

Tracing the Development of Currently Planted Grapefruit Cultivars

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ABSTRACT

The grapefruit (*Citrus paradisi* Macf.) is considered to be a natural hybrid of pummelo (*C. maxima* [Burm.] Merrill) and sweet orange (*C. sinensis* Osbeck), and has gained status as a citrus species. The fruit was first described in Barbados and introduced into the United States in 1809 by Odette Philippe, who brought seed from the Bahamas to Florida. A. L. Duncan coined the name 'Duncan' grapefruit for the seedling tree that was planted about 1830 near Safety Harbor, Fla., which was one of the seedling trees brought in by Philippe. Grapefruit are of two groups, common white flesh and pigmented fruit. Both groups have varieties that are considered seedy and seedless. 'Duncan' grapefruit is considered the most important because all other varieties descended by either seedling variability, mutations or natural hybridization. A detailed description of the development of the current commercial grapefruit varieties is documented.

RESUMEN

El toronjo (*Citrus paradisi* Macf.) es un híbrido natural del pomelo (*C. Máxima* [Burm.] Merrill) y del naranjo dulce (*C. Sinensis* Osbeck), y es considerado como una especie del grupo de los cítricos. La fruta se describió por primera vez en Barbados y se introdujo a los Estados Unidos en 1809 por Odette Philippe, quien llevó semilla de Las Bahamas a Florida. A.L. Duncan le dio el nombre toronjo 'Duncan' a una de las plántulas traídas por Philippe que fue sembrada alrededor de 1830 cerca de Safety Harbor, Florida. Los toronjos presentan dos grupos, con pulpa blanca o pigmentada. Ambos grupos tienen variedades que presentan o carecen de semillas. La variedad de toronjo 'Duncan' es considerada la más importante porque todas las otras variedades descendieron de esta ya sea por variabilidad de la plántula, mutaciones o hibridación natural. En este artículo se documenta una descripción detallada del desarrollo de las actuales variedades comerciales de toronjo.

Additional Index Words: *Citrus paradisi*, citrus, pummelo, shaddock

The grapefruit (*Citrus paradisi* Macf.) is a natural hybrid of pumelo (shaddock) (*C. Maxima* [Burm.] Merrill) which originated in the western hemisphere and is considered a citrus species in most citrus classification systems. The fruit was first described in Barbados in West Indies in 1750 as the "forbidden fruit" and the name "grapefruit" was first used in 1814 in Jamaica because the flavor resembled that of grapes and because the fruit grew in clusters rather than singly like that of most shaddocks (pummelos) (Hodgson, 1967).

Grapefruit was introduced into the United States in 1809 by Odette Philippe, a French count and chief naval surgeon for Emperor Napoleon Bonaparte (Burnett, 1991), who brought seed from the Bahamas to Safety Harbor, Fla., in the northwest corner to Tampa Bay (Jackson, 1991; Jackson and Davies,

1999). Being a surgeon, he began experimenting with budding and grafting.

Dr. Philippe's fruit was not given a variety name until 1892, when A.L. Duncan of Dunedin, Fla., called it "Duncan" grapefruit. The "Duncan" variety is the oldest grapefruit clone in the United States from which all other grapefruit varieties are derived. The parent seedling tree was planted about 1830 near Safety Harbor, seed-propagated from the original trees brought in by Dr. Phillippe. 'Duncan' is white-fleshed, has 30 to 50 seed per fruit and remains the quality standard for grapefruit (Hodgson, 1967; Jackson and Davies, 1999).

There are two groups of grapefruit now, common white-fleshed and pigmented. Both groups contain seedy and seedless cultivars. Fruit with six or less seed is considered

seedless commercially. ‘Duncan’ grapefruit is little planted now, but all grapefruit varieties in the United States descend from it, through seedling variability, mutations or natural hybridization (Hodgson, 1967; Jackson and Davies, 1999).

‘Marsh’ seedless white grapefruit originated as a chance seedling of ‘Duncan’ about 1860 in a planting near Lakeland, Fla. The commercial importance of this seedless fruit was not realized until 1886 when E. H. Tison at the Lakeland Nursery Company began propagating the seedless clone. When C. M. Marsh bought the nursery a few years later he gave it the name ‘Marsh Seedless’ grapefruit (Hodgson, 1967).

