

NATIVE HOME, HISTORICAL BACK GROUND IMPORTANCE OF CITRUS FRUIT IN PAKISTAN

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Scanty information has been responsible for poor knowledge about early history and origin of citrus fruits. Tanaka has reported that true citrus fruits appeared on the globe after Australia had been separated from the main continent during the upper Cretaceous period at least 30 million year ago. While De Condolle does not include the citrus fruits in his list of those which have been in cultivation for 4,000 years, but there seems to be evidence that some of them were cultivated at least that long in China. Hu states that Chinese literature written as early as 2200 BC refers to the cultivation of some citrus fruits in China.

Establishing origin of citrus fruits has been a matter of controversy. However, most of the taxonomists have a general agreement that Himalayan region and South China are the places of origin for most citrus fruits. Many citrus species have their origin in India. Hooker considered not less than 78 species of family Rutaceae as natives of India. Bhattacharya and Dutta suggested that at least two species of subgenus *Eucitrus* – *Citrus indica* and *C. assamensis* and three species of subgenus *Papeda* – *C. ichangensis*, *C. latipes* and *C. macroptera* are definitely indigenous to Assam. Swingle and others maintained that Southern Arabia was the origin of citrus fruits while Von Frimmel considered Mesopotamia as the place of origin, because the seeds of citron, *C. medica* were found in the ruins

of Nippur in Mesopotamia, which dates back to 4000 BC. Probably citron might have been known in Mesopotamia since ancient time. Citron was the first among citrus fruits emigrant to Europe. The Greeks found citron growing in Media and Persia, hence the name *C. medica*. Tolkowsky thought that citron was introduced between 250 and 200 BC. It seems to have spread to Greece and Italy by the end of the third century. The earliest description of citron dates to fourth century AD. In India citron is found under wild conditions particularly in Nilgiris, Assam and the lower Himalayas. It seems probable that Northwest of India is the place of origin of citron. The sweet orange is believed to have originated in Southern China or Cochin China and thousands of years ago it has spread to India. However, with regard to its present form there are divided opinions. According to one it developed its present form in China and then spread to India, while the other opinion is that it has developed its present form in India. Sweet oranges might have been introduced into Europe in the 16th century by the Portuguese. Vasco de Gama found citrus fruits growing on the east coast of Africa, where it might have been introduced during the first century by Arabs from Persia and India. Vasco de Gama on his return trip from India took sweet oranges to Portugal. Many regard this as the first introduction of sweet oranges into

Europe. There is another school of thought about the introduction of sweet orange into Europe. Sweet orange was introduced into India during the thirteenth century from south-eastern Asian countries, when there was trade between India and China and became well established in India, in time to be taken to Europe much earlier to Vasco de Gama. Columbus has introduced orange and lemon in the new world during one of his voyages. Later Portuguese and Spanish travelers took citrus to South America.

ORANGES

The orange is supposed to have been taken to Portugal in 1498 and from Portugal to Malta Island which was Portuguese colony. Blood red varieties of oranges are reported to have arisen in Malta as result of spontaneous bud mutation. In the year 1517 or sometime in the sixteenth century, were taken along with them by Columbus and his successors to South America. The seedless Navel type of seedling orange rose as a bud sport at Bahia in Brazil. This variety then known as Bahia Navel was later taken to North – America and planted at Riverside and Washington and named as Riverside Navel or Washington Navel. Similarly some time in the later part of the sixteenth century oranges were introduced into St. Helena and there from to South – Africa. The common tight skinned early orange called Mosambi was imported into Indo – Pakistan sub continent from Mosambique in Africa which also developed as a bud sport.

MANDARIN

Loose – skinned oranges, belonging to species *Citrus reticulata* Blanco are

commonly designated as mandarins. Though mandarin and tangerine are names used more or less interchangeably to designate the whole group, tangerine is applied more strictly to those varieties producing deep orange or scarlet fruits. The differences between these two groups are very slight, the main visible difference being the colour of the fruit, usually considered Varietal in magnitude. As such from the horticultural standpoint, the Dancy and Beauty tangerins can be called as mandarins. This is easily said than done because these two names got firmly established in the world markets and cannot be easily erased.

