varieties, or again, *C. zonatus* a most striking thing of lilac rose with an orange center. There are many others. Look over all the catalogues, choose wisely and you will have flowers through October and November (in December in mild countries) and again in Spring for two months, provided you include also the familiar Dutch crocus.

Dayton, Ohio

Gloxinias On The Pacific Coast

GEORGE B. FURNISS

Gloxinia seed and tubers for the domestic trade come largely from California. Whether European sources will regain control is doubtful because of regional advantages. Crops are commercially grown along the central and southern coastal sections where the humidity is relatively high. The weather during the growing period is cool at night and warm of days. The species, however, are native of the subtropical regions of America yet the growth seems to be remarkably sturdy and vigorous under these coastal conditions.

Seed is started in February under artificial heat between 65 and 70 degrees. Cultivation is under glass for forcing purposes and as the season advances, which is early, the vents are kept full open during the day. I find that the sooner the plants can be hardened-off and put in a lathhouse, the more robust is the growth. Development may be slower but the results are better than under the ventilation restrictions of a glasshouse.

Greenhouse culture requires extreme skill and a constant battle against pests, fungus and rot. Then, too, the utmost care is required in watering and keeping the foliage dry. The layman lacks the time, perhaps the facilities or the ability, for such detail but he can find satisfaction in a lathhouse. Here, a uniform change of air prevails, no air pockets nor faulty ventilation, or excessive humidity to cause buds to die, or mold to develop.

Water may be use profusely on plants and the surroundings which condition holds humidity and defies pests. Pests just don't like water and this also gets rid of that other burdensome pest —the insecticide sprayer. I water early of a morning, before the sun gets strong, and this gives the air currents ample time to dry off the foliage before evening. This evaporation is also invigorating to plant growth, resulting in turgid stems and leaves.

Watering is done every morning during hot spells and less often according to weather conditions. Yes, even the velvety leaves are wetted which is no other than what occurs in nature. However, effort is made to hold the spray below the flower-heads. A fine

spray is made with the finger held over the nozzle so as to direct and control the force. Force keeps pests from lodging and also strengthens growth. Spraying and pot-watering are systemized together by sections.

In potting, several inches of dry leaves are put in the bottom of the pot for drainage, that is, using top leaves from under oak or other hard-wood trees . . . no crocks, just press the leaves down firmly. This provides free drainage and lessens the danger of over-watering. For compost, I use ½ soil, ¼ peatmoss and ¼ oak leaf-mold. In absence of the last, use ½ peatmoss.

The purpose of adding sand is to open a compost for drainage and air. The amount of sand of course depends upon the texture. Our formula calls for more soil than is generally used; the object is to have the soil sufficient and somewhat heavy so as to slow up the compost in drying out. With each watering, a certain amount of nutriment washes out so that by cutting down the frequency of watering, saves nutriments and time.

The proper texture may be told by the feel and that comes with experience. Upon half filling a pot, I mix in a rounding tablespoonful of fertilizer to a six inch pot, fishmeal preferred. Cuttings, leaf and part of stem, are taken when mature which is the period following the last blooms. Sand is a good rooting medium but must be kept quite dry to prevent rot. Vermiculite, as a rooting medium, advertised under various names, has not proven superior in a check test, even when the surface was pulverized to nestle the fine seed.

The strong argument is, that being sterile, it does not require the disagreeable task of sterilizing as is made necessary by other mediums. But sterilization is not necessary if a coating of dried sphagnum moss is sifted over the surface of the medium. I use the same compost as for potting. This is sifted through a window-screen mesh and the sphagnum is powdered through a tea-strainer. Watering is done by absorption from a saucer. Seed planted in soil, gets a natural and a diversified nourishment immediately and apparently obtains a more sustaining start.

A common mistake is sowing seed too thick, thereby getting more plants than needed, and (2) transplanting before the secondary leaves are developed. Sowing fewer seeds, well scattered and then transplanting with the advent of true leaves, starts the plant on its mission with a rugged constitution instead of a weak, succulent impotence.

A local propagator who wholesales specimen Gloxinia plants to the florist trade and uses greenhouses for forcing, was confronted with his plants languishing in spite of what he did. He called in horticulturists from the University of California who found the Gloxinias suffering from boron deficiency. The formula prescribed was a level tablespoonful of borax (laundry kind) in a pint of water so as to make a saturated solution. This was used at the ratio of 2 drops to each gallon every 2 weeks in watering. The plants responded gradually to this treatment and the grower was thus saved a heavy financial loss. Thanks, that such valuable scientific service is made available by State and Federal Departments.

An infinitesimal element thus becomes the thread between health and disease, between life and death. Its absence becomes a case of starvation from hunger when food sources are abundantly present. Such a plant is like The Ancient Mariner: "Water, water everywhere, Nor any drop to drink."

Some years ago a nationally known California grower added Gloxinias to

his specialities with much introductory publicity. Extreme losses occurred and poor results developed so he quit the species. Perhaps that too, was boron truancy.

Gloxinias are adaptable to northern climates and even in those climates with short summers. Two acquaintances, one living in Nebraska and the other in Minnesota, start their seed and tubers in the household and bloom them on their porches. Also, pots are plunged in the garden in sheltered locations and on the north side of shrubs. . . Yes, hot weather, winds, and rain notwithstanding.

Gloxinias should do well in Alaska as they are closely associated with Tuberous Begonias in period of bloom and requirements. At Skagway in July we saw them blooming in the open and in hanging baskets under trees. These were gorgeous and comparable in size and texture with those in California, only the color was far more vivid—an intensiveness which latitude bestows on its flora. In that latitude the growing period is short but the long daylight and warm weather makes for rapid development. In this there is a surprising fact. There are more days in the course of a year when the temperature in the shade reaches 90 degrees, or over, than at Panama where the average of course is much higher.

Oakland, California

Lily Notes

Lily Improvement Requires Years, But Is Worth It.

A man wants his first child to be a son. A psychologist explains this on the basis that when a man is old enough to have a son, he has already realized that his work will not get as far along as he wishes in his own brief lifetime. He wants a son to carry on the work.

If it happens to be the improvement of hardy lilies, his idea is well grounded.

More than ten years ago I started working on trying to improve hardy lilies for that large region east of the Rocky mountains, which comprises about three-fifths of the United States and perhaps seven-eights of the population.

Iowa is a fine place to create new and better hardy perennial plants. Its blizzard belt, freezing and thawing over and over often with no snow. To stand this they must be really hardy.

While there are a good many lilies, there is also plenty of room for their improvement, especially as to disease resistance, hardiness, vigor.

First, I got together all the books on hardy lilies I could, also bulletins about lilies, lily bulb catalogs and lists, and I did also a good deal of corresponding to get still more information.

Wilson's "Lilies of Eastern Asia" is most helpful.

One must know the field before there can be worth while progress.

That took about five years. Then I was able to lay out the plan as to what should be possible to do and what should be done?

The lilies that do so well on the West Coast are the same lilies that do best in Europe and in England, such as *L. Martagon* and *L. pyrenaicum,* which have naturalized themselves there for more than three hundred years, but are always difficult to establish in New

England or in the northern part of the United States. As to *L. chalcedonicum*, or Red Martagon or Constantinople, it has long been common in many places in England, but in the United States east of the Rockies, it is a very difficult lily, to say the least.

All these lilies do well on the West Coast.

