

## CITRUS FOR ORNAMENTAL PLANTING IN CALIFORNIA

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### INTRODUCTION

THE USE OF CITRUS for ornamental purposes has been a much-avoided subject. Although the beautiful appearance of a citrus tree and its fruit were chiefly responsible for its world-wide spread up until the 18th century, only a few articles discuss entirely or, in part, the decorative nature of citrus.

In the first published book devoted entirely to citrus, Ferrari(5) in 1646 illustrated numerous citrus varieties and "orangeries". The "orangeries" depict citrus planted as espaliers, pot varieties, hedges and in other landscape situations. Tolkowsky(12) traced the history and use of citrus fruits from its origin to modern times, and lavishly illustrated its ornamental use through reproductions of archeological specimens, relics, mosaics, tapestries and paintings from the European archives. Dooryard citrus plantings in Florida are discussed by Granger(7) but most of the article is devoted to cultural practices and pest control, rather than citrus varieties and how they might be used ornamentally. For California conditions, Bitters(4) presented data on dwarfing citrus rootstocks and the possibilities they would have for home use, but did not adequately consider the top varieties with which they might be used. Subsequently, dwarf citrus varieties were considered and evaluated for California use(1).

The climatic adaptation of citrus and the use of microclimates in California home plantings in order to expand the range of citrus were further elaborated in 1953(2). Further consideration of what to plant and where to plant was later more extensively discussed in 1955(3). None of these articles bring all the interesting or pertinent factors together; a little history, a little legend, some landscape principles to be considered, an evaluation of varieties, dwarfing, espaliers, pot varieties, special considerations, etc. It is for this purpose that the present article is intended in order to acquaint the home grower with the situations where citrus may be used in his landscape design and with the varieties available to plant for such purposes.

### HISTORY AND LEGEND

Any discussion of citrus for ornamental purposes would not be complete without a review of the history and distribution of *Citrus* itself. The ornamental aspect of the trees and fruit, and the pride and distinction that accompanied possession of such trees were perhaps more important in the spread of *Citrus* than the edibility of the fruit.

Most historians will probably agree that citrus was native to southeastern Asia. Regardless of origin, mention of miscellaneous citrus species is first made in early Chinese writings before 2000 B.C., occasionally in the eleventh and twelfth centuries B.C., with frequent reference occurring in poems and lyrics of the third and fourth centuries B.C. Citrus was not, however, associated with the poorer class of people, but rather with the nobility. The term "mandarin" has come down through the centuries as applied to the loose-skinned oranges (tangerines) which originated in China and were associated with the Mandarin ruling class. The fingered citron, (*Citrus medica* var. *sarcodactylis*) was known as "Buddah's hand". Ancient urns and later even teapots were cast after its image.

After the early Chinese reports, citrus is frequently mentioned in the ancient writings from Japan and India. The fruits were reserved for and treasured by the rich.

The Medes and Persians in their conquests became acquainted with the citron and spread it to the shores of the Mediterranean. They were perhaps the first to use it in religious rites. Among relics uncovered from ancient archeological ruins are coins bear-



ing the image of citrons. Other articles bearing citron fruits imprinted thereon have also been found. The citron became an important part of the Hebrew's religious rites, and the Etrog citron is currently utilized in certain Jewish services, namely the Feast of the Tabernacles. The Bible, however, makes no reference to citrus fruit. The term "apple" was loosely used as a term for fruit in general, and the citron is still occasionally referred to as the Persian apple or Median apple.

The conquest of Alexander the Great introduced the citron to Greece. Later, conquests by Rome extended it to the shores of Italy. Both Greece and Rome recognized its decorative value and ancient mosaics, murals and sculpturings, found in their temples, public baths and other public buildings included the citron. Such mosaics were found in the ruins of Pompeii, Tusculum and other Roman cities.

There are many legends concerning citrus in ancient mythology; only a few are mentioned in this article. One of these suggests that at the wedding of Jupiter and Juno, the king and queen of the gods, a tree sprang up bearing golden fruit. So proud were the gods of this fruit, but so fearful of its being stolen, that they placed it on the Isles of Hesperides with Atlas the giant to guard them. The hero, Hercules, was assigned as one of his twelve tasks, the feat of obtaining some of these "golden apples of Hesperides". As you know he succeeded, although the giant Atlas almost tricked him into holding up the sky. Apparently later Perseus who slew the Gorgon (from out of whose body sprang Pegasus, the winged horse) must have also visited the Isles of Hesperides. Atlas, fearful that Perseus was going to steal some of the "golden apples," tried to force Perseus to leave, and Perseus, holding up the head of the Gorgon, turned Atlas to stone—and the Atlas mountains in northwestern Africa hold up the sky today.

There is also the story about the Grecian maiden Atlanta, who was as fleet of foot as she was beautiful. She had many suitors, but her conditions for marriage included beating her in a foot race. If they did not, they lost a very important part of their anatomy when they were beheaded. One of the suitors, Hippomenes, obtained some of the golden apples and beat her in the foot race by rolling the apples at her feet as she passed him, and won as she stopped to pick them up.

These are but a few of the legends and myths. How and when these legends arose is not known, but it should be pointed out that the citron was apparently the only citrus fruit known to these countries; the sour orange and the sweet orange were introduced centuries later. The citron is also frequently mentioned in the writings of Theophrastus, Vergil, Pliny and other writers of that period.

