

# Breeding of New Citrus Scion Varieties

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Citrus scion breeding is a long-term project because the process of producing new potential varieties and then evaluating them at several locations in California requires at least two cycles of tree propagation and evaluation. However, the UCR breeding program, which has been funded by the CRB since 1994, is now in a relatively mature phase where the “pipeline” is filled with many new selections at various stages of evaluation.

We can expect new varieties to be released at a relatively rapid pace over the next 10 years. These varieties are available to California growers for several years before release elsewhere and are likely to perform well here where they were developed.

The program focuses on new mandarin types because these are increasingly important in the market, and many successful varieties have originated from breeding programs. The traits emphasized include excellent flavor, seedlessness, easy-peeling, high rind color, economic yield, and low tendency to alternate bearing. A minor focus is on grapefruit types, particularly a pink or red low-acid type similar to Oroblanco. Hybridization has not produced many new orange and lemon varieties because hybrid seeds are difficult to produce in these groups, and few hybrids are sufficiently similar to orange or lemon for commercial acceptance.

Two major strategies are used: (1) development of low-seeded hybrids by crossing parents that produce triploids (like Oroblanco and the TDE mandarin hybrid series); and (2) irradiation of budwood of seedy varieties of all types to induce mutations that confer low-seed content. Progress of specific objectives is summarized below.

**Hybridization:** New pollination involved about 230 crosses of W. Murcott and Clemenules onto 5 new low-seeded mandarin selections, and of these selections onto Clementines. These pollinations measure the potential for cross-pollination-induced seed set in promising selections and determine whether new selections induce seediness in Clementines. Seeds from these crosses are grown and evaluated as potential new varieties.

**Propagation of existing hybrids and parents:** About 380 seedlings from previous hybridization were propagated for future planting. Selected parents were repropagated at UCR to reduce use of field space.

**Initial evaluation of hybrids:** New hybrids were evaluated for fruit shape, fruit color, flavor, seediness, yield, tree size, diseases and other traits. Two new grapefruit hybrids and two new mandarin hybrids were selected and submitted to CCPP for cleanup. Two grapefruit types and three mandarins identified previously continue to be promising.

**Induction of seedless mutations by irradiation:** About 700 buds of California Honey mandarin, Flame, Star Ruby, Cocktail grapefruit, Chandler pummelo and selected lemons were irradiated. About 280 trees from earlier irradiation were planted in the field.

**Initial evaluation of trees from irradiated buds:** About 888 field-planted trees were evaluated for vigor, seediness, fruit size, and fruit quality. Pollen fertility of promising selections was measured because it can be related to seediness in solid blocks. 6 new selections were made.

**Advanced trials:** Selected hybrids and low-seeded selections were evaluated in trials at 7 locations: UCR, South Coast, CVARS, Santa Paula, Arvin, Lindcove, and Woodlake. Data on fruit quality, particularly seediness, were collected from over 2,500 fruiting trees. Most low-seeded selections have remained very low-seeded in these trials. Selections of Nova and Fremont appear quite promising. Yield records were collected for the most promising selections at Lindcove, UCR, and South Coast. A total of about 348 new trees were planted.

**Release of new selections:** We anticipated recommending to USDA that they release the Lee x Nova hybrid in 2007, but many test trees had small crops of abnormal fruit, a problem noted previously. We decided to wait for an additional year to collect more data on this selection. Advanced selections from irradiation that may be released in 2008 or 2009 include Daisy IR1, Fairchild IR2 and Kinnow IR2. In 2006-07 these selections averaged 3.2 to 4.4 seeds per fruit in mixed blocks, somewhat more than Tango (0.22) but much less than their seedy “parent” forms (14-22). Descriptions of Tango and other varieties recently released by the program are available as pdf files at <http://plantbiology.ucr.edu/people/Roose/>

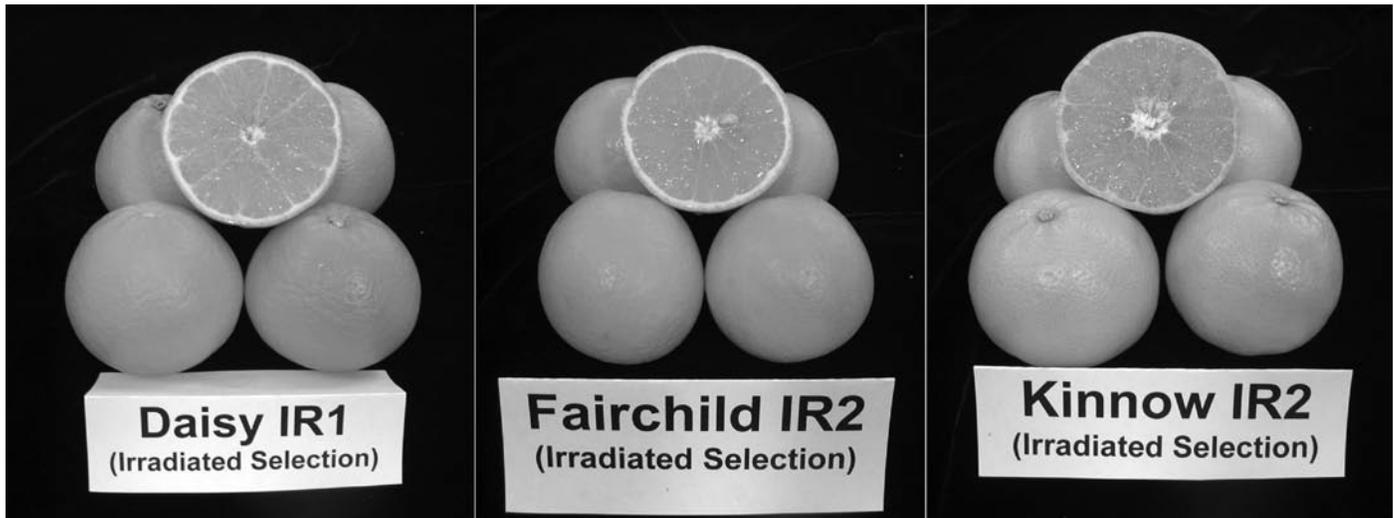


Figure 1. Fruit of three new low-seeded mandarin selections likely to be released in 2008 or early 2009.

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