

Citrus Clonal Protection Program (CCPP)

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The California Citrus Clonal Protection Program (CCPP) is a part of the University of California, Riverside, Department of Plant Pathology and Microbiology. The CCPP is a cooperative program with the California Department of Food and Agriculture (CDFA), the United States Department of Agriculture Animal and Plant Health Inspection Service (USDA- APHIS) and the citrus industry of the state of California represented by the California Citrus Nursery Board (CCNB) and the Citrus Research Board (CRB), which is the primary supporting agency.

The CCPP has six functional pillars: (1) The introduction of citrus varieties in the state of California; (2) The testing of the citrus varieties propagative material for graft transmissible diseases/pathogens; (3) The elimination of the disease- causing pathogens from the propagative material; (4) The maintenance and continuous disease testing of the sources of the citrus propagative material; (5) The distribution of true to type primary citrus propagative material for the needs of the California citrus industry and researchers, and (6) The extension of citrus related information.

2006-2007 Summary

1. Introduction of citrus varieties in the state of California: During 2007, the CCPP requested 10 varieties for introduction into California; the majority of them from the Spanish citrus program at IVIA Valencia (8) and the rest from the Louisiana State University (2). Currently, sources of the newly introduced varieties are been established under quarantine at the Rubidoux facilities.

Table 1. Varieties Pending Release to the Public Domain, 2007

VI	Name	Origin
747	Pehrson Valencia #1	Lindcove, CA
748	Pehrson Valencia #2	Lindcove, CA
749	Pehrson Valencia #3	Lindcove, CA
750	Pehrson Valencia #4	Lindcove, CA
751	Pehrson Valencia #5	Lindcove, CA
752	Pehrson Valencia #6	Lindcove, CA
753	Pehrson Valencia #7	Lindcove, CA
754	Pehrson Valencia #8	Lindcove, CA
755	China S-20 satsuma	PR China
756	Clementine Ain Taoujdate	Morocco
757	China 6-18 satsuma	PR China
759	Everhard navel	New Zealand
760	SRA 507 California Rojo orange	Corsica, France
761	Orange a' Feuilles Laciniees	Corsica, France

2 & 3. Disease testing and pathogen elimination: In 2007, fifteen citrus varieties (14 public domain, Table 1, and 1 proprietary) completed therapy (shoot tip grafting and/or thermotherapy) and VI Index. The VI Index is the most comprehensive index that a variety undergoes during quarantine in CCPP. The VI Index includes bud inoculation into a host range of 60 citrus seedling and propagation plants that are kept at very specific environmental conditions, which will accentuate symptom expression if a pathogen is present. Additional laboratory tests, sPAGE, Hybridization, and RT-PCR (Citrus Viroids), ELISA (Tristeza) and culture for *S. citri* (Stubborn Disease) are also a part of the VI Index. The varieties currently pending released from state and federal quarantine are presented in Table 1.

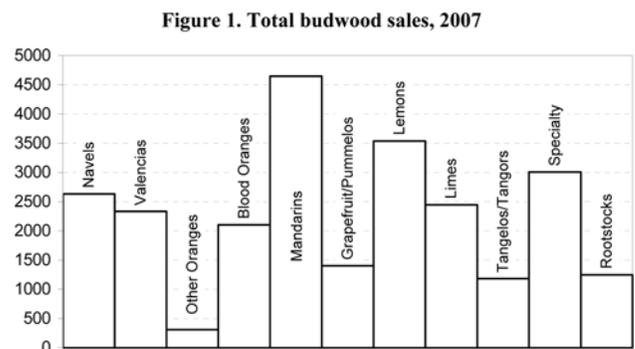
4. Maintenance and continuous testing of citrus sources: When released from quarantine, healthy tree sources will be planted at the Lindcove Foundation-Evaluation Block as well as into the Protected Foundation Block. These trees will be carefully evaluated several times per year by CCPP for true-ness-to-type, fruit quality and overall health and growth characteristics. All CCPP trees at the Lindcove station (LREC) are tested annually for tristeza for the life of the tree by CCPP, while the trees registered for budwood distribution are receiving additional disease tests as required from the CDFA regulations.

This past year, the CTV positive trees in LREC and in the CCPP Foundation blocks were unusually high. The total CTV positive trees in LREC spiked from three (3) last year to 46 while five (5) CTV positive trees were found in the CCPP Foundation-Evaluation Block and Cultivar Bank (CCPP CTV positives: 1990: 1, 1991:2, & 2006:2).