In passing, it might be of interest to briefly mention the origin of the name "citrus". The citron fruit had many uses. Among these were an exquisite odor (perfume), a cure for poison, correcting fetid breath, relief to asthmatics, protection against moths, a remedy for rheumatism and sore mouth, a cure for intestinal disorders and a cure for dyspepsia. According to one explanation, since the fruit had the same general uses as the wood of the Sandarak tree, (*Callistrus quadrivalis*) the ancient name of this wood was applied to the fruit as *Mala Citrea*. The naming of the Median apple as the citrus apple led to the application of the name "citrus" first to the citron and later to other citrus fruits. According to another explanation, the word citrus was derived from the Roman designation of the African citre (*Citrus lybica* Varron). The African citre was cypress-like in appearance and was valued for its beautiful wood. This wood later became extremely rare, and while wood of the citron bore no resemblance to it, the high esteem with which both were regarded probably led to the application of the term "citre" to the Median apple.

The Moors or Arabs in their era of conversion by the sword, spread the sour orange throughout northern Africa and into Spain. They recognized the ornamental value of the sour orange and incorporated it into their planting designs. Beautiful mosques were built in Cordoba, Granada, Seville and many other Spanish cities. Supposedly, the largest and





FIG. 1. The "Mosque of the Omayyads" and the "Patio de los naranjos" built in Cordoba, Spain in 976 A.D. by the Moors, illustrating the use of sour orange in landscape design.  
(After Tolkowsky)

most magnificent in all Islam was the Mosque of the Omyyads, built at Cordoba in 976 A.D. In connection with it, the "Patio de los naranjos" or courtyard of the oranges, was completed at the same time. Sixteen rows of sour orange trees, each running up to one of the arched entrances of the mosque, were orientated so the axis of the orange rows were in direct line with the pillars inside. This is one of the best examples of the symmetry and integration of planting design with architectural design which is so characteristic of the moslem architecture. The lemon was also introduced to Europe by the Arabs, a little later than the sour orange.

The Crusades opened to the people of Europe those areas which had been closed by the expansion of the Arab empire and re-awakened a taste for arts and luxury. The Crusaders were men of the highest class and rank, and were attracted by the desirable products of art and agriculture in the new lands, and sought them for their homes in their native lands. As a result the sour orange, lemon and lime were soon widely cultivated. The sweet orange reached Europe around the 15th century, probably an introduction of the early explorations of the Portuguese.

According to another legend, the King of Spain and his court highly prized the sweet orange. When the French Ambassador in his visit to the court first saw an orange tree, he was greatly intrigued and wanted to present one to the King of France as a gift. The King of Spain, proud of these trees, would not part with any. Later at night while walking through the King's garden, the French Ambassador came across a pretty girl who was weeping. Upon asking why she was crying, the maiden replied that she was engaged to be married, but her father who was the King of Spain's gardener was so poor he could not furnish the dowry. The French Ambassador rose to the occasion and supplied the dowry in exchange for propagating material of the citrus. The girl was married, and in appreciation for the part the orange played in obtaining her dowry, wore orange blos-



soms at her wedding, and as the story goes, so started the custom of orange blossoms at weddings.

"Orangeries", or buildings for growing citrus, spread throughout Europe during the Middle Ages and the Renaissance as a result of the Crusades. The first published book devoted entirely to citrus was printed in 1646 A.D. It was written by Ferrari and titled, "Hesperides". In it may be found a number of drawings of these orangeries. The art of budding, espaliering, growing trees in small containers, the "Verdelli" practice of making trees bloom off season were apparently well known at that time.

By far the most elaborate of these orangeries was that built by Louis XIV at Versailles, France in 1682 A.D. The main body of this building was 500 feet long and 40 feet wide, supplemented by wings 350 feet long at both sides. Louis XIV used the potted citrus as ornamentals about the courtyard and in the palace, especially in entertaining at state occasions. His gardeners too used the "Verdelli" practice, and Louis had the scent of orange blossoms at his disposal the year around. This building still exists and is currently used for this purpose.

Modern transportation and world trade brought to an end the monopoly that the noble and rich held on citrus, and by the end of the 17th century even the commoner was becoming acquainted with, and enjoying the taste of citrus fruits. Familiarity depreciated the intrinsic value of the fruit and the trees, and its novelty as an ornamental faded as the fruit became of increasing commercial value.

### LANDSCAPE PRINCIPLES

A good discussion of landscape principles may be found in Robinson(9). Whether these principles are acceptable today or not, they serve to point out the importance of the three design factors: color, texture and mass and what to look for in citrus varieties to be used for ornamentals in a landscape design.

**COLOR:** The landscape gardener has at his disposal a range of plants from small flowering succulents, through herbaceous plants and vines, to trees. In addition, they may be deciduous or evergreen, and have various foliage colors as well as the tremendous range in color of flowers, size of flower and season of bloom. In citrus, color is more limited. In those which might be used as ornamentals, the color of the leaves is, more or less, a basic green. One can also consider the color of the new growth, which is in some instances, a reddish purple, and also the flowers, which are generally white, although some are pinkish or tinted with purple. Bloom is generally confined to the spring season. The fruits, however, may be very striking in color, generally orange, but may be green, blue, brown, yellow or even red. The fruits also vary widely in size, in number and the length of time they are on the tree.

**TEXTURE:** Texture in landscaping refers to the degree of fineness or coarseness, as it pertains to plant parts. A catalpa tree has a much larger and leathery leaf, for example, than the finely divided, feathery leaf of a jacaranda tree. A fan palm is much more coarse or rougher textured than a cocos palm. In citrus too, texture is a factor although confined chiefly to size and spacing of leaves. The size of the leaves and the distance between the leaves varies greatly. The shape of the leaf, whether compound or simple, and the surface texture of the leaves are further factors for consideration. The shaddock leaf may be eight to ten inches long and four to five inches across, whereas, that of the finger lime may be one inch long and one-half inch across. Leaves of the box orange are almost round and leathery, while those of the orange jessamine are finely divided and fragile.