Then there is a lily from Burma, India—the *giganteum*, which is largest lily known. It grows as much as 12 feet tall, and is the pride of large English estates. It blooms only once. Has large, white fragrant flowers. It is a very difficult lily east of the Rockies.

After about five years gathering material, I made out a plan and started to get together the bulbs I needed for the various crosses.

One rare *Speciosum rubrum* I got from the one place in Japan where it could be secured, and the only place anywhere. If I had waited another year, I would not have had them.

Then I got lily bulbs from Manitoba, Canada, 200 miles north of the U. S.-Canadian line. They are hardy all right. Also got some fine bulbs from British Columbia, and from many parts of the United States.

One bulb I needed to fit in a certain, important place, is not a commercial lily. No bulbs to be had anywhere. Finally I got some seeds from the Boyce Thompson Institute for Plant Research. I raised four bulbs. Last year two of them bloomed the first time. They gave me plenty of pollen, which was what I wanted them for.

Although I made some crosses before last year, I was not supplied with the right lilies to do what I planned.

One of these earlier crosses was *candidum* or Madonna as pollen parent, on Scajowea as seed parent. Neither of these produce seed normally. This cross produced seed that was viable. That is, it grew. Scajawea is a hybrid of two Pacific coast native lilies, *Humboldtii* × *paradalinum*.

It is named for the Indian woman guide of Lewis and Clark expedition.

In 1946 nearly fifty crosses were made. About half of them did not take. I rather expected that.

The best of these so far is a second generation hybrid in-bred cross. The seeds were the largest, heaviest, plumpest and darkest colored lily seeds I have ever seen. The seeds measured 3/16" by 3/8".

They were planted indoors in sub-irrigated flats, several weeks after planting several varieties of such early germinating lilies as *formosanum*, including several hybrids—also *concolor* and *Aurelianense*.

But the new cross seeds were up long before the *formosanum* and others. In a short time they have become at least five times as large, and have already begun to send up true leaves. At this rate they should bloom by 1948, as it is a rule with lilies that those that germinate quickly also bloom in a couple years or so.

The slow germinating lily seeds, such as *auratum*, *speciosum*, and such, do not bloom under about five years from seed. It is possible, by giving them liquid fertilizer about every other week, to get them to bloom in as short a time as four years.

I had *formosanum Wilsoni*, the late *formosanum*, last fall that were eight feet tall with a dozen nine-inch blooms on one stem, white and fragrant. The *formosanum* is said to be a short-lived lily. I have not found them so. These are seven years old, and get larger and better every year. The stems are so sturdy that they do not need to be staked. I have other tall lilies that do require staking, such as *henryi*, also known as the Golden Speciosum. This

is the longest blooming lily I have.

As to the *formosanum,* keep them away from the Tiger lilies, and its a good idea to keep all other lilies also away from Tiger lilies. And still, the Tigers are the most vigorous, hardy and healthy liles we have. They naturalize here. Some people don't care for them. Say they are coarse.

Among the crosses is *auratum* × *speciosum* which is the long lost and outstandingly beautiful Parkmanii hybrid, lost for some 75 years. I suppose that this cross is *auratum* pollen on *speciosum rubrum.* There are several other *speciosum,* of course, such as *album,* and others. I have a list of 12 different varieties of *speciosum,* six of *formosanum,* and there are hundreds of *auratums;* some of them retailing up $125 a bulb.

Now I am just getting started in new and I hope better hardy lilies.

There are also various *speciosum* on *auratum* crosses. Some even starting to grow, which they should do for a year. If they grow early they will also bloom early.

Its only about a dozen years I have been at it.

The second generation hybrids, especially in-breds, should result is newer and better, more hardy, vigorous and disease resistant lilies.

The vast region east of the Rocky mountains is fortunate as to lilies. Those that do best in that immense region are the lilies native to China and eastern Asia, which include *auratum, formosanum*—from the island of that name — *speciosum, regale, tigrinum,* and many more, including the lovely Siberian Coral lily, or *pumilum,* formerly known as *tenuifolium.* It is one of the earliest lilies to bloom, blooming in June. From then on there are lilies in bloom until black, killing frosts come in autumn, and garden is dead but full of dreams for the next year.

The lily experts assert that *auratum* and *speciosum* are the two finest liles, and they are included among the lilies especially adapted to the United States east of the Rockies.

But it is not going to hurt at all to improve these and create new lilies that are hardier, more vigorous and more disease resistant. That is the job I have picked out. In another five years or so, I hope to have something to show for some 15 years of very interesting work.

I have a giant form of Coral lily that grows more than three feet tall. This summer I discovered that this lily has a lovely honey fragrance, not strong. There are several named kinds, including several yellow.

The rules of heredity work just the same as to hardy lilies as hybrid seed corn, chrysanthemums, and other plants.

The hybrids often have more vigor than either parent.

The new hybrids that is making such rapid growth will not be a white, and it probably will not be highly fragrant. In color it wil be probably an orange or pink. There is an interesting future for hardy lilies.

H. Roy Mosnat
Belle Plaine, Iowa

Cactus and Succulents

W. Taylor Marshall, *Editor*
Director, Desert Botanical Garden, Phoenix, Arizona

Succulents in Oakland

Just how much can be accomplished by a small but earnest group of plant lovers to further interest in their own specialty was clearly demonstrated at the Spring Flower Show in Oakland by the Cactus and Other Succulent League.

About thirty members comprise the group but each is an enthusiast for succulent plants and a hard worker where his hobby is involved. Only such a group would have considered entering the 15th Annual Show in all three classes of entry for succulents as listed by the Show Committee.

First there was class 577, A collection of cacti-20% other Xerophytic plants permissable—not less than 500 plants—not less than 700 square feet. Next was class 579, Outdoor exhibit of Succulents—not less than 50 species and varieties—not less than 100 plants, and lastly there was class 581, Collection of the more delicate succulents—not less than 30 plants—judged for cultural merit and rarity.

For these classes the Show Committee provided first prizes of $320, $80, and $30 and it was extremely likely that there would be no efficient competition for them but to keep us alert these is a provision in the show rules that says "Where there is no competition it will be left to the discretion of the Judges to award 1st, 2nd, 3rd, etc., premiums or no award."

Preparations for the exhibits began a full year in advance when each of our members selected his best plants and commenced to groom them to assure near perfection. The last six week ends before the show every member, who was free to do so, gathered at the show grounds to work on the exhibits.

For the largest exhibit a background scene suggested by Shiprock Mountain, New Mexico was built and painted by our own members. Dirt was hauled to build up a natural-looking gully and covered with reddish-brown slag which blended with the color of the backdrop and in this we planted fine specimens of Cacti as can be seen in Figure 1.

For the Succulent plant exhibit we had a ready made background in a log cabin already in place and it was necessary only to bring in rich soil and colorful rocks with which to build a rockery in which our choicest and most colorful succulents were planted. A small section of this garden is seen in Figure 2.

For the third entry we had a shadow box built and painted with aluminum paint, and there we showed nearly perfect specimen plants of both cacti and the other succulents, each pot wrapped in florists foil and the whole lighted by one fluorescent fixture. This entry is shown in Figure 3.

Yes, we did win first prize on each of the entries and our society is richer by the $430 prize money less about $200 which we spent on the entries.

But more important than the prize money we attracted the attention of almost every one of the more than 100,000 paid attendance and some of them will surely be sufficiently interested to start a collection of succulent plants.

