Update on the federal Specialty Crops Research Initiative (SCRI)-funded pistachio project

Adapting Pistachio Production to a Changing Climate (4-year project, 2022-2026)

Team:
Pat J. Brown (UC Davis; breeding)
*Louise Ferguson (UC Davis; extension)
Richard Michelmore (UC Davis; biotechnology)
*Reza Ehsani (UC Merced; ag engineering)
*Brittney Goodrich (UC Davis; economics)
Richard Heerema (New Mexico State University; extension)
Giulia Marino (UC Davis; physiology)
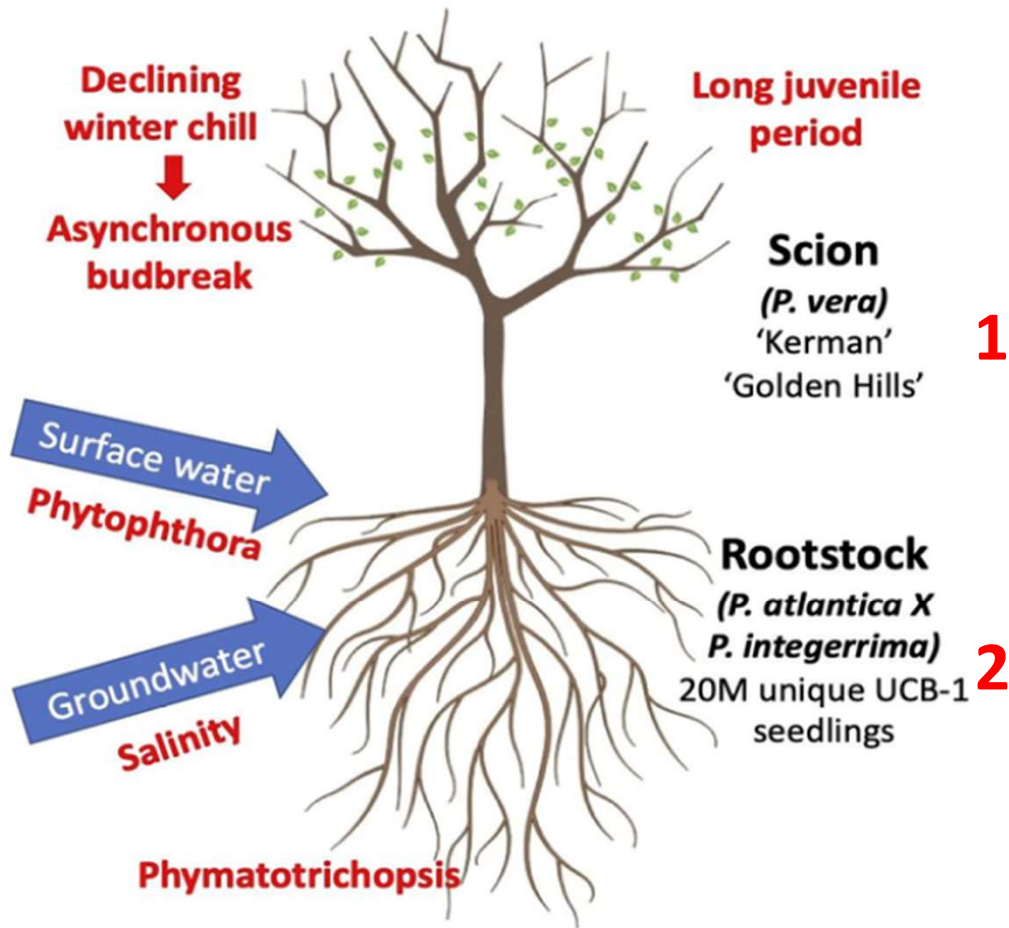Grey Monroe (UC Davis; genomics)
Tor Tollhurst (Purdue; economics)
Flo Trouillas (UC Davis; pathology)

