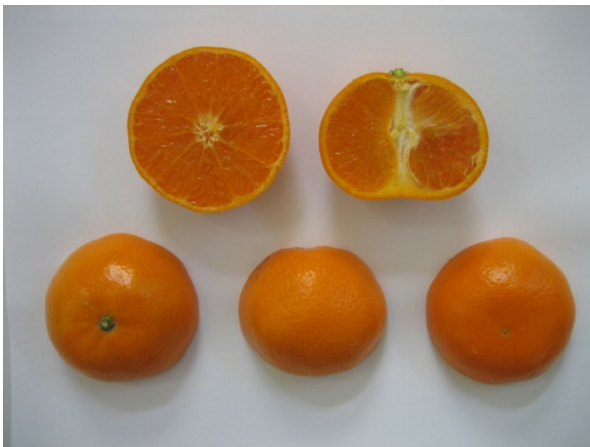


'KinnowLS' Mandarin

Mikeal L. Roose and Timothy E. Williams, Department of Botany and Plant Sciences, University of California Riverside

'KinnowLS' is a mandarin selection developed at the University of California Riverside by mutation breeding of the diploid mandarin cultivar 'Kinnow', a mid-to-late season maturing variety. 'KinnowLS' differs from 'Kinnow' in typically having 2-3 seed per fruit or less in all situations of cross-pollination while 'Kinnow' has 15-30 seeds per fruit in cross-pollinated situations. In Riverside, California 'KinnowLS' matures in winter (mid-January) and holds its fruit quality characteristics through April. Fruit are large for mandarins, oblate in shape with an orange rind color and an extremely smooth rind texture. Flesh is deep orange in color and finely-textured, fruit are juicy, with a rich, sweet and distinctive flavor when mature. Fruit are easy to peel. Tree growth habit is vertical and vigorous, producing a large and rather dense upright crown with excellent production commencing in the third year after planting. Alternate bearing can be a problem in trees that are not culturally managed to reduce this tendency. In summary, 'KinnowLS' is a mid-season maturing diploid mandarin that combines large-sized fruit of excellent quality and production with low seed content even in mixed plantings. It may be successful in the mid-to-late season marketing window that currently has few low-seeded, high quality cultivars.

Fruit Characteristics. Fruit of 'KinnowLS' are oblate in shape with no neck. The fruit has a rounded basal end which is flattened at the stem attachment point with a truncate (slightly depressed) distal end. The fruit is large-sized for a mandarin (classed as Jumbo by State of California standards and size 21 for industry packing standards) averaging 2.7 in (68.0mm) in diameter and 2.2 in (55.2mm) in height, with a very smooth, orange color rind and slightly conspicuous, slightly depressed oil glands. The rind is slightly adherent at maturity and relatively thin, averaging 0.1 in (2.5 mm) in thickness. Fruit peel easily. The fruit interior has a moderately fine flesh texture with 10-11 segments and is quite juicy, averaging 49% juice and 0.32 lb (145g) in weight. Fruit from trees on Carrizo and C35 citrange rootstocks average 12.2-13.9% soluble solids and 1.26-2.09% acid in mid-January at four trial locations in California increasing in soluble solids to 13.5-15.8% with acid decreasing to 0.97-1.98% in mid-February. By mid-March juice averaged 13.3-17.0% soluble solids and 0.80-1.87% acid. Fruit generally continue to increase in soluble solids and decrease in acidity well into April and May at all trial sites. Based on evaluation of an average of 1500 fruit per location, fruit average 2.45 seeds per fruit in the presence of heavy cross-pollination at all locations from 2007 to 2009. Rarely, individual fruit may have 4-7 seeds. No trees or sectors with seedy fruit have been observed. Seeds are polyembryonic.



Fruit of 'Kinnow' taken at Riverside in February and 11-year-old mother tree on Carrizo citrange rootstock

Tree Characteristics. Tree size and growth characteristics of 'KinnowLS' have been consistent with those of 'Kinnow' throughout the evaluations, both varieties being quite vigorous and producing a large, vertically growing tree with a dense crown. The eleven-year-old 'KinnowLS' mother tree at Lindcove on Carrizo citrange rootstock is 10.1 ft (3.1 m) high and 9.8 ft (3.0 m) wide with an upright, though beginning to spread, crown exhibiting a dense growth habit. Five-year-old 'KinnowLS' trees on Carrizo rootstock (in less dense plantings) were similar in size to the 11-year-old mother tree. Bud unions of trees on Carrizo and C35 rootstock show moderate rootstock overgrowth. The selection lacks thorns. Pollen viability for 'KinnowLS' is moderately low in comparison to normal 'Kinnow' (20-30% germination for 'KinnowLS' vs. ~70% germination for 'Kinnow'), and pollen production in comparison to normal 'Kinnow' is significantly reduced. These pollen characteristics suggest that 'KinnowLS' will not cause seediness in adjacent varieties. Full fruit production of 'KinnowLS' normally begins in the third year after planting, however trees can be precocious and set some fruit in the second year after planting. 'KinnowLS', is similar to 'Kinnow' in reaching high production levels relatively quickly. Mean yield of five-year-old trees ranged from 152-211 lb (69-96 kg) on Carrizo rootstock and 165-196 lb (75-89 kg) on C35 rootstock at the four fruiting trial sites. The original 'KinnowLS' mother tree at Lindcove produced 156 lb (71 kg) in the fifth year and in years 9, 10 and 11 yielded 191, 101, 240 lb of fruit respectively indicating that the variety has somewhat of a tendency to alternate bear. In this respect, it is similar to 'Kinnow' which can exhibit severe alternate bearing if the crop is not managed to reduce overproduction in 'on' years.

Release and Distribution: Release of 'KinnowLS' for propagation in California has been approved and budwood will be available to licensed nurseries in June 2011. 'KinnowLS' has been submitted for patenting by the Regents, University of California. A license to propagate and sell the variety will be available to any CDFA licensed California citrus nursery that purchases said license. Budwood for 'KinnowLS' will be distributed from registered screen-protected trees by the University of California Citrus Clonal Protection Program to those licensed nurseries. A three year exclusive propagation period for California nurseries will be enforced. Licenses for propagation outside the USA are being negotiated, but will not take effect until three years after release in California.