W. C. Andrew

Official Flower Show photo.

Fig. 1. The 700 square feet cactus entry.

An Oklahoma Collector

Six years ago, at the age of thirteen, the cacti of our neighborhood attracted my attention and I collected plants of *Echinocereus purpureus, Coryphantha vivipara, Neobesseya missouriensis* and of three Opuntias and established them in our garden. Since then my collection has grown until it numbers about 200 species of Cacti.

At first I was able to obtain only small cuttings and seedlings and some seed which I planted and from which I have raised some nice plants. A year after my interest was first aroused, my uncle, Lewis W. Sweet, took me on a trip to Texas where we collected additional species to add to our collection, Mr. Sweet also had a cactus garden.

Since then we have been companions on other trips to Texas, New Mexico and Arizona, the last in the spring of this year on which trip we took 162 Oklahoma cacti to the Desert Botanical Garden near Phoenix where an Oklahoma section was started.

In 1944 I built a 12 x 12 greenhouse to house my ever-increasing collection but found that even with this protection I was not too successful with the tropical and subtropical species such as *Epiphyllum* and *Cereus,* both of which seem to need a more humid air that is usual in Oklahoma.

My favorites are *Mammillaria, Astrophytum, Echinopsis, Gymnocalycium* and *Hamatocactus* all of which flower freely in my greenhouse. In the picture taken in my garden in 1944 the large plant is *Homalocephala texensis* which I found near my home

Fig. 2. A section of the Succulent Plant exhibit.

at Mangum. The crest on a graft is one of several found by my uncle in one locality at the west edge of town. It is *Echinocereus purpureus.*

The second picture shows part of the desert plant collection at my uncle's home which has since been moved to a more natural setting on his farm at the edge of town.

My collecting trips have greatly increased my interest in desert plants. On one of our trips I found the most aristocratic of cacti, *Pediocactus Simpsonii* at the summit of a 10,000 foot

Stover Studio

The shadow box exhibit of specimen plants.

peak near Mountainair, New Mexico. My visit to the Giant Cactus of Arizona gave me a real thrill and I also greatly enjoyed the visit to the Desert Botanical Garden near Phoenix where I had an opportunity to see so many of the Mexican and South American species growing just as they would at home.

My interest in cactus has proved itself by the number of fine people I have met through it and the many happy hours I have spent with my plants. My only regret is that circumstances will not permit me to go to some good college and really find out about cactus and all plant life.

GILBERT TAYLOR

Aloe for winter flowers

The Aloes are Liliaceous plants from South Africa, Arabia and the Mediterranean countries, all are succulent and all produce colorful flowers on simple or branched inflorescences with flowers in nodding racemes in reds, yellows or orange.

In the more favored parts of our country they are grown outdoors, as we grow them in Arizona, and they lend brilliant color at a time when the cacti and other desert plants are bare of blooms.

Many of the smaller species make good pot plants to be grown outdoors in the warmer seasons and brought in and placed in a sunny window in winter where the flowers can brighten the room.

Perhaps most gardeners have had a plant of *Aloe variegata*, called pheasents breast, at some time and many still have but I wonder how many of them

Cactus beds at the Sweet home.

supply enough light in the winter season to develop flowers.

The accompaning study by R. C. Proctor, Arizona famed cactus flower photographer, was made in February and shows *Aloe spinosissima* at the peak of its flowering.

In pot culture a soil composed of equal parts of top soil, sharp sand leaf mold has proved best and water can be freely supplied in hot weather but as winter nears give less water until the plant is taken indoors when the soil in the pot should be allowed to completely dry between waterings.

Idria columnaris Kellogg.

The lad who saw a living elephant for the first time and declared "there aint no such animal" has many counterparts amongst the visitors to the Desert Botanical Garden when they first view our plants of *Idria columnaris*.

The plant is a tree which may attain a height of forty feet or more, the trunk is shaped like an inverted carrot, 12 inches or more in diameter at the base and tapering to a point at the apex, silvery gray at the base to fresh green

Gilbert Taylor and some of his plants.

at the growing tip. From the trunk arise numerous short, spiny and leafy branches. The first leaves on new growth branches are borne on long pedicels which harden into spines when

R. C. Proctor

Flowers of Aloe spinosissima

J. A. Schrender

Idria columnaris growing in a cactus garden, Lafayette, Calif.

the leaves fall, secondary leaves appear at the axil of these spines in groups of two to four. The tree is leafless in dry periods.

The cream colored flowers are borne on panicles at the apex of the plant in July and August.

The plant was first collected by Dr. Veatch near the Bay of Sebastian Viscaino on the peninsula of Baja California and was described by Dr. Kellogg in 1885 as a species of *Fouquieria* or "ocotilla" but five years later Dr. Kellogg placed it in the monotypic genus *Idria*. It is therefore a member of the plant family Fouquieriaceae or Candlewood which contains but two genera and about nine species.

It is found only in the central section of Baja California and in one small colony near Puerto Libertad in Sonora on the western coast of the mainland of Mexico.

In Lower California the tree is called "cerio," the name for a tapering altar candle, by the natives, but the Americans refer to it as the "living telegraph pole." Reg. Manning, the desert cartoonist and artist, being a very wise man has not forgotten his "Alice in Wonderland" and he calls our plant the Boogum Tree in his book "What Kinda Cactus Izzat" and it is by this name that *Idria* is known to most of the visitors to the Desert Botanical Garden.

Idria is naturally an undivided column but occasionally a plant has a divided main trunk from twenty feet above ground. T. S. Brandegee was of the opinion that such branched trunks were the result of an injury to the main trunk rather than a natural growth habit.

For strength the plant has a conical woody structure covered by a thick and punky bark and filled with a pithy substance. The woody cone which survives after the tree has died bleaches white when the punky bark has disintegrated and shows numerous holes where the branches arose from the living plant.

Idria has been successfully grown in gardens in the desert districts and in many parts of the milder districts of California, Texas and Florida and it has also been successfully grown as a potted plant anywhere if hothouse protection is available for the colder months of the year. Like most desert plants it requires a very porous soil and little or no water in cold weather.

Camellia Notes

H. Harold Hume, *Editor*

Growing Camellias and Azaleas in the Rose Capital of the World

The fall of 1946 in East Texas was warm and dry, with an Indian summer spell of lazy, pleasant days and nights, accompanied by drying winds and an unusually small rainfall for our section at this time of year. Because of the lack of any real winter weather, we were forced to continue watering and mulching our camellias and azaleas to prevent the drying out of the soil and to meet the demand of the rapidly swelling flower buds. Many varieties were prematurely advanced for their regular blooming season.

We had occasional twinges of doubt about the wisdom of continuing to water so much so late, but feared that the lack of moisture at this time might cause bud dropping and the wilting of some new late growth on some of our smaller plants. Hopefully we looked for a moderate cold spell to take the plants gently into dormancy, but none came before Christmas.

On September twenty-first we were excited to find a fully opened White Daikagura. A very pleasant surprise, as we had bought the two-year graft the year before as a White Perfection. It made an interesting addition to our family of solid Red and Variegated Daikaguras.