Although pigmented pummelos had been known for centuries, it was not until 1907 that a pink-fleshed, grapefruit was noticed on a limb sport of ‘Walters’, a midseason, seedy white grapefruit that had originated as a seedling near Belleview, in Marion County, Florida, in 1887 on the property of Mr. Walters. This pink-fleshed, seedy grapefruit was called ‘Foster’ by the Royal Palms Nursery at Oneco, Fla., after its finder, R. B. Foster of nearby Manatee in 1907. Today ‘Foster’ is of interest only because it was the first pigmented grapefruit variety. Interest in ‘Foster’ declined after 1913 when a limb sport of ‘Marsh Seedless’ was found, which in 1924 was named ‘Thompson Pink Marsh’ (Hodgson, 1967). Although it was discovered by S. A. Collins in 1913, it was not named until 1924 when it was distributed by Royal Palms Nursery. It was extensively planted in Texas because of its pink flesh and lack of seed and it replaced ‘Foster’ in Florida (Hodgson, 1967).

Five years after ‘Thompson Pink Marsh’ was introduced, a tree in the Lower Rio Grande Valley of Texas produced a bud-sport limb in McAllen, Texas, discovered by A. E. Henninger in 1929. The ‘Henninger Ruby Red’ was, in 1934, the first citrus variety patented (U.S. Plant patent No. 53) and became known as ‘Ruby Red’ grapefruit. The same year, J.B. Webb of Donna, Texas, also introduced a bud sport of ‘Thompson Pink Marsh’ which he claimed to have found in 1931. Because of its attractive rind color and deeper-flesh color it was called ‘Redblush’ and became the leading red grapefruit planted in the U.S.A. (Hodgson, 1967). ‘Ruby Red’ and ‘Redblush’ are indistinguishable and are considered identical. At the same time ‘Redblush’ appeared, several claims of finding other limb sport mutations were made in the Lower Rio Grande Valley of Texas (Maxwell, 1948). Eight of these were tested by Mr. Norman Maxwell at the Texas Agricultural Experiment Station in Weslaco, Texas. There were no significant differences in time of maturity, fruit quality, color or yield (Krezdorn and Maxwell, 1959; Waibel, 1953; Norman Maxwell, personal communication).

The ‘Henderson’ variety is one of the first intermediate red grapefruits discovered that had deeper red flesh and peel blush than ‘Ruby Red’ or ‘Redblush’ and its interior color did not fade towards the end of the harvesting season as much as was typical of other varieties. In 1945, Sam Henderson, Sr. had planted an orchard of a strain of ‘Ruby Red’ sold by the Everhard Nursery in Pharr, Texas, at his farm on State Highway 107 west of Edinburg and north of McAllen, Texas. During the 29 Jan. - 3 Feb. 1951 freeze, the trees were killed back to just above the bud unions. The grapefruit tops grew back following the freeze and formed trees with multiple

trunks. The orchard went through another major freeze 9-12 Jan. 1962, but freeze damage was not as severe as in 1951.

In 1973, an employee of Sam Henderson, Jr. noticed that one large limb had fruit with more intense red blush and brighter yellow background color. The flesh color was deeper red than that of fruit of the rest of the tree and maintained its color when the color of standard red grapefruit faded in April and May. Sam Henderson, Jr. gave W.V. Ausmus, a McAllen nurseryman, the right to propagate the ‘Henderson’ bud sport and he started selling trees of it before it was brought to the attention of research institutions in the area (Maxwell and Rouse, 1980). In 1973, Mr. Henderson took Dr. Heinz Wutscher of the USDA Citrus and Subtropical Fruits Laboratory in Weslaco, Texas, to the tree and asked for an evaluation. One third of the canopy of the tree was a mutation, apparently the result of damage from the 1951 freeze. The mutated part of the tree was easily distinguishable because of the much redder peel color of the fruit. Fruit samples from both parts of the tree were compared and budwood was taken for virus testing and propagation. Seed collected during fruit analysis was sent to Dr. C.J. Hearn of the U.S. Horticultural Research Laboratory in Orlando, Fla., who planted two seedlings of ‘Henderson’ (Block 1, Row 26, trees 71 and 73) at the Whitmore Foundation Farm near Leesburg, Fla. A limited amount of fruit with better external blush and deeper red flesh color than ‘Ruby Red’ was observed by Dr. Hearn before the 1983 freeze when both trees were severely damaged.