**MASS:** Mass in landscape design refers to the size and form of a plant. Some plants are markedly dwarfed while others grow quite high. Plants are variously shaped—some grow as mats, others as hedges, some are dome-shaped, egg-shaped, vase-shaped, pear-shaped, columnar, etc. In citrus, considerable size variations occur. Some plants such as the ponderosa lemon are inherently dwarfed and slow growing, and may be grown in



pots; others, such as the sour orange, grow large enough to make excellent shade trees. Citrus trees also vary in shape and many withstand pruning to shape.

In any planting design it is desirable that two of the three design factors be kept constant, one may vary. For example, if mass and texture are constant, color may vary. If color and mass are constant, the texture may vary, etc.

In applying these three important design factors to a planting, their use is governed by five simple principles which are important considerations. The principles are: simplicity, scale relationship, balance, sequence and focalization. These principles apply very well to the use of citrus in a planting.

**SIMPLICITY** implies restraint in use of plants. Don't over-do the planting or the design factors. It is best accomplished by repetition and the use of a few forms so as to emphasize a singleness of impression. A few citrus trees go a long way.

**SCALE RELATIONSHIP** involves a knowledge of the ultimate size of the citrus plants as well as their texture. Don't plant a citrus tree that will have an ultimate growth of 15 feet, for example, in front of a four foot window. Likewise, this will avoid planting tall or vigorous citrus in front of slow growing or dwarf selections.

**BALANCE** calls for related organization of the plants as far as their distribution and use in a planting. It is brought about by uniformity of contrast and symmetry. Thus tree roses are planted on both sides of a walk—not the tree roses at one side, and hollyhocks on another. Likewise at the entrance to a driveway one doesn't plant a Lombardy poplar on one side and a cypress on the other, the trees are paired. This consideration should be given to the use of kumquats, calamondins and citrus trees with similar growth characters.

**SEQUENCE** is concerned with proper graduations of the design factors; color, texture and mass. Sequence is thus a uniformity of change, movement or transition from one line to another, one mass to another, one color to another, etc. In a planting, a tall variety should not be planted next to a dwarf variety, but rather plants of intermediate height are used from border to background. Likewise certain colors clash and varieties should be planted in which colors blend well or moderate one another. Be familiar with the citrus varieties, particularly their size and texture and how they may be associated or blended with other plants in the planting.

**FOCALIZATION** is a uniformity of emphasis. It is the proper use of plants to accent or highlight, and in some instances subordinate, a particular object, or modify line or form. Plants may be used to attract attention to a fountain or sundial, or to modify the sharp angle of a roof or gable, or to hide a compost pile. The striking color of citrus fruits will readily attract attention and the compact, dense foliage provides a good screen.

In a planting design, citrus may be used for the following purposes: hedges, basal plantings, shade, corner accent, framing, individual specimens and backgrounds. Special consideration may be given within these situations to the use of espaliers, variegated varieties, oddities, dwarfing rootstocks and even specimens that can be confined to small containers. In the discussion which follows, the author indicates the citrus varieties which he thinks have ornamental possibilities and suggests how they may be used. While the number of citrus varieties available for such purposes is very limited, they are deserving of special consideration for planting. Most citrus has beautiful dark-green, glossy, evergreen foliage. Secondly, while the blooms are not very showy, they are exceptionally fragrant and several selections are nearly everblooming. Lastly, the fruit is in many instances edible or useable in one form or another, besides being attractive and showy, and may hang on the tree for long periods of time.

By the term "citrus" the author is referring to the taxonomic classification of W. T. Swingle(11) which refers to those plants in the orange subfamily *Aurantioideae* in the plant family *Rutaceae* and includes those genera and species of the Tribes *Clauseneae* and *Citreae*. In this article both citrus and the citrus relatives are referred to under the general heading of citrus since they are so closely related, may be generally intergrafted



or hybridized and have similar potential ornamental qualities. The author has also confined his remarks chiefly to specimens with which he is familiar and has observed in the citrus variety block at the Citrus Experiment Station or in various landscape plantings throughout southern California. For lack of any simple systematic way in which to discuss these potential ornamental specimens, they are principally presented according to specific grouping and within the group in the alphabetical order of their commonly known names.

If the same amount of care is given to a citrus tree as to a rose, gardenia or camellia plant, the results will be equally as satisfying. Cultural practices, irrigation, pest control, fertilization, etc. are thoroughly discussed by Johnston (8) and will not be gone into here.

## VARIETIES TO CONSIDER

### *The Sour Orange Group*

**BOUQUET SOUR ORANGE:** The Bouquet Sour Orange has been occasionally grown in both California and Florida as an ornamental shrub. The variety has been very often confused with and mistakenly called the Bergamot Orange. It is apparently identical with the Bouquet des Fleurs and generally just called Bouquet. The Bouquet is a type of the sour orange with very closely spaced leaves. Specimens rarely grow over eight to ten feet high and are somewhat spreading with dense foliage which tends to cluster because of the short internodes (distance between leaves). The leaves are more rounded than those of sour orange and the fruits are not as large or as conspicuous in color, in addition to containing fewer seeds. An extensive hedge of this variety may be found at the Citrus Experiment Station, Riverside, California. This hedge is now 40 years old and is still healthy and beautiful, requiring a minimum of pruning. It appears to be well adapted for this purpose, but is not nearly as fruitful as individual specimens. As a shrub it could be used in situations similar to those in which pittosporum is commonly grown. It is generally propagated by budding. The fruits are sour, like a sour orange and probably be used for making marmalade or even pie. The tree could also be used for framing, corner accent, an individual specimen or even backgrounds. This variety has been extensively grown in southern France where the flowers are used in the manufacture of perfume.