By the middle of October the Alba Plenas, Debutantes, Alba Plena Fimbriatas, some Pink Perfections, Davis Rose and Dawns and Cheerfuls were in bloom; followed by Prof. Sargents, Ellen McKinseyes, and the lovely Lady Clares. Purity and Lotus were in flower at Christmas, along side of Adolph Audusson, Red and Variegated, with the Donckelaaris flaunting their regal splendor from three choice spots in our garden.

How grateful we were for our ideal soil, a perfect blend of sand and clay, slightly acid—"Nature's Greenhouse," the horticulturists were calling it—and for our usually very reasonable climate with plenty of rainfall in the spring, fall and winter. Summer drouths were not of too long duration, and sprinkler systems and hand-watering took care of them.

This year we were looking forward to a banner blooming crop. Now, for the first time, we would be able to compare in our own garden, the Lady Hume's Blush with Mrs. K. Sawada; the Tea Garden with the Georgia Donckelaari and the Eugene Lize Donckelaari; Alba Plena with K. Sawada and Henningham Smith; and Flame with Red Donckelaari. This year we would see Chandleri Elegans next to its red sport, Sophia, and its solid rose, Francine.

But the best laid plans can't compete with the eccentricities of our Texas weather!

On December twenty-eighth the thermometer stood at 76 degrees—a warm, shirt-sleevesy day. The weather man was predicting a sudden drop, possibly freezing before morning. With several such false alarms in the past to guide us, we confidently expected nothing worse than that very late "cool spell" our plants had been needing for the past six weeks. With nightfall, came a brisk shower which allowed the camellias plenty of moisture to cope with the cold, we thought.

But—by daylight, the thermometer had fallen to 21 degrees, fifty-six degrees in eleven hours. A Texas "blue

norther" had struck with all its power and fury. The gorgeous blossoms of the afternoon before were encased in solid ice. From 21 degrees the thermometer continued to fall until it reached 10 degrees, four days later. For ten days East Texas was in an icy grip, with several days of noon thaw to be followed at night by another hard freeze. The United States Weather Bureau stated that this had been the quickest and biggest drop ever recorded in this section. Cold comfort to us and our camellias!

East Texas has occasionally experienced near-zero temperatures in the past, but never anything like this. Always these low temperatures had been proceeded by sufficient cold to make most of the plant material of this section completely dormant. This year many thousands of young roses were killed in the fields; gardenias were killed back to the ground, in many cases destroyed completely. All nursery stock suffered severely. The estimated loss to the rose-growers, alone, was in hundreds of thousands of dollars. The many beautiful flowering shrubs this section is famous for were either killed back, or their bloom retarded and very meager.

Of the azaleas, the Indicas received greater damage than the Kurumes,—Pride of Mobile (Elegans Superba) more than Formosa, Pres. Claeys, Flame, Daphne Salmon and Fielders White. The bark on many twings was split, with the bark at the base of a few plants completely girdled. These latter plants, after a false spring growth, soon languished and died. The Belgian Hybrids faired even worse. Of twelve varieties in our garden, only one is still alive. The Kurumes were burned in bud and leaf, but managed a decent show of flower late in the spring. We cut out the damaged twigs and branches of many of the azaleas as soon as possible, but some were missed. These branches died back and the as the plants that received immediate bushes have not recuperated as rapidly treatment.

Now, with the Kaempferis and Macranthas, it is a different story. These two splendid species of azaleas went ahead with a bountiful showing of bloom. The late-flowering, deciduous Kaempferis blossomed right on schedule, and to our great surprise and joy, we discovered about two dozen "double-flowered" plants among some we had bought as singles. The evergreen Macranthas, in rosy pink and salmon pink, extended our azalea blooming period well into June.

The only diagnosis of camellia damage and fatality we have been able to make for ourselves, from this experience, pointed to the growing condition of the individual plant itself. It was very evident that camellias, either in full bloom, half-opened bud, or overladen with bud, are much more susceptible to cold damage than plants with less matured buds still wrapped in their protective husks. These husks or sepals seem to form a kind of winter overcoat on the buds, and, until they begin to split and open, offer some measure of protection to the flower from the cold.

Our loss was greatest in grafted plants that had been bought and set out in October, two months previously. But this loss was not confined entirely to recent plantings, alone. Several of the plants we had purchased the fall of 1945, also, were badly hurt or killed. We decided perhaps, that the camellias from a certain nursery were more susceptible to the cold. But, again, this was not proven to our satisfaction, as a five year old graft of Lady Hume's Blush came through with only a few burnt terminal leaf-buds and leaves

We lost several of the very beautiful semi-double Audussons, (by far my favorites) ; a large Donckelaari — an eight year old graft on about fourteen year old understock; a Eugene Lize Donckelaari, two Mrs. Chas. Cobb, one Aspasia, Eleanor of Fairoaks; several Rubra Virginalis, and three Alba Plenas were so badly damaged that the plants had to be cut back almost to stumps. With the Alba Plenas, that was not unexpected, but the other camellias were either semi-doubles or peony-formed, and had been previously thought more cold resistant than the double varieties.

Many of the so-called tender "double" camellias came through with less harm to the plants themselves than some of the ones recommended for the northern-most camellia belt. Mrs. K. Sawada, Lady Hume's Blush, Henningham Smith, C. M. Hovey, Rosea Superba, Mathotiana, Eleanor Haygood, Otome, Purity, Prince Eugene Napoleon, Margherita Caleonie, and many other doubles seemed to be hurt very little. True, there was some split bark on branches, late spring die-back on twigs, but on the whole, they look very "thrifty."

The flower buds were ruined on all of the one hundred and sixty odd varities of camellias in our garden, with the exception of the old faithfuls, Tricolor Seboldi, Leucantha, Austell Pink and Empress of India. The flowers on the two latter camellias opened very late, in May, and were dwarfed and somewhat distorted.

The leaf-buds were killed on many of the plants and defoliation began in about four weeks. Since many of the new leaf-buds were destroyed, the plants have had a hard struggle to replace these; in most instances, the new leaves are rather small and sparse. The flower-bud crop for 1947 seems very good, but not as heavy as last year. This is probably just as well, and will save disbudding of any surplus.

Of course, we now realize that a great deal of the camellia damage was our own fault. We had kept our plants in a growing condition by heavy watering during the warm, lush, spring-like days in December. But hindsight is always better than foresight. This year we have resolved to try to enforce dormancy, if necessary, by withholding water from the plants from about the fifteenth of October to the first week in November.

In February of this year we gave each plant a moderate feeding of cotton seed meal. We consider this the ideal fertilizer on our soil for all plants, with the exception of bulbs. Again in April, we used cotton seed meal in more liberal amounts—about two cupfuls scattered back from the base of the trunk for a large shrub, and then watered in thoroughly; for smaller plants, a scant cupful. About the first of June, for the sake of trying something new, we used the 5-10-5 formula, but in very small amounts, two tbsps. around larger plants, one around small ones, well watered in. At all seasons we are careful to maintain sufficient mulch, renewing it when it has washed away or decayed into the soil. We have found oak leaves, pine straw, grass cuttings, rotted oak or pine saw dust excellent for this use. We have learned by experience not to put the mulch too close, or too deep, around the base of the trunk, but to gradually deepen it back to the edge of the branches of the plant, and there form a basin. This holds extra water for the bush and helps to prevent leaching.

