Satsuma Tangerine  
**Citrus unshiu Marcovitch**

**Scientific Name:** Citrus unshiu Marcovitch

**Common Name:** In most citrus producing areas, satsuma mandarin is the preferred name, but satsuma tangerine is also used.

**Family:** Rutaceae

**Origin:** China and Japan

**Distribution**
Grown in cool subtropical regions of Japan, Spain, central China, Korea, Turkey, along the Black Sea in Russia, southern South Africa, South America, and on a small scale in central California and northern Florida. The world's largest satsuma industry is located in southern Japan where climatic conditions are favorable for the production of early ripening satsuma tangerines of high quality. Selection of slight mutations and seedlings from controlled pollinations over many years has resulted in a collection of over 100 cultivars that differ in date of maturity, fruit shape, color and quality. 'Owari' is the primary satsuma cultivar commercially grown in Florida but two other cultivars, 'Silverhill' and 'Kimbrough' are also available.

**History**
Satsuma mandarin may have originated in China but it was first reported in Japan more than 700 years ago where it is now the major cultivar grown. The first recorded introduction into the United States was in Florida by George R. Hall in 1876. The name "satsuma" is credited to the wife of a United States minister to Japan, General Van Valkenberg, who sent trees home in 1878 from Satsuma, the name of a former province, now Kagoshima Prefecture, on the southern tip of Kyushu Island, where it is believed to have originated. During the period 1908-1911, approximately a million 'Owari' satsuma trees were imported from Japan and planted throughout the lower Gulf Coast states from the northern Florida Gulf coast to Texas, where an extensive tangerine industry developed. However occasional severe freezes have reduced the satsuma to a cultivar of minor importance.

**Importance**
While this fruit is grown primarily for fresh consumption, a portion of the crop is canned as fruit segments or juice in Japan, China and Spain. In these countries deeply colored juice is blended with orange juice to improve color or sold as single strength tangerine juice. Fresh fruit is also imported into Canada and noncitrus producing areas of the U.S., where it is the earliest seasonal citrus crop to reach the market. During the 1995-96 season, all tangerines and tangerine hybrids were grown on only about 6% of the total citrus acreage in Florida, with satsuma tangerines occupying only a small part of that acreage.

**Description**
Although authorities differ as to the number of species and appropriate classification and grouping, mandarins have been divided into four groups: 1) satsuma group (Citrus unshiu,) 2) the King group (C. nobilis), 3) the Mediterranean group (C. deliciosa), and 4) the common group (C. reticulata). This publication focuses on the satsuma group. See Fact Sheet FC33A, "Tangerines and Tangerine Hybrids", for more information on these other groups.
**Tree**
Budded trees are small to medium-small, low-growing, usually spreading and drooping, nearly thornless, with less foliage and a more open growth habit than other commercial citrus cultivars. Trees are very hardy to cold and resistant to unfavorable conditions but susceptible to sour orange scab (Elsinoe fawcettii), a fungal disease that causes scabby, wart-like lesions on leaves, twigs and fruit without usually affecting internal fruit quality.

**Leaves**
Leaves are dark green, large, lanceolate, tapering at the base and apex and are typically broader than other tangerines. Both main and primary lateral veins are prominent above as well as below. The petiole is slender, very long, and has narrow wings.

**Flowers**
Petals of the flower are white and the flowers are "perfect", containing both male and female flower parts. Satsuma tangerine flowers produce little viable pollen and have few viable ovules. However, this cultivar is highly parthenocarpic (develops fruits without fertilization, resulting in the production of seedless fruit) and does not require pollination by other citrus cultivars.

**Fruit**
Botanically, the fruit of tangerines and of all citrus species, is a special berry known as an hesperidium. Fruit is medium to small and shaped like a flattened sphere; sometimes slightly necked; seedless (0 to 6 seeds, if any); has 10 to 12 segments that are loosely separable; tough carpellary membranes and a hollow axis. In areas with cool night temperatures, the flesh is a brilliant reddish orange, tender and melting, with a rich, subacid flavor. Pulp-vesicles are short and broad. Seeds, when present, have light green cotyledons.