**CHINOTTO AND MYRTIFOLIA ORANGES:** Although somewhat distinct the Chinotto and Myrtifolia orange (*Citrus aurantium* var. *myrtifolia*) will be discussed as a group since they are so similar. Both are apparently variants of the sour orange.

The Chinotto has a slightly broader leaf than the Myrtifolia and a more open type growth. The flowers are not as showy. It annually bears a very heavy crop of deep orange-colored fruits, slightly flattened in appearance, and about one and three-eighths inches in diameter. This profusion of bright colored fruits, which persist throughout the season, superimposed on the dense, fine textured foliage make this variety *ne plus ultra* of the natural dwarf selections. The juice is usable for making a refreshing drink. Some strains are seedless and are prized for the preparation of candied oranges, jellies, preserves and other similar products of distinctive character. This variety makes an excellent pot variety or individual specimen and can be used satisfactorily for framing purposes or basal plantings. It would also make a good hedge. It may be budded on other stocks and has been successfully grown from seed, a limitation with the seedless varieties.

The Myrtifolia is a small dwarf tree or shrub, with thornless branches and very small, closely set leaves. The leaves are only about one-third as large as a standard sour orange and their close spacing presents a rosette type growth. The foliage is thus very dense and compact and the tree is very symmetrical. Growth is generally slightly columnar to conical and mature trees 25 years old at Riverside are only about ten feet in height. The tree has a prolific bloom but in contrast to the Chinotto sets very few fruit. The Myrtifolia is similar in appearance to pittosporum and could be used for hedges, backgrounds, individual specimens or corner accent very effectively.



**SALICIFOLIA:** Another similar but less known selection is *Citrus aurantium* var. *salicifolia*, which as the name implies, is a willow-leaved variety. It is a larger tree than either the Chinotto or Myrtifolia. The leaves are about one-half inch wide and three inches long and are more of a yellowish green in color giving a slight golden cast to the tree. It has fruits similar to the Myrtifolia, more in number but not as numerous as the Chinotto. The fruits are not showy or large, are a yellowish orange, coarse and not edible. This variety has not been observed outside of the Citrus Experiment Station variety collection.

**SOUR ORANGE:** The sour orange (*C. aurantium*) has many varieties. The species has been known and grown for hundreds of years. It was a favorite with the Arabs who probably introduced it to Spain and the rest of Europe. Chiefly valued then for its ornamental value, the sour orange was extensively used in the landscaping of the mosques, courtyards and public buildings. In recent years its principal value has been as a rootstock and in the manufacture of marmalades. An excellent pie may be also made from the fruit. However, because of its very attractive, bright-colored, reddish-orange fruits and its lush, dense, dark green foliage, the sour orange still has considerable merit as an ornamental. Certain varieties have long, lanceolate, willow-like leaves, others variegated (sectoral) fruits of contrasting colors. Certain towns recognizing its beauty have used sour orange as shade trees in their roadside plantings. A planting of this type may be seen in Tempe, Arizona and mixed planting near Litchfield, Arizona. Some institutions, viz. Scripps College for Girls, Claremont, California have effectively used sour oranges in patios, courtyards and drives. It may best be used as a shade tree, individual specimen, background or corner accent. Sour oranges probably should be budded. Seedlings may be grown, but they tend to be more columnar and thorny.

#### *The Lemon-Lime-Citron Group*

**CITRON:** The Citron, *Citrus medica*, is one of the oldest of the citrus fruits and certainly one best known to Mediterranean countries during ancient and medieval times. It is not commonly grown in the United States because the trees are fairly sensitive to frost—but no more so than the limes. Many areas in California would certainly possess a suitable micro-climate for its planting. The trees are generally grown as cuttings and are dwarf in size. They tend to be short-lived. The citron blooms almost throughout the year. The leaves resemble a lemon, but are generally coarser and more leathery. The tree is generally open or sparsely foliated. The fruits are large, averaging five to seven inches in length and three to five inches in width. The fruit is principally used for its peel. The rind is generally more than an inch thick and is used in the production of candied peel which is extensively used in the flavoring of confections and cakes. The pulp is not eaten. "Citron water" may also be manufactured from the fruit and may be used in flavoring of liqueurs and vermouth and for medicinal purposes. Because of their thick rind the fruits keep for a long time and are very attractive when used in table displays. The Etrog variety is used by the Jewish people in the ceremonies connected with the Feast of Tabernacles. The trees could probably best be grown as individual specimens and could also be espaliered.

**FINGERED CITRON:** The fingered citron, *Citrus medica* var. *sarcodactylis*, although not known to be in California as an ornamental at the present time (1957), has been introduced under the University's new citrus importation program, as a result of numerous requests by garden clubs. The variety is also known as "Buddah's Hand". While it is a horticultural monstrosity, fruits of the fingered citron are highly esteemed for their fragrance and used extensively by the Chinese and Japanese as sachets for perfuming rooms and clothing. The floral end of the fruit is split into a number of finger-like sections, hence the name. The plant may be grown from cuttings. Since it is a dwarf, it can be grown as a potted plant or as an individual specimen.

**LIMEQUATS:** The limequats are hybrids of the lime, *Citrus aurantifolia*, with the kumquat (*Fortunella* sp.). The crosses were made to provide the tender lime with some



of the hardness of the kumquat. All of the limequats have fruits resembling the lime in appearance and character, and are used as a substitute for it. While they are more hardy than the lime, they are still sensitive to frost, and this with their thorniness and poor fruit characters make the limequats not too desirable in most locations. The Eustis and the Lakeland are the best varieties, but some fine specimens of Tavares have been observed. Limequats can be grown as potted plants or as dwarf specimens.