In 1981, Mr. Charles Youtsey, Chief of the Florida Citrus Budwood Registration Bureau, collected budwood from Tree 71 in Row 26 of Block 1 at the Leesburg Whitmore Foundation Farm. The source tree was given identification number SPB-800-26-71 and three trees each of it were propagated on Citrumelo rootstocks F/80-8 and F/80-9, and two trees each on Carrizo citrange and Smooth Flat Seville rootstocks. The trees were planted in Division of Plant Industry Foundation Block F/F near Winter Haven, Fla., in 1984. The first good crop was set in 1986/87 and fruit characteristics appeared to be different from the ‘Henderson’ variety; internal color was close to ‘Star Ruby’, it was commercially seedless and had good quality and internal color throughout the season (Robinson, 1988). Dr. Hearn gave this selection the varietal name ‘Flame’ and it was released by the USDA in 1987 and widely planted in Florida (USDA, 1987). Recently published information that ‘Flame’ descends from an unnamed mutation of ‘Ruby Red’ is incorrect (Saunt, 2000).

‘Ray Ruby’ is an intermediately red grapefruit that has red flesh similar to ‘Henderson’, deeper than ‘Redblush’, but not as red as the super reds like ‘Star Ruby’. ‘Ray Ruby’ was discovered by Colonel Robert Ray in 1970 when four five-to-six year old replacement trees in a 20-acre ‘Redblush’ orchard on LaHoma Road and Five-Mile Line north of Mission, Texas, in the Lower Rio Grande Valley turned out to be atypical. These trees produced fruit of deeper red color than ‘Redblush’; there is no record of which nursery the trees came from nor of the mother tree. When Colonel Ray sold the orchard in the 1970’s, the four trees were moved to his home site. Two trees were lost in transplanting, the two surviving trees are the source trees of ‘Ray Ruby’. Fruit from the two trees was

identical. 'Ray Ruby' was tested and released in 1977 by Texas A&I University Citrus Center in Weslaco, Texas (Hensz, 1978). The suggestion that 'Ray Ruby' might be from 'Redblush' may be correct, but it is not documented (Saunt 1990).

'Star Ruby' is the deepest red of the red-fleshed grapefruits, and the standard to which other red grapefruits are compared. 'Star Ruby' originated as a seedling grown from 'Hudson' grapefruit seed irradiated with thermal neutrons at the Brookhaven National Laboratory, Long Island, New York. 'Hudson' was found as a lower limb on a 'Foster' tree by Charles E. Hudson in his orchard near San Benito, Texas, in the mid-1930s after a freeze had killed the tree to just above the bud union a few years earlier (Hensz, 1966). Irradiation was successful in reducing the extreme seediness of 'Hudson' (40-60 seed per fruit) to the essentially seedlessness of 'Star Ruby' (0-9 seeds per fruit) (Hensz, 1971). Seedlings from the irradiated seed were grafted to sour orange (*C. aurantium* L.) in 1960, transplanted into the field during the 1961/62 season and they fruited in 1966. A selection from these trees was released by Texas A&I Citrus Center in Weslaco, Texas, in 1970 as 'Star Ruby'.

'Rio Red' is another super red whose parentage goes back to one of 1,400 'Ruby Red' seedlings, presumed to be nucellar, planted in 1953 (Hensz, 1985). The seedlings were grafted on sour orange and planted to observe their performance. The better trees were selected from this group in 1959. Budwood from these trees was irradiated with thermal neutrons or X-rays at the Brookhaven National Laboratory, Long Island, New York in 1963. A selection from the trees propagated from this budwood that produced fruit redder than fruit from 'Ruby Red' was designated as A&I-1-48 and trees propagated from it by budding in 1971 were planted in the field in a comparison trial with other varieties. In 1976, a natural bud mutation which produced fruit nearly as red as 'Star Ruby' was discovered on one of the A&I-1-48 trees and designated as A&I-1-48S. A&I-1-48S was released by Texas A&I Citrus center as 'Rio Red' in 1984.

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