**Fruit Quality**
Satsumas have consistently high quality only in regions with cool winters and hot summers. Fruit grown in humid subtropical areas commonly matures internally and has good eating quality before good peel color develops. Such internally mature but externally green fruit is sometimes marketed as Emerald Green satsuma tangerines Looseness of the rind requires that fruit be clipped at harvest to avoid plugging or tearing, leading to subsequent postharvest decay. Fruit will not tolerate careless handling, does not respond well to degreening and in general, does not ship well. Fruit size is also an important quality factor. The rind is thin and somewhat leathery; moderately smooth with large and prominent oil glands. As fruit matures, the rind surface becomes increasingly bumpy and the rind separates from the flesh somewhat.

**Bearing Season**
Season of maturity: November - December. Fruit hold poorly on the tree after maturity and must be picked promptly, but store well.

**Cold Tolerance**
The satsuma tangerine tree is the most cold- tolerant cultivar of commercial importance. Mature dormant trees have survived minimum temperatures of 15°F to 18°F in northern Florida, northern California and southern Alabama without serious injury. Moreover, because of their low total heat requirement, some cultivars ripen earlier than oranges and most other mandarins. As a consequence, the satsuma tangerine is ideally adapted to regions with winters too cold for other citrus fruits but with growing seasons warm enough to produce fruit of early maturity and good quality. Its range of climatic adaption for commercial culture is therefore narrow and restricted to the higher elevations and colder areas of the sub-tropical zones. In the United States, climatic
conditions suitable for satsumas occur in central and northern Florida, in a narrow strip extending along the Gulf of Mexico across Alabama, Mississippi and Louisiana into eastern Texas and in the Sacramento-San Joaquin Valley basin of California. Although these areas are subject to severe freezes, current cold protection methods, using in-tree microsprinklers, can protect trees to a height of approximately five feet. This cold protection strategy may be the key to at least partial revitalization of satsuma plantings in these areas.

**Season of maturity**
October - November. Seeds: 0-6, but rarely present. As maturity passes, the neck, if present, increases in size. The rind roughens and loosens. Tree moderately vigorous but slow-growing; medium-small, spreading and drooping; very productive. Fruit of good quality which, because of the firm consistency of the flesh and tough carpellary membranes, is especially suitable for canning.

**'Silverhill' Satsuma.**
Season of maturity: October - November. Seeds: 0-6, but rarely present. Fruit medium in size, slightly more oblate than most. Rind relatively thin and smooth. Abundant juice with high sugars and low acid content, hence very sweet. Tree very vigorous, productive and more up-right than other satsuma cultivars.

**'Kimbrough' Satsuma.**
Season of Maturity: October - November. Seeds: 0-6, but rarely present. Introduced from Louisiana, this cultivar produces larger fruit than the 'Owari' satsuma, with rind thickness, internal color, taste and fruit production comparable to 'Owari'. Trees are large and productive with a spreading growth habit and are thought to offer 1-2°F better cold tolerance than 'Owari'.

**Rootstocks for Satsuma Tangerines**
Trifoliate orange is the most commonly used rootstock for satsuma tangerines, especially in cool climates where maximum cold tolerance develops. However, in Florida, where the winters can be relatively short and interrupted by brief periods of warm temperatures, trifoliate orange does not provide consistent protection from cold. Trifoliate orange grows well on fertile, clay to loamy type soils. It does not develop a very deep or wide-ranging root system and is poorly adapted to saline or calcareous conditions, but its resistance to foot rot, a soil-borne disease, makes it a good choice for soils with poor drainage. Trifoliate orange is susceptible to exocortis, a virus-like disease; blight, a disease whose causal agent is unknown; and the burrowing nematode, with some selections resistant to the citrus nematode.

"Cleopatra" mandarin has the highest tolerance to salinity among commercial rootstocks, making it a good choice in coastal areas where ocean sprays or high levels of salinity in groundwater may be a problem. This rootstock induces maximum cold hardiness in the scion but is susceptible to foot rot and highly susceptible to root rot, another soil-borne fungal disease, especially in poorly drained soils. Considered a "lazy" rootstock, fruit production may lag several years behind that of other rootstocks. It is susceptible to both citrus and burrowing nematode and to blight but only after about 15 to 20 years.

*by J.J. Ferguson*