**MEYER LEMON:** The Meyer lemon is also referred to as the Dwarf Lemon. The variety is perhaps a hybrid of orange and lemon and has some of the characters of both. It is a semi-dwarf tree, spreading in character, almost thornless, with dense lemon-like foliage. The fruits are very smooth-skinned as well as thin-skinned. The fruits are elliptical in shape, and obtain the size of a commercial lemon. The fruit is light orange in color with similarly colored flesh. The flesh is juicy, lemon flavored and of medium acidity. Fruit is available more or less throughout the year. It is an excellent variety for home use and is an acceptable substitute for a lemon. This variety is nearly as tolerant to cold as standard citrus trees. While it is generally grown as a cutting, the Meyer lemon grows well-budded on sweet orange or rough lemon stock. Its principal use is as a dwarf variety, used as an individual specimen or a basal planting. However, it should be pointed out that as the Meyer grows older, either as a cutting or a budded tree, it may grow to large size. The Meyer has also been used as an espalier, and has successfully been grown as a hedge. Frequent use of it as a pot plant has also been made. The Meyer lemon is very precocious in bearing and one year old cuttings will set and bear a few fruits.

**PONDEROSA LEMON:** The ponderosa lemon is also sometimes called the Wonder lemon or American Wonder lemon. It is a small tree, eight to ten feet tall at 20 years of age, depending on growing conditions. While it resembles a lemon, it is undoubtedly a hybrid, possibly with the citron. The fruits are large (hence the name, ponderosa) are slightly obovate (tear-shaped), and may average up to five or six inches in diameter and weigh more than a pound apiece. The fruit is seedy, but juicy and sour. While the flavor of the fruit is not as good as the lemon, it could be substituted for it. The fruits resemble a lemon in color and are available throughout the year. This variety is frequently grown as a pot plant by nurserymen in the northern United States. It is perhaps best adapted for this use, but may be used as an individual specimen as well. The variety roots easily from cuttings.

**RANGPUR LIME:** The Rangpur lime is an acid lime, sometimes called a red lime. It has at times been confused with the Otaheite orange and substituted for it, although the Otaheite is seedless (the Rangpur not) and the Rangpur highly acid (the Otaheite not). The Rangpur lime is easily rooted from cuttings and is frequently grown as a shrub or in the capacity of a dwarf. It has a bushy type growth and may eventually reach a height of 15 to 20 feet. Apparently there are strains within the variety and fruit color and shape vary somewhat. Generally the fruit color ranges from yellow orange to reddish orange, the flesh is also a deep orange. The fruit is generally ablate in shape and ranges up to two and one-half inches in diameter. The fruit could easily be mistaken by the layman for a tangerine and this confusion has probably led to its limited use. The juice is orange in color, has an excellent lime-like taste and could easily be substituted for limeade. The chief use of this variety is as a dwarf in early years, but older trees grow large and make an attractive individual specimen or background.

**OTAHEITE ORANGE:** The Otaheite orange is somewhat of a misnomer since it is not an orange but is probably nearer to being an acidless lime or a hybrid thereof. This variety is inherently a dwarf variety and is easily grown from cuttings. The variety is nearly thornless and spreading in growth. The flower buds are tinted with purple, and the new growth is a deep purple—in contrast to the Rangpur lime. Fruit color ranges from orange to reddish orange. The fruits are chiefly spherical in shape and range in size up to about one and three-fourths inches in diameter, and thus is smaller than the Rangpur lime. The fruits have orange-colored flesh, are seedless or have abortive seeds,



have the odor of a lime, but are flat and insipid in flavor. The Otaheite is frequently grown as a potted ornamental. They are especially attractive at Christmas time since plants a foot or so high may be carrying up to a dozen fruit in addition to producing flowers at the same time. This would appear to be its most practical use.

### *The Mandarin Group*

**CALAMONDIN:** The calamondin (*Citrus mitis*) belongs to the tangerine (loose-skinned) group, or is closely related to it. The tree tends to grow tall and columnar, and is very shapely in appearance. As an ornamental it has been widely used in Florida and to a lesser extent in Arizona and California. The calamondin is very cold resistant and easy to grow. The tree is a prolific bearer and may have hundreds of fruit at any one time. The Chinese name for it is "Sechi Chieh" (meaning four seasons), which is very appropriate since it is in fruit the year around. The quantity of fruits make the tree spectacular in appearance, actually thousands on a mature tree. The fruits are orange-colored, slightly flattened in shape and about three-fourths to one and one-half inches in diameter. The fruits make excellent marmalade and the acid juice makes a very presentable drink when sweetened with sugar. The fruit has a slight soapy taste and is inferior to the Shekwasha or Cleopatra mandarin. Since this tree is tall and columnar, it may best be used as a background tree, a shade tree, an individual specimen or for corner accent. On occasions, it has been used in hedges. On a dwarfing rootstock it makes an excellent pot variety. A variegated selection is also available.



FIG. 2. The Calamondin used for corner accent at the Citrus Experiment Station, Lake Alfred, Florida. The Cleopatra mandarin and the Shekwasha could be used for similar purposes.

**CLEOPATRA MANDARIN:** The Cleopatra mandarin is also a loose-skinned variety. It is sometimes referred to as the spice tangerine and the Ponki. While it is best known for its merit as a rootstock, its ornamental value has not generally been recognized, although some attractive specimens may be found in Florida. In California it is a very symmetrical tree with dense, dark foliage and myriads of bright orange-red fruits. These fruits are somewhat flattened and average up to one and one-half inches in diameter. It is not as columnar as the calamondin but is slightly more bushy. Like the calamondin, however, the fruits hang on the tree from one crop to another, so it is possible to have the tree



covered with beautiful fruit the year around. The fruits are seedy and are too small to be of commercial value but do have an excellent flavor. Trees of this variety would best be used for background, individual trees or corner accent. Its somewhat pendant branches would not adapt it for shade purposes.