In spite of their close relationship and having many characters in common, the mandarin oranges can easily be separated into rather distinct-groups; in fact certain investigators have proposed to recognize these groups as distinct species. As such, King orange was given a name, *Citrus nobilis*, and Satsuma oranges are named as *C. unshiu* while Swingle considered them as natural varieties of mandarin oranges. Webber has separated the mandarin oranges into I- King group ii- Satsuma group, iii- Mandarin group iv- Tangerine group v- Mandarin – lime group and finally vi- Mitis group. However, till the taxonomic investigations are completed, it seems advisable to retain the name mandarin as group name to all the loose – skinned oranges.

The most important mandarin in India, undoubtedly is the Santra (*Citrus reticulata*) which includes varieties such as Nagpur santra, Coorg Santra, and Khasi orange.

GRAPE FRUIT

The origin of the grapefruit is not definitely known. Those who have made

a careful study of the problem state that is apparently did not come from China or adjacent areas in the southeastern portion of Asia where some citrus fruits are native, or from any of the European citrus growing areas. Grapefruit has been introduced and grown in Europe only in comparatively recent years.

Sloane (1696, 1707) described the shaddock as growing in Jamaica by 1696 and in Barbados by 1707, but he did not mention the “forbidden fruit”, or grapefruit. Hughes (1750) was the first to mention it as being found in Barbados, and Browne (1789) reported it from Jamaica under the names “forbidden fruit” and “smaller shaddock.” Marloth (1952), who discussed briefly the origin and early distribution of citrus fruits, said that some grapefruit trees were growing in South Africa as early as 1661.

About 1809, a Spanish nobleman. “Don Phillippe” [Felipe], migrated to Florida and settled near what is now locally known as Green Springs, in Pinellas County. He was said to have brought grapefruit seeds with him, and from them to have developed a small grove, the first grapefruit planting in the state (Hume, 1926). Just where Phillippe obtained his seeds, and the exact date of planting, were not stated. There appear to be at least 2 explanations as to the source of the seeds. A citrus fruit called the “grapefruit” was growing in Jamaica (Lunan, 1814), and this may have been the source. On the other hand, Duncan (1892), a pioneer grower in the same county, who named and introduced the Duncan grapefruit, stated that “fifty years ago Phillippe planted seeds ‘of grapefruit’ which came from Cuba.” At any rate, he could not have obtained his seeds from Europe or Asia since, as stated above, the grapefruit was not

known in those areas until much later than his time.

Phillippe gave seeds from his grove to many of his neighbors, and many of the old seedling grapefruit trees in Florida are said to have come from this source.

Tussac (1808-27) described a variety of shaddock as a fruit not larger than a good orange, which was borne in bunches like grapes and which was designated as the “forbidden fruit” or “smaller shaddock.” Apparently, the variety known to the early writers as the “forbidden fruit” was known also, at least in Jamaica, as the “grapefruit.” It thus appears reasonable to assume that the name “grapefruit” originated in Jamaica, and has been used since 1814.

ORIGIN OF SOME VARIETIES

The Marsh White, with no pink coloration in its fruit, is well authenticated as having arisen as a seedling or a root sprout from a seedy white grapefruit in Florida (Webber, 1943; Waibel, 1953). It is the most common, nearly seedless, commercial grapefruit in the United States and in most other grapefruit-producing areas.

The Foster (Foster Pink) originated in Florida as a limb sport on a tree of the Walters variety, which is a white, seedy type. The Foster, discovered in 1906, is also a seedy type, and was the first Pigmented grapefruit variety of record in Florida (Webber and Batchelor, 1943).

Hodgson (1955) said that the Thompson (Marsh Pink) originated as a limb sport on a Marsh tree in Florida, was discovered in 1913, and introduced in 1924. The pink color in the Thompson is limited to the pulp; that is, it shows no color in the rind as indicated by the absence of color in the membranes, mesocarp, and external fruit surface.

The Thompson, in common with the Marsh, is nearly seedless and, according to Hodgson (1967), it was the first seedless pigmented variety to be discovered. In the early 1930's, the Thompson was widely planted in Texas but, as predicted by Webber (1943), this variety is likely to be superseded by the deeper pink and red varieties unless it still proves to be superior in quality.