The new growth this year on our camellias has been shorter than ever before, but looks strong and healthy, for the most part. The spring and sum-

mer growth on the azaleas has been very good, on some plants better than we normally get. Wood is matured and ready for cuttings. Flower buds are again swelling. A new season of bloom is at hand, and hope is high again. We are very optimistic, and feel sure Fate will not play another such trick on us this year. In fact, in our collective optimism, we have organized "The Azalea and Camellia Society of East Texas," and are planning for a Camellia Show in December. With this many qualified voters banded together, perhaps Congress will finally do something about the weather.

VIRGINIA BURKS
Tyler, Texas

The Gardener's Pocketbook

The Argemone or Prickly Poppy.

In 1929, while visiting the Wind Cave National Park in South Dakota, I was impressed by a showy white-flowered Argemone or Prickly Poppy that grew there in great profusion, and was led to consider the possibility of its use as a garden subject in the Northern Great Plains. As the only botany I had at the time was Gray's Manual, which gave A. *platyceras* as the only white-flowered Argemone, I concluded that this South Dakota form must be of that variety, and, judging from its stature and size, I thought it must be a perennial. However, when I mentioned this in a contribution to this Magazine, Lester Rountree wrote me from California that *Argemone platyceras* was an annual with her. I have since learned from later botanies than Gray's that the variety I saw in South Dakota was *Argemone intermedia*. I have also learned from actually growing it in my garden that it is a perennial that blossoms the first year.

Our Editor's article on the "Prickly Poppies (Argemone) in the July, 1946 number prompts me to give the following information concerning this attractive species of the Poppy family. Without including the technical botanical data, the Argemones are generally described by modern botanists as follows:

Annual or perennial herbs or rarely shrubs, with prickly bristles and yellow or white sap. Leaves alternate, clasping, pinnatifid or lobed, the divisions tipped with spines and often blotched with white. Flowers erect in bud, perfect. Petals 4-6, showy, yellow or white. Stamens numerous. Sepals 2-3, hooded or horned, deciduous.

Rydberg's "Flora of the Prairies and Plains of Central North America," which is the latest and best Botany for the Great Plains region, lists the following varieties of Argemones:

A. mexicana, with yellow flowers; its habitat, hillsides, cultivated ground and waste places in the West Indies, Florida, Texas, South America, Africa, East Indies, and Australia. Cultivated and escaped; reported from Colorado, Iowa and Kansas.

A. intermedia, with white flowers; habitat, the plains of South Dakota, Missouri, Texas, Northern Mexico, Wyoming.

A. hispida, white flowers; habitat, the plains and hillsides of Kansas, New Mexico, Utah and Wyoming.

A. squarrosa, white flowers; habitat, the plains of New Mexico, Colorado and Kansas.

A. hispida above is listed in Coulter & Nelson's "New Manual of Rocky Mountain Botany" as *Enomegra hispida*, since Mr. Nelson considered it

to have sufficient distinctive characteristics to warrant its being classed as a distinct species. *Enomegra* is *Argemone* spelled backward. It is described by Nelson as a perennial. Rydberg has restored it to its original place among the Argemones.

Gray's "Lessons and Manual of Botany" lists also Argemone *platyceras*, giving as its habitat Central Kansas and Nebraska, south and westward. Rydberg does not list this variety.

It will be noticed that Rydberg does not state which varieties of Argemone are annuals and which perennials. *A. mexicana* and *A. platyceras* are probably annuals, though they may act as biennials under certain conditions. *A. hispida* and *A. intermedia* are no doubt perennials, but are somewhat short-lived and may even act as biennials. I have no data on *A. squarrosa* in this respect.

I planted seeds of *Aregmone intermedia* in ordinary garden soil in early May of 1945 and they came up and blossomed in late August of that year. It was necessary to move them to another location that fall, where they came up again and blossomed throughout July and August of 1946. The same plants are in blossom again at this date, August 2, 1947, this being their third year of blossoming.

I find that *Argemone intermedia* is a fine garden plant. It propagates readily from seed and resists drouth and heat. I use it for planting among Oriental Poppies, where it fills in the spaces caused by the dying foliage of the latter with its glaucous leaves and great white silken corollas with rings of golden stamens clustered around a rich purple stigma. Although Southern South Dakota appears to be the northern limit of its natural habitat, my experience shows part of North Dakota and close to the 49th parallel. I am sorry that our editor did not try *A. intermedia* instead of *A. platyceras* and *A. mexicana!*

Allan L. Truax
Crosby, North Dakota

The White Sands National Monument.

The White Sands National Monument in south central New Mexico has appeared frequently in print. Not far from here, the army established a proving ground where the first atomic bomb was exploded, and later new types of projectiles were tested. But it is not primarily because of a desire to visit the scene of these epoch making events that anyone interested in the distinctive plants, animals, or geology, would take a trip to this section. Here we find an area of about 225 square miles that is absolutely unique in this country.

Suppose you are touring to the "Monument." If evening is approaching, you will probably spend the night at the little town of Alamogordo, stopping at one of several excellent motor courts.

If you can spend an extra day in this section, by all means take the short trip from Alamogordo to Cloudcroft, making a gentle and delightful mountainous ascent of about four thousand feet. As you ascend, you will observe the change in plant life from the Sonoran to the Transition zone. At the base, near Alamogordo, you pass numerous apricot orchards: at Cloudcroft, you are among the evergreens, with occasional open spaces, on which Columbines, Iris, Penstemon, Erigerons, and numerous other genera of low growing herbaceous plants flourish.

Let us now take the fifteen mile trip to White Sands. As you proceed, you find stretches of rather arid country, where nevertheless a fairly large number flowers, such as Yuccas, Asters,

Yucca elata

Onagra gypsophila

Lupines, yellow composites grow. Suddenly you see in the distance an enormous tract of white sand—just as white as new fallen snow. You are approaching the entrance to the "Monument."

When you arive at the entrance, you are greeted by one of the Rangers, who incidentally will probably take you through the small, but interesting Natural History Museum. The Ranger informs you that "White Sands" is really a huge gypsum bed, and like sand dunes on the sea shore, the shifting winds continually blow these particles around, often forming large mounds and depressions. It seems incredible that any plants can live under these unfavorable conditions. And yet we counted a fair number of interesting species. These were seldom found in clumps, but single plants were well spaced, as if there were not enough nutrition in the soil to enable several to survive in close proximity. Apparently through a rapid elongation of their stems the plants often surpass the crest of a rising dune. It is said that occasionally a plant has been dug up, with roots and stems underground, that were *forty* feet long. Here we have a remarkable adaptation to environment.

The most conspicuous and tallest plant is *Yucca elata,* with its creamy white flowers. Among the lower growing ones, many had extremely grey, wooly leaves. One of the most attractive ones was an Evening Primrose, *Onagra gypsophila,* with good sized flowers having a somewhat pinkish cast. As far as I know, this interesting species grows only in this locality. Then there is a "Sand Verbena," *Abronia angustifolia,* with a faintly pink flower that I believe is also found only in this section. The above mentioned plants seemed to us the most distinctive ones that we found. Of course there were others of more or less interest, many of them belonging to the Composite family.

ROBERT M. SENIOR

Some Native Orchids

Liparis liliifolia or Lily-leaved Twayblade is none too common in our woodlands. Unlike other native orchids, it grows up from a pseudobulb. In early April there is sent up from this bulb a shoot covered by several sheaths. As soon as weather permits, the sheaths give way and the plant produces two green leaves.