**SKEKWASHA:** The Skekwasha, *Citrus pectinifera*, has characters very similar to the calamondin and the Cleopatra mandarin. The fruit is about the same size as the Cleopatra, more yellow in color, less seedy and of better eating quality. It could be substituted under similar situations.

### *Citrus Relatives*

**CHINESE BOX ORANGE:** *Severinia* sp., commonly called the box orange are additional citrus relatives. In habit of growth they very closely resemble the common box (*Buxus sempervirens*). There are many forms differing slightly in height, character of growth, size and shape of leaves, thorniness, etc. Generally they are a low shrub or dwarf tree with somewhat rounded leathery leaves about one and one-half inches long (varying with the variety) and attached by short stalks to the twigs. The internodes are short, so the leaves are densely crowded on the branches providing a very compact growth. Some varieties are thorny, others are spineless. The flowers are small, white, inconspicuous and lacking in aroma. The fruits are small (about the size of a pea), round, dark blue (nearly black) and filled with one or two large seeds. This species may be propagated by cutting, seed or budding. It is compatible with citrus, trees 26 years of age are growing on it in the rootstock plots of the Citrus Experiment Station at Riverside. The chief value of this species is its foliage. Its symmetrical shape and beautiful, dense, vivid green foliage would make the small leaved varieties an excellent substitute for the common box as a hedge. The large leaved varieties as an individual specimen in any situation where pittosporum or carissa might be used. It stands pruning well but is compact enough not to require pruning. In addition to being quite tolerant to cold, it also appears to have a high resistance to insect pests and diseases.

**FINGERLIME:** The *Microcitrus* species are near relatives to citrus. They are frequently referred to as the Australian Wild Limes and some of the species as Fingerlimes. Most of the species grow into tall shrubs or small trees and make handsome ornamentals.



FIG. 3. *Severinia*, the box orange, used as a hedge surrounding the Post Office at Orlando, Florida.



The seedlings are very spiny. The leaves are probably the smallest of any of the true citrus and the citrus relatives averaging about one inch long and one-fourth to one-half inch wide. The habit of growth is such that young trees especially have the appearance of a very dwarfed fir tree. New growth is long and pendant, and purplish in color. The flowers are small, pink and fairly attractive. The fingerlime produces a fruit about three inches in length and three-fourths inches in diameter. The fruits are very aromatic and could probably be used for making pickles or preserves. Since most of these varieties are quite vigorous, they could be used for hedges or windbreaks. Pruning the lower branches would produce an attractive shade tree and it could be used as an individual tree or a background specimen. Propagation may be made by budding on citrus, by cuttings or seed.

**HESPERETHUS ACRENULATA:** This citrus relative has some promise as an ornamental because of the pendant nature of its beautiful, feathery green foliage. It is compatible with citrus. Experience is lacking with this variety but it does deserve consideration.



FIG. 4. Kumquat trees for framing at stairway entrance to a sunken garden.

**KUMQUATS:** The kumquats or *Fortunella* sp., are also citrus relatives. There are a number of varieties commonly grown in the United States, the best known of which are the Nagami, Marumi and Meiwa. *F. hindsii*, a very dwarf small fruited variety is also now available. All are truly deserving of the Chinese synonyms "golden orange" or "golden bean". The various species, although inherently dwarfs, differ in their growth and are generally propagated on trifoliate orange stock which markedly dwarfs them further. The tree and the fruit resemble a miniature orange. The leaves are one-fourth to one-half the size of the average orange leaf and are more lanceolate (narrow and pointed). The fruits are small, seldom more than an inch in diameter and vary in shape with the variety. The fruits are bright orange in color and have a thick, fleshy sweet, edible peel—a unique feature in citrus. The pulp is mildly acid and contains several seeds. The fruit is generally eaten in its entirety. The author believes the Meiwa is the sweetest of the common varieties. The fruits also make excellent pickles, marmalade and



candied fruits. The fruits may also be used as attractive and distinct table decorations, particularly during the Christmas and New Year holidays, and are generally clipped with a short section of the stem and a leaf or two attached. Kumquat trees have a high ornamental value because of the numerous, small but highly colored fruits it bears which remain on the tree nearly the year around. They may be grown as pot plants but are most effectively used as individual specimens for corner accent and as framing plants. In China it is frequently the custom to place bearing potted plants on the table during dinner where the guests can pick off the fruit and eat them between food courses. The kumquat would probably make a fine hedge. These plants are very resistant to cold and can be grown in many sites where other citrus will not tolerate the temperatures.

**TRIPHASIA TRIFOLIA:** *Triphasia trifolia* or limeberry, is yet another of the citrus relatives. It is widely grown as an ornamental shrub in many tropical and subtropical areas. In some instances it has been used for a hedge. It has a compound, trifoliate leaf and fragrant white flowers, followed by dull red fruits about one-half inch in size. The foliage is an attractive, shiny dark green. The plant makes a small, round-topped shrub, suitable for dooryard plantings or potted specimens. It has become naturalized to certain sections of the United States, is now at Riverside and seems very worthy of consideration for ornamental use.