The Ruby (Henninger's Ruby), of deep flesh color and with a red blush on the peel, likewise occurred as a limb sport on a Thompson tree in Texas, and was found in 1929. This fruit has characteristics similar to those of Thompson (Marsh Pink) in all respects, except for the deep-red color uniformly distributed throughout the membranes and pulp (Juice vesicles) but not present in the juice. The fruit has colored albedo and a red blush on the exterior surface of the rind. The color of the flesh fades with fruit maturity. In Texas, Ruby is the most prominent pigmented variety, and has been extensively planted there.

The Webb (Webb's Redblush) is another mutant (limb sport) of the Thompson, discovered in 1931. As Webber (1943) noted, the Redblush is so similar to the Ruby that is difficult to distinguish these varieties by physical appearance, because the Redblush also has a red blush on the outer rind, and deep-red flesh. The Thompson, Ruby, and Webb are nearly seedless, which is important with respect to their commercial possibilities. Of these 3 kinds, the Ruby has successfully superseded the Thompson, and has become the most prominent pigmented variety in commercial production.

The Burgundy (Burgundy Red) grapefruit is a late-maturing variety that was discovered in Florida about 1948. It is seedless, has red pulp, but fails to

develop external rind coloration under Florida growing conditions. The pulp of the Burgundy is more highly colored than that of the Redblush, and the color is retained over a longer maturation period. The Burgundy variety first occurred as anentire tree, which indicates that it originated as an undetected bud sport of the Thompson. The nucellar seedlings of the Burgundy do not produce the true color of the parent clone.

POMMELO

An interesting illustration of the danger of basing history on nomenclature is afforded by the pummelo. The English name, with its variations, is derived by some from the Latin 'Pomum melo' and it seems quite reasonable that such a large yellow fruit might be called the 'melon fruit'. But Bonavia is apparently right in deriving the name from the Dutch 'pomelomes', the origin of which is uncertain, or from the same source. Such forms as 'pomelomes', and 'pimple nose' occur in the early English literature. Some vernacular names such as 'papanas' in Bomby and 'bambalinas' in Madras, may have the same derivation. In North India the most common names are 'mahtabi' and 'chakotra', and for these, again certain pundits have very plausible explanations. The former is supposed to compare the fruit to the moon, 'mahtab' while 'chakotra, is said to come from 'chak', a wheel. Bonavia, on the other hand, derives 'mahtabi' from 'batabi' from Batavia, and 'chakotra' from Jakatra, the ancient and now revived name for Batavia. If he is right, as seems likely, this is an indication that the pummelo came to India from Java where many varieties are now cultivated, although it may have been imported

from other regions also. De Candolle thought that the species originated in the islands east of the Malaya Archipelago, including Fiji and the Friendly Islands. Siam produces a great variety of pummelos, including some very good ones. This indicates that they have been grown there for a very long time, and it is possible that they originated on the mainland of south – eastern Asia, rather than in the island region. Bretschneider (1898) on the other hand, states definitely that they are indigenous to China, and Tolkowsky points out that they were mentioned in a collection of Chinese documents written between the 24th and 8th centuries B.C. The pummelo seems to have followed the sweet orange to Europe, where it has never become important except as the grapefruit, which is thought to have originated as a variation of the pummelo. The name shaddock, sometimes used for this fruit, is said to have come from Captain Shaddock, whose ship was one of the first to take the fruit to the West Indies, in the 16th century.

LEMON

The origin of the lemon has long been a source of controversy among both historians and taxonomists. Tolkowsky (1938) believed that the earliest mention of the lemon is in Sanskrit texts assigned to about 800 BC, thereby suggesting an Indian origin. Webber (1943) concluded that the lemon was native to the eastern Himalayas in northern Burma and southern China. Hodgson (1967) asserted that the lemon must have originated in the eastern Himalayan region of India and adjoining areas, because natural hybrids with citron and lemon characters are found there. Webber, Reuther, and Lawton (1967) agreed that the exact place and mode of

origin of the lemon remain in doubt, although they speculated that it originated in southeast Asia. When lemon culture began is also unknown. Tolkowsky (1938), on the basis of ancient literary references, theorized lemon culture was well established in Iraq by about 900 AD. Certainly, the culture of the lemon was furthered in Persia and Palestine by the Arabs, and there is considerable evidence from literature that the lemon was commonly grown in the twelfth century AD (Webber, Reuther and Lawton, 1967). The Arabs also appear to have carried the lemon with them in expanding Citriculture into Spain and the North African countries.