Between these two leaves the flower spike pushes its way upward. The flowers are odd looking, the side petals and sepals being reduced to thin hairlike bodies, the lip being contrastingly broad, delicate brownish orchid in color

and iridescent. The blossoms are borne to the side of the pseudo bulb and each year a new parent plant is formed beside the old bulb, the plant of the following year arises from the old bulb, drawing upon the old one for food until it is exhausted.

Contrary to general belief they may be transplanted successfully. We have had them in the garden for three years receiving very little attention. The Tway-blades are most likely to be found in damp places, but these were discovered on a hillside in dense shade.

We were thrilled the day we discovered a Colony of Whorled Pogonia near us. This exotic looking plant is of interest to anyone with a minimum of curiosity. It is as bizarre in appearance as orchids of the tropics. The plant stem is 10-12 inches tall at the summit is borne a set of five leaves, from the center of leaves comes the flower with its long purple sepals overhanging the strikingly colored lip, which is Nile Green at back, lighter in color towards the front. This Pogonia, (*P. verticillata*) was first described under its present scientific name by Thomas Nuttall, an early American botanist.

The Rattle-snake Plantain is as handsome when only in leaf as it is in flower, making it a year around favorite. The plant creeps by prostrate stems and in such a manner produces rosettes of leaves at intervals about the place it grows. The leaves are deep green with white markings all over the upper surface. This orchid, *Epipactis pubescens* is common here, usually growing in the pine barrens. In July it sends up a spike of white sac-shaped flowers. Like some of the Ladies' Tresses the leaves remain green the entire year.

The genus Spiranthes, or Ladies' Tresses are represented by four species in this locality. These plants all have their flowers arranged in spiral fashion upon the stalks. The Spiranthes blossom throughout all seasons (except winter); different species occur at different times of the year. In early spring the Vernal Twisted Stalk can be seen in the meadows. In the summer we have the small species known as Beck's Tresses (*S. Beckii*) and the grass leaved *S. gracilis*, which is much taller and more striking in appearance. *S. cernua* is the last orchid of the season and perhaps the commonest, bearing flowers that, however insignificant in size, are marvelous pieces of mechanism to which such men as Charles Darwin and Asa Gray devoted hours of study.

The earliest orchid to bloom here is the Showy Orchis (*Orchis spectabilis*) which is found in our woods. The flowers of purplish pink, of deeper and lighter shades are borne several on a stem, which in turn arises from between basal leaves. The flowers are very beautiful and fragrant but it is best left in native habitat. If placed in the garden they will probably live and bloom for one year—then disappear.

We have grown excellent specimens of *Habenaria fimbriata*. The beautiful purple and pale lilac flowers were exquisite, but plants short-lived.

Another native orchid is *Aplectrum hyemale* (Adam and Eve). This interesting species grows about one foot high, bearing greenish-brown flowers lasting a long time. It prefers rich loam and semi-shade.

Mrs. J. Robert Chrismon,
Greensboro, North Carolina

Poncirus trifoliata

It is surprising so few gardeners grow, or even know this charming small tree for it is decorative at all

seasons and, because of its long sharp thorns, may be also used to form an impenetrable hedge. As it is easily and quickly grown from seed it is an inexpensive plant for that purpose. Furthermore, the pruned branches may be used to surround choice plants that are beloved of rabbits, laid carefully over crocuses or other spring-flowering bulbs as a protection against destruction of their blossoms by birds, and when judicously placed among the foliage of plants which pet dogs or cats for their favorite sleeping mats will deter them, the animals, from seeking such clumps as couches.

Few other plants can claim so continuous a round of beauty in stem, foliage, flower and fruit. During winter its irregular branches and twigs and its large barbed spines, both of which are at all times a rich deep green, make it an object of interest and beauty. Blooming in spring before the leaves appear it is extremely lovely with its two inch wide flowers with pink stamens produced singly or in twos and threes close hugging the stems at axils of the spines. These seem to be several forms for while I can detect but little or no fragrance from those I have grown some friends claim it is very fragrant and Bean in Trees and Shrubs Hardy in the British Isles makes the same claim. During the summer the rich glossy green of leaf, spine and stem is always fresh and attractive against the more quiet and often tired looking greens of the August foliage. Then in late September the fruits begin to color and it assumes an added beauty. The fruits are like miniature oranges about two inches in diameter and covered with a soft velvety down; during the summer as they gradually increase in size they pass from deep jade to emerald and finally are a rusty dark green before beginning to ripen when they slowly change first to a rusty lemon, then a soft yellow and finally become a bronzy apricot. In their various stages of ripening they gleam against the rich green of the leaves; but before the fruit is fully ripe the leaves begin to color and by mid-October are a rich bright yellow of about the shade of the Ginkgo and slowly fall leaving the ripe fruit on the stems a little while longer. There are few plants that can provide a full year of loveliness.

Being one of that class of plant-lovers called by Jason Hill, Curious Gardeners, I like to know all I can about my plants—their histories, derivation of name, habitat; as well as their soil requirements and other needs and have got into the habit of expecting others to be fully as curious. Known in common garden language as the Hardy, or the Trifoliate Orange because of the threefold formation of its leaves, our plant has been loaded with a heavy cargo of botanical synonyms; Bailey gives no less than seven, of which that used above is legally correct —at least here in America for Bean gives *Aegle sepiaria,* DC. as the correct one on the other side of the water. Linnaeus started it on its round of aliases by naming it *Citrus trifoliata* but subsequent botanists have usually separated it from the clan of the true orange and the lemon chiefly because its stamens are free and not united as in *Citrus* and also because of the trifoliate leaves. It is interesting to note that when Linnaeus established this genus he chose the old Greek word *Kitron* which had long been used for the lemon, citron and orange although this word *Kitron* originally in very ancient times been used for some fragrant wood which came from Africa.

Then De Candolle, for reasons above stated, placed our plant in the genus

Aegle which genus had been created by Correa and named for one of the damsels of divine extraction who, according to Greek myth, guarded the golden apples in the garden of the Hesperides; he, De Candolle, gave it a new specific name, *sepiaria,* from the Latin *sepes*—a hedge—referring to the plant's use as a hedge. Then Rafinesque, throwing aside these and several less known names, made a new genus for it calling it *Poncirus,* from the French *poncire*—a kind of quince—and retained Linnaeus' specific name. It is very probably that Linnaeus knew the plant only as an herbarium specimen for it does not seem to have been grown in Europe until much later and then probably in the southern parts only; Johnson's Gardeners' Dictionary states it was introduced into England in 1869. De Candolle must surely have known it as a living plant—and one that had become fairly common—in that his specific name refers to its usefulness as a hedge. Here in America it certainly was known long before 1869 for tradition claims it as a plant in colonial gardens of Virginia and other parts of the South. It is a well known fact that pre-revolutionary traders constantly brought back ornamental plants from the far East.

Although native to northern China it was long considered a native of Japan where it had been grown for many centuries. It is interesting to note that it is mentioned several times in The Tale of Genji, written by the Lady Murasaki in about the year 1000 of our era. However there is the possibility that she refers to some real orange but I am certain she means our plant for at no time does she speak of its being eaten, always both flowers and fruit are praised for their beauty and their fragrance. According to W. T. Swingle, in Bailey's Cyclopedia of Horticulture, it is "referred to in the Mannyo shu, a Japanese MSS. work dating from the 8th century" and it was "described and figured in the Cheng lei pen ts'ao, printed in 1108 A.D." which is a Chinese book.