**PONCIRUS TRIFOLIATA:** The Trifoliate orange, because it tolerates cold, is widely propagated in the East as far north as New Jersey. It has a trifoliate leaf, is extremely thorny and is deciduous. The flowers are very conspicuous in the spring since they precede the leaves. The fruits are about the size of a golf ball, very seedy and inedible. It is frequently used for hedges but appears to have no place in areas with temperatures which other citrus varieties will tolerate. Dwarf varieties are known.

**SINTON CITRANGEQUAT:** A very attractive ornamental in Florida and has recently been introduced to California. It is a trigeneric hybrid of trifoliate orange and sweet orange crossed with kumquat. The fruits are a very deep reddish orange and are very conspicuous throughout the winter and spring. The fruit is not edible. The trees are very hardy and could be grown out of the range of normal citrus.

**ORANGE JESSAMINE:** *Murraya* sp. (*Murraya exotica*, *Murraya paniculata*, *Chalcas exotica*), frequently called the "orange jessamine", is a citrus relative perfectly adapted as an ornamental. It has a compound leaf, finer in texture than that of the Wampee, very similar to a wisteria leaf but more delicate. The small leaflets are a shiny dark green. The twigs are thin, spineless and flexible, providing a dense but pendant type of foliage. The flowers are white, fairly large and conspicuous, hanging in large panicles (clusters) at the terminals of the twigs or on laterals. These blooms are exceptionally fragrant and reminiscent of jasmine. This tree is practically an everbloomer at Riverside and its delightful fragrance graces the air throughout the season. The *Murraya* is fairly fruitful and the species at Riverside sets a small red fruit about one-half inch long and one-fourth inch wide. The variety question is a little confusing with *Murraya*. Specimens observed in Florida were more fruitful but less vigorous than those observed in California. The red fruits, on a contrasting green background coupled with the attractive and fragrant bloom, make the variety the acme of citrus ornamentals. *Murraya* at Riverside withstands cold as well as commercial citrus and is practically pest free. The plant withstands pruning well. It may be grown as a basal planting—such as cottoncaster or abelia, as a corner accent plant, as an individual specimen or as a background plant. A very attractive hedge may be found in Riverside. Generally, not compatible with citrus, it is best grown as a cutting although the author has successfully grown it from seed. The foliage provides excellent greens for floral arrangements. *Murraya koenigii* which is more tree-like in growth is in California. Its leaves are used in making curry.

**WAMPEE:** The Wampee (*Clausena lansium*) is not a true citrus, but is a citrus relative. It grows as a tree and may attain a height of 20 feet or more. The leaves are compound, somewhat similar to those of a native black walnut in size and shape. The leaves





FIG. 5. Flowers of the Wampee. These are white and borne in a cymose cluster similar to a lilac inflorescence. For photograph of fruit, see cover.

are rougher in texture than most citrus and more yellow-green in color. The nodes are very close together giving a rosette type of growth to the twig and consequently providing a very dense foliage. The flower is unique in that it is large and occurs as a large panicle (cluster) at the ends of the branches, much like a lilac type of bloom. The fruits at Riverside are mature in the early fall and occur in open clusters much like a thin bunch of grapes. The fruits are yellowish-brown to russet-brown in color, attain about the size of a quarter and are almost round. The fruit is edible and highly prized by the Orientals. The peel is very thin and the pulp very tender—very similar to a grape or a litchi. At Riverside, many of the fruits are one-seeded and some only have abortive seeds. While the Wampee can be budded on citrus it may best be grown as a cutting or from seed. It would make an excellent shade tree, a background tree, or an individual specimen, but is probably too coarse in texture for other purposes. The Wampee appears to be much freer of insect pests than our standard citrus varieties.

### SPECIAL CONSIDERATIONS

**ESPALIERS:** Espaliers are trees trained to grow flat as against a wall or trellis by selective pruning procedures. The most common types of espaliers are the Cordon, tier, candelabra and fan. Such plants do not take up a great deal of room and may also be exposed to a smaller microclimate and kept warm by heat radiated from the wall. Citrus may thus be extended beyond its normal climatic zone. Certain varieties, particularly the lemons because of their habit of growth, best lend themselves to this procedure. The summer navel may also be adapted for this purpose. Adequate fruiting occurs under this procedure.

**VARIEGATED VARIETIES:** Occasionally citrus varieties mutate to different characters than those normally associated with the variety. One of these is a leaf variegation and/or fruit variegation. In the leaf variegation certain sections of the leaf may be devoid of chlorophyll (green color) while other sections may be characterized by different layers



or intensity of green such as in a variegated ivy. If a plant has variegated leaves it also has variegated fruit, but it may possess variegated fruits without having variegated leaves. When this occurs in the fruit, various peel sectors of the fruits are of contrasting color. Sweet orange, lemon and sour orange selections are available in this form. One variety of lemon in addition to having the variegated leaf and variegated fruit also has a pink flesh, a novelty indeed.