ORIGIN OF SOME VARIETIES

i. Eureka

The Eureka originated in California in the 1880's from a group of seedlings grown from fruit of Italian origin.

ii. Lisbon:

The Lisbon is of Portuguese origin and is believed to be a selection from the Gallego seedling clonal group in that country.

ii. Berna:

The Berna which has undesirably large fruit is the most important Spanish variety and is represented by more than 90 percent of the acreage in the Levant. The variety is also widely grown in Algeria and Morocco.

iii. Femminello Ovale

The Femminello Ovale (Comune, Ruvittaru) provides good quality fruit for fresh shipment or processing. The Femminello group represents the oldest Italian lemon varieties and accounts for about three fourths of Italian production. The trees are characterized by an everblooming, everbearing habit which makes them very responsive to the

verdelli or forced treatment of Sicilian lemon culture.

iv. Femminello Sfusato

The Femminello Sfusato (Favazzina, Siracusa) is similar or identical to the California Lisbon clones. This variety has largely been replaced in Italy by the Femminello Ovale and other varieties.

v. Interdonato (Speciale)

Interdonato (Speciale) is considered a lemon citron hybrid, and originated in about 1857 on the property of Colonel Interdonato in Nizza, Sicily. It has good resistance to mal secco disease and is planted mainly for that reason. It accounts for about 5 percent of Italian lemon production.

vi. Mesero

Mesero (Primofiori, Fino) is a Spanish variety of unknown origin, which is preferred processors for its high juice and acid content.

vii. Monachello

Monachello (Moscatello) is probably also a lemon-citron hybrid. At one time it was planted exclusively in Italy because of its resistance to mal secco disease, although it is inferior to Femminello.

viii. Villafranca

Villafranca is believed to be of Sicilian origin and was first planted in Florida about 1875. The fruit is indistinguishable from Eureka, and the variety has steadily decreased in commercial importance.

LIME

The lime is frequently confused with the lemon, which makes it very difficult to trace its early history. It is very commonly grown all over India, but does not seem to occur wild. Perhaps the most probable theory is that of Bonavia that it also originated in the Malayan region. He points out the possibility that both the English word 'lime' and the

Indian 'nimbu' or 'limbu' may have come from the Malayan 'lemoen'.

PROBABLE ORIGIN OF SOME SPECIES

***Citrus Medica* Linn (Citron)**

Commonly considered to be indigenous to India. Rajit Singh reports the distribution of many types of citron all over India. Probably citron is the first citrus fruit to reach Europe. Romans found it growing in Media and Persia, hence the name *Citrus medica*. Jews called it Etrog and made use in their rituals. It is mainly grown for its peel. Citron is most sensitive to frost.

***Citrus aurantifolia* Swingle (*Acid lime*)**

Includes, Egyptian, Indian, and Mexican limes. Tanaka says it is a native of Malayan peninsula, while Hume says it is native to India and South eastern Asia.

***Citrus latifolia* Tanaka (*Tahiti or Persian lime*)**

It is a native of South Pacific. Botanically it closely resembles *aurantifolia* but physiologically it is quite different. It is as hardy as lemon. It is a triploid. It is more resistant to pests, diseases and unfavourable conditions in general.

***Citrus limettioides* Tanaka (*Sweet lime*)**

It is indigenous to India. An important rootstock in the near East and grown to some extent for the non-acid fruit. Tender to frost.

***Citrus Jambhiri* Lush (*Rough lemon; jambiri*)**

Tanaka found this fruit scarce in eastern India, though Bonavia collected it in the United Provinces. Dutta found at least six distinct forms of *jambhiri* in Assam and believed Assam as native place of *jambhiri*. Ranjit Singh reports unlimited variation in the types of Rough

lemon found in India. As such it can safely be concluded that Rough lemon is indigenous to India. It is one of the world's principal rootstocks. It is fairly sensitive to frost.

Citrus karna Raff (Kharna khatta)

It is indigenous to India. It exhibits characters suggestive of the lemon, and Rough lemon or possibly sour orange also. The leaves and flowers of this species are similar to those of Rough lemon, but are larger in size and the petiolar wing is more prominent. As a root stock it is widely used in India.

Citrus limonia Osbeck (Rangpur lime)

It is a native of India. It is a prolific variety of citrus with well flavoured and very acid fruit.

