

# 2019-2020 Annual Report

## Citrus Under Cover Production System (CUPS) for California

P.E. Rolshausen, UC ANR, UC Riverside,  
[philrols@ucr.edu](mailto:philrols@ucr.edu)  
Year 2 of 4 (50% Complete)

### Objectives

1. Evaluate the long-term performance of CUPS
2. Cost benefit analysis of CUPS
3. Evaluate rootstock-scion combination under CUPS
4. Extend scientific information to the citrus industry

### Problem and Significance

Huanglongbing (HLB) is the most destructive citrus disease of all time. Since it was first discovered in 2005, it has devastated the citrus industry in Florida and is now affecting the industry in Texas, while its incidence has rapidly increased in California. The U.S. citrus industry cannot rely solely on insecticides or antibiotics sprays to manage HLB. In addition, tolerant/resistant cultivars are years away from being commercially available. Growing citrus under protective screen offers a practical near-term solution for growers to sustain high production levels and maintain the longevity of new plantings under HLB disease pressure.

### Benefit to Industry

This work will provide growers science-based guidelines on how to grow citrus under protective screen and offer the industry an analysis of the costs and benefits of CUPS under different disease scenarios.

### Progress Summary

The first trial will be planted in the Spring of 2021 and will feature two one-acre blocks of Tango x C35 and two one-acre blocks of Cara Cara x Rich 16-6 planted both in CUPS and in open field (4

acres total). Blocks will be planted at a density of 8' x 14' (390 trees per acre). Weather stations and soil sensors will be placed inside and outside the CUPS so we can record environmental parameters including temperature, relative humidity, wind, soil moisture and irrigation. In addition, we will record data on tree physiology (water consumption, water potential, stomatal conductivity, evapotranspiration, chlorophyll content, and photosynthesis) at key physiological tree stages. We will also record horticultural data (tree growth, flushing periods, timings of flowering and fruit set) and tree productivity data (fruit yield, and fruit quality). Finally, we will scout pests and pathogens at pre and post-harvest. The data collected for the next 5+ years on those two citrus variety standards will help assess tree performance in CUPS and calculate the cost-benefit analysis.

The second trial will be planted in the Spring of 2022 and the experimental design will be blocks of 8 scions x 6 rootstocks with 8 replicates of each combination (384 trees total). Trees will be planted at a density of 8' x 14'. The scion X rootstock combinations include: (1) 8A Lisbon lemon; (2) Texas Star Ruby grapefruit; (3) Cara Cara orange (4) Shiranui mandarin; (5) Kishu mandarin; (6) Satsuma mandarin; and (7) Nules clementine X (I) US897; (II) US942; (III) C22; (IV) Flying Dragon; (V) C35; and (VI) Rich16/6. Because of an incompatibility issue the last scion X rootstock combinations selected are: (8) Allen Eureka lemon X (I) US897; (II) US942; (III) C22; (IV) C35; (V) X639; and (VI) Macrophylla X Volkameriana. The data collected for the next 5+ years will help assess the best scion x rootstock combinations for CUPS under California conditions.

### CRB Project # 5400-154

### Publications and Presentations

Rolshausen P.E., Barry, G., and Schumann, A. 2019. Citrus Under Cover Production System (CUPS). *Citrograph* 10(1):40-43.

**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.