The most probable reason for these high numbers is the increasing CTV pressure from the surrounding Tulare pest control district, which since 1998 does not participate in the tristeza suppression program. This is also supported by the spatial clustering of the majority of the positive trees in the southwest corner of the station adjacent to the known positive trees off-station which will continue to be a source of inoculum during aphid activity.

The above findings generated a very uncertain situation for the safe use of the Foundation-Evaluation Block trees for the 2007 budwood distribution, therefore the CCPP registered the Screenhouse Protected Foundation Block in-ground and potted trees. In total 251 trees, 68 in-ground and 183 potted, were registered in the Protected Foundation Block in 2007 as presented in Table 2.

Citrus Type	Number of Registered Trees
Blood Oranges	7
Clementine	17
Grapefruit & Pummelo	20
Kumquat	8
Lemon, Lime, & Limetta	42
Mandarin	36
Navel	20
Rootstock	24
Satsuma	12
Sour Orange	2
Specialty	21
Sweet Orange	10
Tangelo & Tangor	16
Valencia	16



The registration procedure for the CCPP budwood sources includes an annual index into West Indian Lime (Tristeza, Vein Enation), index into citron every third year (citrus viroids), and index to sweet orange/dweet tangor every fifth year (Psorosis and related diseases). The 251 registered trees of the Protected Foundation Block are an addition to the 283 registered trees of the Foundation-Evaluation Block, which are maintaining currently their registration status.

The Foundation-Evaluation Block trees are a valuable asset for the program, the researchers, and the industry; therefore, they will be maintained as budwood producing sources for as long as possible and until new information is produced for the tristeza status of the LREC and the surrounding areas.

Following its commitment for the control of graft-transmissible disease of citrus in California the CCPP in collaboration with the Central California Tristeza Eradication Agency and the CCNB resumed the testing for the cooperative registration of nursery-owned citrus scion and seed source trees. This program insures that citrus nurseries will have a supply of clean propagation budwood so that they can produce the highest quality nursery stock for the California commercial groves.

5. Budwood distribution: In 2007, the CCPP budwood distribution scheme underwent two major changes. An on-line ordering system was launched, and two out of the three annual budwood cuts took place in the Protected Foundation Block. The online system allows the clientele to access a personal account (containing address, phone number etc.) and select from a user friendly environment the citrus varieties of interest. The system automatically monitors and records the ordering history of each user and generates budwood labels, moving permits, statistics, and other budwood sales related information.

In 2007, CCPP distributed approximately 24,500 buds (2006: 27,000, 2004-2005: 31,600 buds) with Navel oranges, Mandarins and Specialty varieties representing approximately 40% of the total sales (Fig. 1). This pattern is slightly different from the 2006 budwood sales where the three citrus types represented 57% of the sales. This is primarily due to a reduction in Mandarin budwood sales by 40%. Noticeable is also an increase from last year in the sales of Valencia oranges (~80%) and Lemons (~50%).

6. Extension of citrus information: The CCPP continued this year the collection of fruit evaluation data from field propagations during 2-3 week intervals just prior to and during fruit maturity. This year's evaluation information is available at the web page http://www.ccpp.ucr.edu/tests/LREC_37.html along with the 2005 & 2006 data. The CCPP also continued adding pictures and fruit data to the individual variety websites at www.ccpp.ucr.edu. Additionally, the variety data are now shared with the website of the UC Riverside Citrus Variety Collection <http://www.citrusvariety.ucr.edu/citrus/index.html> with dual links from and towards the CCPP website. The CCPP again hosted a Foundation Block Field Day in December of 2007, which was very well attended. During this field day the entire Foundation Collection as well as the Cultivar Bank and experimental plots were available for viewing and fruit tasting. Fruit from CCPP trees was also made available for the annual Lindcove fruit display for growers, the CRB exhibits at World Ag Expo and the California Citrus Mutual Citrus Showcase, and other events of this type.

The CCPP is dedicated to helping maintain California in the forefront of high quality fruit production. The continued availability of disease tested propagation material from the CCPP is essential for the continued protection and viability of California's citrus industry. We at the CCPP wish to thank the CRB for its continuous support.

NOTICE: The research results included in this publication are summary reports for the benefit of the Citrus Research Board and the growers it serves. They are not to be taken as recommendations from either the individual reporting or the agency doing the research. ***Some of the materials and methods mentioned are neither cleared nor registered for commercial use. The summaries were written by the project leaders identified. Both technical names and registered trademarks of materials are used at the discretion of the authors and do not constitute any endorsement or approval of the materials discussed.*** Questions on possible applications should be directed to the local University of California Extension Specialist, a licensed PCA, or the appropriate regulatory agency.