Citrus aurantium Linn (Sour, Bigarade or Soville orange)

India is said to be its possible home. Dutta reports that sour orange grows gregariously in certain parts of the Naga hills, Khasi hills etc. Hume considers South eastern Asia, probably Cochin China as the place of origin.

Citrus sinensis osbeck (Sweet orange)

By far the most important species of Citrus, of great economic importance and most widely cultivated all over the world. It is generally accepted that the sweet oranges have originated in southern China. Tanaka considers it to be indigenous to Eastern Burma, while Swingle considered it to be either native of Southern China or North eastern British India. It is generally believed that sweet orange in its present form had developed in China, before it migrated to India during the thirteenth century. The research of Gallesio proved that sweet oranges were not known in Europe until early in the fifteenth century. Christopher Columbus during his second voyage to the New World in 1493 has

introduced sweet orange into the New World.

Citrus Grandis Osbeck (Pummelo or Shaddock; Chakotra)

It is considered to be indigenous to Malaya and Polynesia, Different names have been used for this species. Swingle and Tanaka go by Citrus grandis while chatterjee maintains that Citrus maxima is correct. Another fairly common name is Citrus documana orange. Moderately hardly to frost. Important only in Orient. The principal centers of production occur in Southern China, Thailand, Vietnam, Malaysia etc.

Citrus reticulate blance (Orange or Santra of India)

On the basis of a report by Bonavia that mandarins were found under semi-wild conditions at Butwal, Tanaka concludes that mandarin is indigenous to Nepal. However, most of the taxonomists accepted Cohin-China as the birth place of mandarins. Rumphium had seen it cultivated in all the Sunda Islands and said that it was introduced from China.

Citrus unshiu M (Satsuma mandarin)

Japanese origin, Satsuma mandarin as a group include several varieties in Japan, of which Owari is a most important one.

KUMQUATS

Kumquats belong to genus Fortunella. Kumquat is a Chinese word meaning 'gold orange'. They are native to South-eastern China. Thunberg described it under the name Citrus japonica. It was also given several names by several people. However, in 1915, Swingle separated the Kumquats from Citrus and placed them in a new genus Fortunella, named after Robert Fortune, who introduced the Kumquat

into Europe in 1946. The four known forms were described as species.

***Poncirus trifoliata* L. (Trifoliata orange)**

It is indigenous to Central or North China. Unlike other citrus fruits it is deciduous and more hardy to cold, therefore, used as a stock in regions where the frost hazard is great as in Japan, China, United States and USSR . It is commonly grown as an ornamental plant in Asia, Europe, and North America. The Chinese, for centuries used the dried fruits in their medical practices.

IMPORTANCE IN PAKISTAN

In Pakistan, citrus is the largest group of fruits produced over an area of about 5 lac acres, which is about 40% of the total fruit produced in Pakistan. More than 95% of Citrus is produced in the province of Punjab. About 70% of the Citrus Grown in Punjab is kinnow.

The production of Citrus fruit is more than 20 million ton. Besides it is consumed as fresh fruit, processing of kinnow into concentrated juice for export and local industry has also been started. This is a good start as only industrialization can provide the required capital and technology for revolutionizing our citrus industry.

Citrus fruits and frozen concentrated orange juice are in a great demand. Our citrus can play a vital role on this aspect.

Pakistan has tremendous potential for expansion of Citrus industry due to its suitability of soil, largest river and canal network and favorable climatic conditions for Citrus production.

The citrus growing in Sargodha, Faisalabad, Multan Division is not only a source of income to the growers but also have the following impact in the

socio economic life of the people of Pakistan

- It has great opportunities for employment
- It provides raw material to the Citrus based industry
- Citrus production has increased the per Capita availability of fruits to the people of Pakistan.
- It has contributed a reasonable share in GDP.
- Due to increase in export on yearly basis Citrus contributed foreign exchange for the country. During the year 2002 Citrus export from the country was worth 21 million dollars.
- Citrus grown over thousands of acre exert pleasant effect on environment and resulted in reduction of pollution.
- Citrus orchard grown over a vast area provide a great pleasure, aesthetic and relaxation to the viewers.
- It has a great potential for value addition products.
- Citrus fruits are important due to nutritive, medicinal values and source of prosperity.

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