Coming from the northern part of China it should certainly be hardy far beyond the northern limit of Philadelphia as given in Bailey's Cyclopedia; and so it is. At Gladstone, in northern New Jersey, there are trees that have been in the garden for over twenty years and flower and fruit annually; in Yonkers, N. Y. there is a six foot high hedge which is so severely prunned each spring that it has no chance to bloom, the intent being to keep out dogs; in a garden beyond Nyack, N. Y. there are several trees eighteen to twenty feet high. So to my certain knowledge it is hardy at least to Latitude 41 North; and the winters in all these places are severe with frequent and sudden drops in temperature to below zero.

The gardens in which I know it present a wide range of soil, from sandy loam to heavy clay and from quite calcarious to strongly acid. It is claimed that the plant does not like an extremely sandy soil or one with a heavy lime content but I have grown it in a garden where lime was applied yearly because of an impression that tulips, daffodils and bearded iris needed lots of lime.

It is easily raised from seed and reaches flowering size in three to four years at a height of about three and a half feet. The seed may be taken from the fruit and sown in rows either in the autumn or following spring; or the whole fruit may be planted as soon as it falls. In the later case a group of seedlings with appear early the following spring and when two or so inches tall separated and either set out in

nursery rows or in their permanent positions. For hedge use it would be well to grow the plants in a nursery row until about a foot tall and when planted permanently to pinch out the tips so as to induce low branching. Seedlings and even small trees transplant easily. Where squirrels abound one may expect tufts of seedlings in all sorts of places for these pests seem to be deceived by the firm rind of the fruit and consider them nuts and so bury them and either forget them or later find that they are not edible.

While fragrance of the blossoms is debatable there is no question about that of the fruits for a dish of them used as a table decoration will pleasantly scent the room.

ALFRED BATES, New Jersey.

The Blue Latan Palm

The Mascarene Islands form a small cluster in the Indian Ocean about five hundred miles east of Madagascar. Their flora consists of a peculiarly diversified group of plants, exhibiting a very large percentage of endemism. The palms of this tiny bunch of islands are of particular interest, since they include several which are favorites with growers the world over.

One of these, the so-called "Blue Latan," is known by the botanists as *Latania Loddigesii*. It is a rather large palm which is gradually receiving the attention it deserves in southern Florida. Specimens have been widely utilized in recent years in plantings around Miami, and there are large examples of it in the several palm collections in Coconut Grove.

The tree illustrated here was growing in the magnificent palmetum of the Fairchild Tropical Garden. It is a female specimen, and the immature fruits may be seen emerging from the trunk, among the leaf-bases. Several male trees were flowering nearby, and the fruits produced by this tree were thus probably fertile.

The Blue Latan Palm

Latania is the only genus of Mascarene palms with dioecious plants. It is placed in the tribe Borasseae, and as now understood consists of three species, all endemic in the Mascarenes. The other two species, *Latania borbonica* and *L. Verschaffeltii,* are both planted in southern Florida and elsewhere in the tropics and semi-tropics of the globe, though usually not as extensively as *L. Loddigesii.*

With its glaucous, often blue, large leaves, and usually short rough trunk, this palm forms an attractive specimen in a short time if given adequate care. The leaves usually measure about four feet across, and are rather stiff. They gradually lose their glaucous character as they mature, and some forms have

For composting refuse.

scarcely any of this glaucosity at any time.

The fruits of *Latania Loddigesii*, measuring up to about three inches in length, are more or less cylindrical and generally not especially numerous. The male inflorescences consist of finger-like spikes of varying number which are borne on a woody peduncle from the main spadix. They become hard and rough with age, previously bearing numerous fuzzy flowers.

The Blue Latan Palm, though not one of our smaller introduced species, nevertheless deserves a place in many dooryards in southern Florida. Its neat habit, graceful form, and unusual coloration make it one of the loveliest of exotic species available to us at this time.

Alex D. Hawkes
Miami, Florida

The Garbage, from kitchen to garden.

These days the problem ever present with the gardener is how best to fertilize his plants, for horses are being replaced by machinery, cows kept only by skilled dairymen and chickens with their high susceptibility to diseases being raised almost entirely by experts. Another problem for the person who lies in a completely rural part of the country is how to dispose of the garbage—for no one comes to collect it.

For years when there was plenty of cheap labor the garbage on our place was driven to a distant spot in the woods where there was a hole, ,a fresh hole was dug every year) and dumped there. After three years the hole was emptied, the contents screened and spread upon the garden with highly satisfactory results as to soil composition and growth. Then the war came,

labor had become scarce and the time it took to drive the garbage over to the pit could not be spared. It became imperative to find another solution for garbage disposal and in this respect we moved into modern times in the matter of garbage disposal.

For garbage—inspired by the sight of the excellent garbage pit at the Garden Center in Stockbridge, Massachusetts—a pit was dug on sloping ground where the drainage is sharp, and alongside of the cold frames. Behind the frames is the compost heap and the whole is about three hundred feet from the house. This pit consists of a hollow square built of concrete block measuring six feet six inches by six feet nine inches and being six feet deep on the low end and eight on the high. The floor was cemented and a large drain inserted with a pipe to carry the moisture down the hill. The mouth of the drain was covered with a fine screen, to keep out animals. To roof this receptacle a door-like frame in two parts was made of strong wood and two layers of wire screening were nailed across it. Thus air can come in and out of the pit but no animals or flies. There is a slight odor but this persists for a few hours only after the garbage has been dumped.

The refuse from the house is emptied into this pit every other day and a spadeful of top soil (a heap of which lies conveniently alongside) is scattered over it as also a handful of lime.

Thus we have the satisfaction of knowing our garbage is rotting, slowly turning into crumbly fertilizer under absolutely sanitary conditions and that within three years when the container will be full we will have only to dig out the contents and spread them on the garden.

HELEN M. FOX,
Peekskill, N. Y.

From the Midwest Horticultural Society

Acer japonicum

This small shrub-like maple from the Orient is one of the subjects that appears in localities where some enterprising landscape architect or nurseryman has pioneered in offering them or placing them in plantings.

These maples which may reach a height of fifteen feet are generally seen in forms that rarely exceed six to ten feet. They are not overly particular as to soil but will likely make best growth in a moderately moist well-enriched soil. The plants send out typical maple shaped leaves but of a small size, just a few inches across. The habit of growth is a branchy shrub and it is usually rather symmetrical. The yearly growth is short so that the development of a five or six foot specimen is a time consuming task.

The variation in this maple is extreme. Some varieties have green foliage that resembles some of the other dwarf maples, while others have leaves that are dissected, and still others have colored foliage that is striking. Deep maroon reds, bright blood reds, and many other forms with various, reddish hues can be found. Some have the normal leaf while others have the curiously dissected leaves in addition to the color.

While some of the forms border on the grotesque, many of the red hued kinds fill a definite need for a low plant with symmetrical growth that can add color and form variation to the landscape. As with all accent plants, they can be easily overdone. However, there is still room in many gardens for a specimen or so of the brilliant forms, and in rockeries some of the green-leaved dissected ones may be interest-

ing. These plants are interesting in all sizes and small plants will attract attention even when first planted.

Austrian Copper Rose.

