

# Production Research:

## Focus on Applied Research to Address High Priorities

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Starting in 2024, under the direction of California Avocado Commission Production Research Chair Danny Klittich, the PRC began a process of developing and ranking a list of research priorities. This process resulted in a call for proposals that was sent out to the world avocado research community in late 2024. The final list contained 41 topics, with 19 being ranked high priority in the categories of cultural management, irrigation, pest management and agricultural chemical product research.

In response to the call for proposals, 22 concept proposals were received and reviewed by the PRC in January 2025. Of those, 12 researchers were asked to submit full proposals for further review by the PRC. Ultimately, the PRC recommended nine proposals for funding and the board approved eight of those projects.

### **Pest & Disease Management**

Four approved projects fall into the broad category of pest and disease management. The first of these projects establishes a pesticide resistance monitoring program for avocado thrips. Growers have been managing avocado thrips since the late 1990s, and for many the pesticide of choice is abamectin. However, the continued reliance on one pesticide can lead to the development of resistance (see “Pesticide Resistance Issues Facing California Avocado” Fall 2025 *From the Grove*) and some pest control advisors and growers have reported abamectin treatment failures, increasing the concern that resistance is building in thrips populations. Dr. Hamutahl Cohen, entomology advisor for Ventura County, will lead the efforts to develop screening protocols for thrips populations from groves with varying pesticide use history to determine the extent of resistance development and help develop protocols for resistance management.

Dr. Fatemeh Khodadadi, assistant professor of extension

in the Microbiology and Plant Pathology Department at UC Riverside, is leading a project on avocado branch canker. ABC, previously referred to as Dothiorella canker, is a ubiquitous disease caused by a large group of fungal pathogens in the Botryosphaeriaceae family. These pathogens exist worldwide and cause diseases on numerous crops. In recent years, they have become more problematic as they are broadly considered opportunistic pathogens. That is, as plants are weakened by other problems — for example, phytophthora, salinity or heatwaves — fungal pathogens can gain a foothold and cause disease. Previous CAC-funded work with Dr. Themis Michailides documented the diversity of Botryosphaeriaceae fungi affecting avocados and conducted some initial fungicide screening efforts. Dr. Khodadadi’s project will expand on this previous work, screening fungicides both in the lab and in the field, as well as looking at how factors such as irrigation practices and salinity affect the establishment and severity of ABC.

Drs. Jim Adaskaveg and Patricia Manosalva will be working on Phytophthora management. Avocados are primarily affected by two Phytophthora species, *P. cinnamomi* and *P. menzei* (aka., *P. citricola*). The latter causes trunk canker on avocados and can be controlled by keeping sprinklers from wetting the trunks of avocado trees. The former is an aggressive soil-borne pathogen that causes avocado root rot. For decades, avocado growers worldwide have relied upon phosphorous acid applications to control root rot. Phosphorous acid works best when applied as a trunk injection, but this method is time consuming and expensive, and if done incorrectly can cause severe injury to the tree. Thus, many growers apply it through the irrigation system. As described above for thrips, the continued reliance on one chemical can lead to pathogen resistance. Recently, mefenoxam (Orondis®) came to market and is extremely effective at controlling avocado root

rot; however, there is fear that growers will become reliant on this new chemistry putting resistance pressure on it. To address these concerns, Drs. Adaskaveg and Manosalva will be screening *Phytophthora cinnamomi* populations from throughout California for resistance to currently registered fungicides and conduct fungicide efficacy trials under commercial conditions to determine the best protocols to maximize chemical protection and reduce the emergence of *Phytophthora cinnamomi* resistant populations.

The last entomology related project is being conducted by Cal Poly Pomona graduate student Carson Loudermelt. Carson will be conducting a survey of avocado groves to identify the species of pollinator insects that are responsible for pollination in avocados. Additionally, Carson will evaluate how different features of orchards — such as weed species populations and proximity to native habitat or other natural areas — influence pollinator diversity and abundance in the orchard.

### **Irrigation Management**

Two funded projects fall under the heading of irrigation management. The first, conducted by Dr. Ali Montazar, builds on his recently completed project determining avocado crop water use under varying conditions and establishing seasonally variable crop coefficients for avocados in California (see “Hass Avocado Crop Water Use: An Analysis for California Production Systems” Spring 2025 *From the Grove*). In this new project, Dr. Montazar will evaluate the effects of various irrigation management strategies on avocado yield and quality, and quantify water use efficiency enhancement following improved irrigation management practices.

In a related project, Andre Biscaro, irrigation advisor for Ventura County, will explore alternatives to the California Irrigation Management Information System (CIMIS) — which has become increasingly less reliable in recent years — for calculating irrigation requirements. An advantage of the CIMIS network is that the stations are standardized, with each station being the same and situated within a 4-acre well-watered grass area, ensuring the data they generate are accurate. However, many stations within the CIMIS network are not functioning and the network does not have stations in many avocado growing areas. Biscaro will attempt to determine how large a grass area around a station is required for accurate, reliable readings and work to develop a network of these stations that can be linked to the avocado irrigation calculator tool he recently developed. Essentially, Biscaro is trying to develop a “crowd sourced” reliable weather station network that can enhance or even replace CIMIS.

### **Cultural Management**

The final two funded projects fall under the heading of cultural management. The first relates to soil salinity and is being led by PhD student Jesse Landesman. She is working under the direction of Dr. Jennifer King at UC Santa Barbara. Landesman’s background is in soil chemistry, and her goal is to understand how the various soil types throughout the California avocado growing region influence salinity risks. She intends to accomplish this by working with growers to collect historical water quality and yield data and coupling this with soil chemistry data. The goal is to better understand which soils are at the greatest risk of salinization based on their chemistry and irrigation water quality so that growers can be given better information on how to manage salinity on different soil types.

The final funded project is with Dr. Lauren Garner at Cal Poly San Luis Obispo. Dr. Garner has been managing one of the avocado rootstock breeding trial sites on the Cal Poly campus. Funding was not continued for the broader avocado rootstock breeding project led by Dr. Patricia Manosalva. This project was initiated six years ago with the goal of generating the required data to release UC-developed avocado rootstocks. To date, no rootstocks from that project have moved toward release despite repeated promises. However, the PRC saw value in maintaining the trial site at Cal Poly SLO due to its unique location relative to the other sites and the potential for additional projects to be developed there in the future.

### **Other Projects**

Several other projects were also funded in the past couple of years and are ongoing. These include a project by Dr. Mary Lu Arpaia to investigate the efficacy of artificial pollination systems. A couple of companies have developed artificial pollination systems in recent years and are actively marketing these to growers. However, no independent data exist to support or refute these companies’ claims about their systems.

Dr. Mark Hoddle has two projects currently funded by CAC. These include pest exploration in Guatemala to better understand what avocado pests, specifically fruit feeding pests, exist there so that the pest risk analysis can be as complete as possible for allowing Guatemalan fruit to enter the U.S. market. This project builds on initial pest survey work in Guatemala that Dr. Hoddle conducted nearly 20 years ago. The other project funded with Dr. Hoddle is to develop a commercial production method for the pheromone of the avocado seed weevil and field test the pheromone in Mexico. This project will help with early detection of this pest should it ever enter California and also will be valuable in the survey work in Guatemala. 🍷