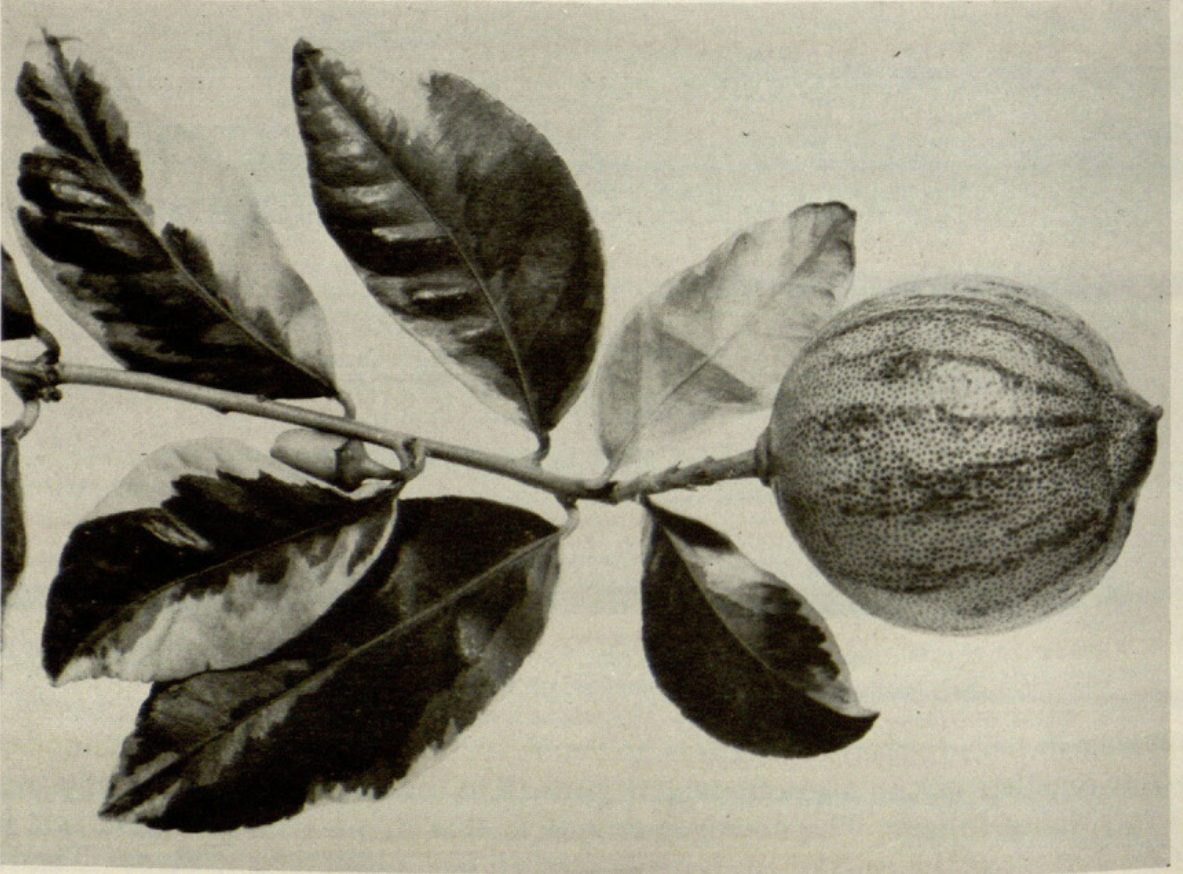


FIG. 6. A variegated lemon—showing leaves and fruit and the contrasting densities of chlorophyll (green) or the lack of it. (Courtesy H. B. Frost)

**DWARFING ROOTSTOCKS:** Common varieties of citrus may be held to small stature for the convenience of the home grower by having them propagated on dwarfing rootstocks(1). Such trees not only require less space, but are easier to pick and to spray for pest control. These trees are generally very productive in proportion to their size and the small size enables one to grow more trees or more varieties in a smaller space. The trifoliolate orange is generally used as the dwarfing stock although other stocks are capable of dwarfing and are used to a limited extent. Varieties may be dwarfed up to fifty per cent of normal size in this manner and in some instances more. Some top varieties are inherently dwarfed and an additive effect may be secured here.

In addition to dwarfing rootstocks it is also possible to reduce the size of the tree by removing a ring of bark and inverting it when it is replaced. In some instances a small strip of the original bark is left in place. The degree of dwarfing varies with the width of the ring or the width between rings, if a second ring is used. This procedure has been tried with apples(8) but is not common or accepted practice as yet. Similar experiments are under way with citrus.

**UNUSUAL VARIETIES:** The home grower seldom has adequate space to grow all the citrus fruits he would like. Standard varieties such as Valencia or navel oranges which may be used in large quantities for juicing or eating should because of space limitations, be given secondary consideration unless on a dwarfing rootstock. Old trees, however, do make excellent shade trees or may be used for corner accent. Thought should be given



rather to varieties of excellent eating quality which are generally not available on the market. Among some of these are the Kara mandarin, Dweet tangor, Frua mandarin, Satsuma orange, Torocco orange, Bearss lime and others.

**POT VARIETIES:** In some areas, favorable weather for growing citrus prevails except for a very short period in the winter months. Several fruiting varieties mentioned previously can be confined to a small container or tub and moved inside for protection during cold temperatures. Varieties best suited for this purpose are the Meyer lemon, ponderosa lemon, Otaheite orange, kumquat and Chinotto.

The ornamental qualities of citrus are well summed up by Gallesio(6) who states, "Of all the plants spread by nature upon the surface of the globe, there are none more beautiful than those we know under the names of citron, lemon and orange trees which botanists have included under the technical and generic name, Citrus. These charming trees are both useful and ornamental. No others equal them in beauty of leaf, delightful odor of flowers, or splendor and taste of fruit. No other plant supplies delicious confection, agreeable seasonings, perfumes, essences, syrups, and the valuable aides so useful to colorers.

"In a word, these trees charm the eye, satisfy the smell, gratify the taste, serving both luxury and art and presenting to astonished man a union of all delights.

"These brilliant qualities have made the citrus a favorite in all countries."



FIG. 7. Robertson navel on a dwarfing rootstock grown as a pot variety. (Courtesy Floyd C. Dillon)

#### COVER PHOTO

Fruits of the Wampee. The fruits are brown in color, about one inch in diameter, have a thin skin, about one seed, and a flavor somewhat like a grape.





Bitters, W. P. 1957. "Citrus for ornamental planting in California." *Lasca leaves* 7(Spring 1957), 29–43.

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