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
6. The extension of citrus related information

2009-2010 Summary
1. Introduction of citrus varieties in the state of California. The CCPP received one (1) proprietary and four (4) public domain varieties for introduction and/or release into California. Sources of the newly introduced varieties were established under quarantine at the Rubidoux facilities and disease testing and therapy procedures were initiated.

2 & 3. Disease testing and pathogen elimination. Eight public domain citrus varieties (Table 1) 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.

4. Maintenance and continuous testing of citrus sources. When released from quarantine healthy tree sources are planted at the Lindcove Foundation-Evaluation Block as well as into the Protected Foundation Block. These trees are carefully evaluated several times per year by CCPP for trueness-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.
Table 1. Varieties Released in to the Public Domain, 2010

<table>
<thead>
<tr>
<th>VI</th>
<th>Variety</th>
<th>Origin</th>
</tr>
</thead>
<tbody>
<tr>
<td>796</td>
<td>Mapo Tangelo IVIA 190</td>
<td>IVIA, Spain</td>
</tr>
<tr>
<td>797</td>
<td>Ueno Satsuma IVIA 406</td>
<td>IVIA, Spain</td>
</tr>
<tr>
<td>798</td>
<td>Maltaise Demi Sanguine Blood Orange IVIA 393</td>
<td>IVIA, Spain</td>
</tr>
<tr>
<td>799</td>
<td>Louisiana Early Satsuma (LA Early)</td>
<td>LSU, Louisiana</td>
</tr>
<tr>
<td>803</td>
<td>Femminello Siracusano White Flower Lemon</td>
<td>Italy</td>
</tr>
<tr>
<td>804</td>
<td>Kao Nun Pummelo</td>
<td>Thailand</td>
</tr>
<tr>
<td>805</td>
<td>Fukushu Kumquat</td>
<td>USDA, Riverside</td>
</tr>
<tr>
<td>806</td>
<td>c. sunki</td>
<td>USDA, Riverside</td>
</tr>
</tbody>
</table>

In 2008, the CCPP Protected Foundation Block became the primary source of budwood for the state of California since the annual tristeza survey of LREC (spring of 2008) showed that positive trees outside the CCPP collection had increased to 75 while eight more tristeza positive trees were detected in the Foundation-Evaluation Block by the CCPP personnel. The three budwood distributions (January, June and September) for 2008 were performed exclusively from the 667 trees of the Protected Foundation Block. In 2008, the CRB committed the necessary funds for the expansion of the protected block by 30,000 sq. ft. Construction was completed in 2010, and tree planting began in the spring of 2010. Today, the Protected Foundation Block contains 890 trees, representing approximately 450 varieties. The CCPP maintains both potted and in-ground trees inside these structures for the varieties that traditionally have high budwood demand.

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) which was performed on the registered trees of the Protected Foundation Block while the trees of the Foundation-Evaluation Block received only the annual tristeza ELISA test. In addition, the CCPP initiated the testing of all the trees in the Protected Foundation Block for Huanglongbing with real time quantitative polymerase chain reaction (q-PCR).

Following its commitment for the control of graft transmissible disease of citrus in California the CCPP in collaboration with the CDFA 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. During the 2009-10 the CCPP budwood online ordering system performed well while the ordering history of each user was updated with information prior to the lunch of the system in 2007.

This year the CCPP executed 135 orders, for 236 varieties-VIs, and total of 24,621 buds (2009: 36,059, 2008: 31,161, 2007: 26,173, 2006: 26,471, 2005: 32,056 buds) with the Mandarins representing approximately 35% of the budwood demand, double of that of Navel oranges (Fig. 1 & 2).
Figure 1. Total budwood distribution, 2010

Figure 2. Total budwood distribution, 2010-Percentages
6. Extension of citrus information. The CCPP continued this year the collection of fruit evaluation data from field propagations. This year’s evaluation along with data from previous years have been loaded in the new CCPP web site interface which will allow the user to see and compare fruit information in an dynamic manner. For example the user will be able to select specific varieties and compare specific characteristics (i.e. sugar acid ratios) of for a specific time period. This project is supported by the CCNB in collaboration with the UCR Citrus Variety Collection and therefore the user will have access in two different set of data. The database platform was completed during 2008 and we launched the public interface during 2009.

The CCPP again hosted a Foundation Block Field Day, 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 World Ag Expo, the 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.