Almost everyone is familiar with two shrub roses that are greatly admired as garden subjects. One of these, the Harisons Yellow, is one of the most widely distributed roses in the country, while the other, the Hugonis rose, is popular in many gardens. Another showy rose that has much the same characteristics is the Austrian Copper.

The Austrian Copper is one of the oldest roses known. It has been cultivated since 1596 and has enjoyed continuous popularity. In America it was introduced from Europe and was widely grown until about a century ago when the popular Harisons Yellow originated from it. Harisons Yellow had the advantage of being a double rose and the garden lovers of that time were more interested in plants that did not like the wide roses that they saw everywhere. Austrian Copper is a large single rose, about half again as large as Hugonis. The color is a deep yellow on one side of the petals and a bright coppery red on the other. Actually the first of the bicolor roses and one of the most striking. Foliage and habit are very similar to that of Harisons Yellow and so are a fine for garden decoration even when not in flower.

Now that the emphasis has shifted from the all doublt roses to the single as well, this old time lovely rose should once again come into its own as a hardy neat, and showy beautiful rose for the shrub border or the rose garden.

Acer Schwedleri.

One tree that deserves far wider planting is the red-leaved form of the Norway maple. This has all the desirable atributes of the common green form with the addition of fine spring color and a contrasting bronze effect during the summer. The Norway maple is one of the finest of trees for street and lawn planting with a strong straight trunk and a spreading habit that is excellent for shade. Foliage is attractive and in large plantings is effective.

The red form known commonly as Schwedleri is a bright red in early spring when the young growth is starting. As summer progresses the red changes into a bronzy green that makes a fine contrast with the bright green of the common form without being obtrusive. Where large numbers of maples are used the occasional introduction of a Schwedleri will add a great deal of variety and interest without changing the pattern or form that may be desirable under such conditions. Street plantings, parks, and cemeteries can all do well to add a definite percentage of Schwedleri's to the quantity of Norway maples used. In home plantings the variety can well be substituted for the green form unless several are to be used. Then use of both forms will add variety and interest to the planting.

The Norway maple is suitable for use in all situations where any maple can be used. It is more rapid in growth than the sugar maple and is far superior to the soft maples in habit, cleanliness, and longevity. It is useful whever a shade tree of good size is needed. It will grow in a wide variety of soils and under most exposure conditions.

ELDRED E. GREEN

Nandina domestica

While the question of hardiness is in our mind we may consider this inter-

esting and attractive plant which, praise be to the God of Botany, is not encumbered with any synonyms but has been left where Thunberg placed it when he created the genus and used the Japanese name with a specific clearly meaning domestic, this because it is always grown near the home in Japan. Various reasons have been given for this custom from the use made of its twigs as tooth picks or tooth brushes to the quaint superstition that dreams must be whispered into its foliage either to prevent them from coming true or to insure their realization—one may take ones choice. Originally a plant from northern China, like so many of such it has for many centuries been cherished—and claimed a native—by the Nipponese.

It is an interesting plant in that it belongs to the Barberry Family which it in no way resembles save in structure of flower and fruit and to a great extent reminds one of a bamboo, of which it is no relation, in the graceful featheriness of its leaves. While its panicles of small white flowers are not of great garden value, its bright red berries in numerous clusters, there is also a white form, are outstanding in autumn and early winter. Then too it is lovely in the early spring when the new foliage is strongly tinged with red and purple-bronze; nor is it unattractive during the winter for the hard textured long and very narrow leaves assume shades of purplish red and persist until the spring growth begins.

It is spoken of here because it is considered not hardy enough to be grown north of central Virginia. This past spring I was greatly surprised to see it growing in a garden outside Mendham, N. J. which is about 40 degrees 45 minutes North Latitude and subject to hard winters. Yet in this garden it had survived five winters at the base of a two and a half high dry stone wall which supported a terrace; furthermore the wall faced west and was open to north and west winds that blew across a wide valley. The owner told me it had never been frozen back to the root though several times about a third of its stems had been killed and that while it blossomed it had never fruited. I have not been able to find any statement that it is a dioecious plant and wonder as to the cause of its unproductiveness. The plant has never had any more winter protection than the leaves which the wind blows against the base of the wall and they are not very deep for snowdrops and the vernal Adonis were blooming through them within a foot of the stems of the shrub. Could its unfruitfulness be the result of constant shade for a huge oak grew to the south of the terrace and no sun ever reached the plant? If so here is another instance where cultural advice is incorrect for we are told it should be grown in "full or partial shade."

These two examples should stir the adventurous gardener to experiment with other half-hardy material. When we remember that *Yucca filamentosa* which is native no further north than North Carolina and Tennessee braves undaunted the winters of northern New York and Vermont or the humble *Ornithogalum umbellatum* once native of the Mediterranean region is now thoroughly at home in New England states we should take greater chances than we do and not meekly accept horticultural dicta.

Alfred Bates,
New Jersey

SOCIETIES AFFILIATED WITH
THE AMERICAN HORTICULTURAL SOCIETY

(*Continued from page* i)

Takoma Horticultural Club,
A. C. Barret, Pres.,
4719 Brandywine St., N. W.,
Washington, D. C.

The San Francisco Garden Club,
465 Post St.,
San Francisco 6, Calif.

Trinity County Garden Club,
Mrs. Rose N. Grigsby, Treas.,
Weaverville, Calif.

The Trowel Club,
Mrs. J. Douglas Rollow,
4524 Cathedral St., N. W.
Washington, D. C.

Tulsa Garden Club,
Mrs. Allen Henry, Pres.,
1301 South Yale,
Tulsa 4, Okla.

Victoria Horticultural Society,
Mr. Jack G. Beastall, Sec'y.,
255 Battleford Ave.,
Victoria, B. C., Canada

Vivian Garden Club
Vivian. La.

Welcome Garden Club
Mrs. J. A. Reid, Pres.,
400 Speed Drive,
Monroe, La.

Winnsboro Garden Club,
Winnsboro, La.

Woodridge Garden Club,
Mr. George Targett, Pres.,
2948 Carlton Ave., N. E.,
Washington, D. C.

Worcester County Horticultural Society,
30 Elm Street,
Worcester, Mass.

The American Horticultural Society

INVITES to membership all persons who are interested in the development of a great national society that shall serve as an ever growing center for the dissemination of the common knowledge of the members. There is no requirement for membership other than this and no reward beyond a share in the development of the organization.

For its members the society publishes THE NATIONAL HORTICULTURAL MAGAZINE, at the present time a quarterly of increasing importance among the horticultural publications of the day and destined to fill an even larger role as the society grows. It is published during the months of January, April, July and October and is written by and for members. Under the present organization of the society with special committees appointed for the furthering of special plant projects the members will receive advance material on narcissus, tulips, lilies, rock garden plants, conifers, nuts, and rhododendrons. Membership in the society, therefore, brings one the advantages of membership in many societies. In addition to these special projects, the usual garden subjects are covered and particular attention is paid to new or little known plants that are not commonly described elsewhere.

The American Horticultural Society invites not only personal memberships but affiliations with horticultural societies and clubs. To such it offers some special inducements in memberships. Memberships are by the calendar year.

The Annual Meeting of the Society is held in Washington, D. C., and members are invited to attend the special lectures that are given at that time. These are announced to the membership at the time of balloting.

The annual dues are three dollars the year, payable in advance; life membership is one hundred dollars; inquiry as to affiliation should be addressed to the Secretary, 821 Washington Loan and Trust Building.