*presenting today

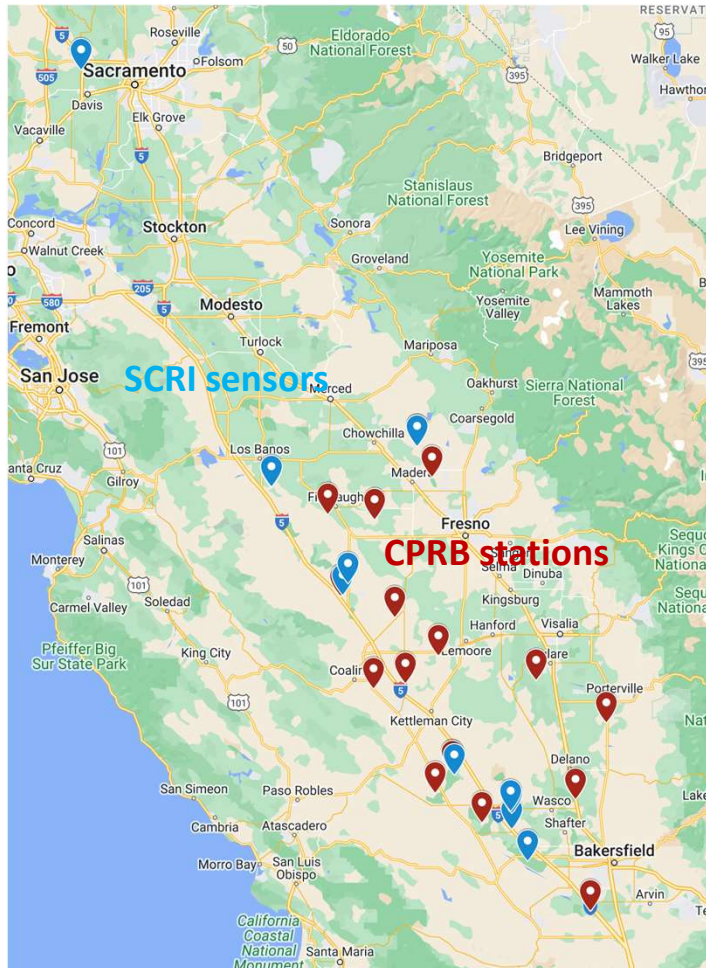# Overview

Building better chill models for pistachio

Ivan Bermudez, Mukesh Mehata, Louise Ferguson

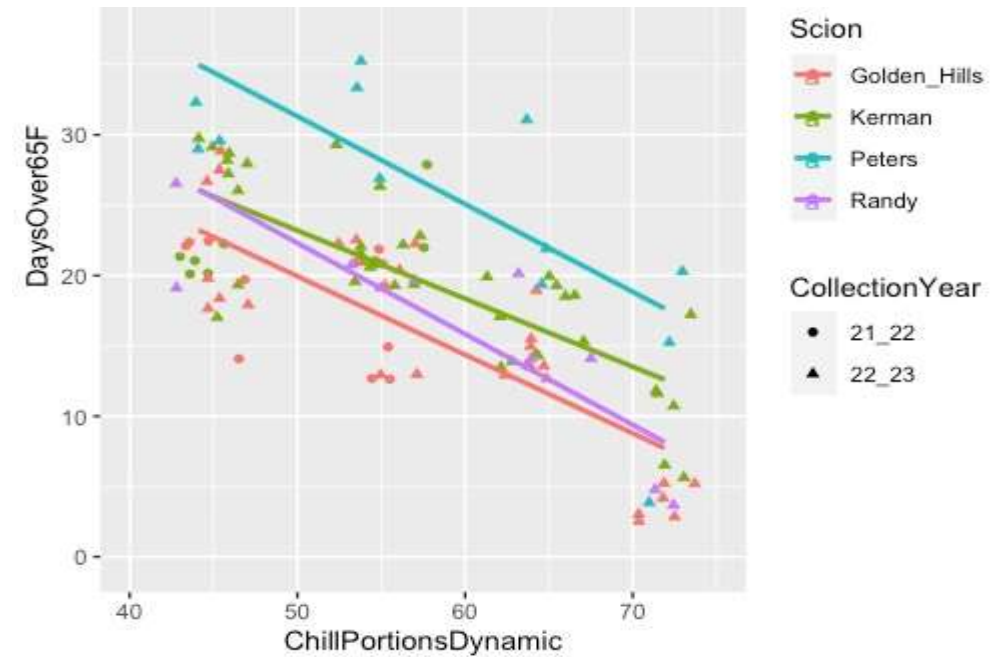14 orchards with weather stations being installed with CPRB funding

10 additional orchards with SCRI sensors installed

We want to help you:
- Plan application of dormancy-breaking agents
- Match male-female cultivars in new orchards

Harvest sticks through the winter, track days to bud push in the greenhouse
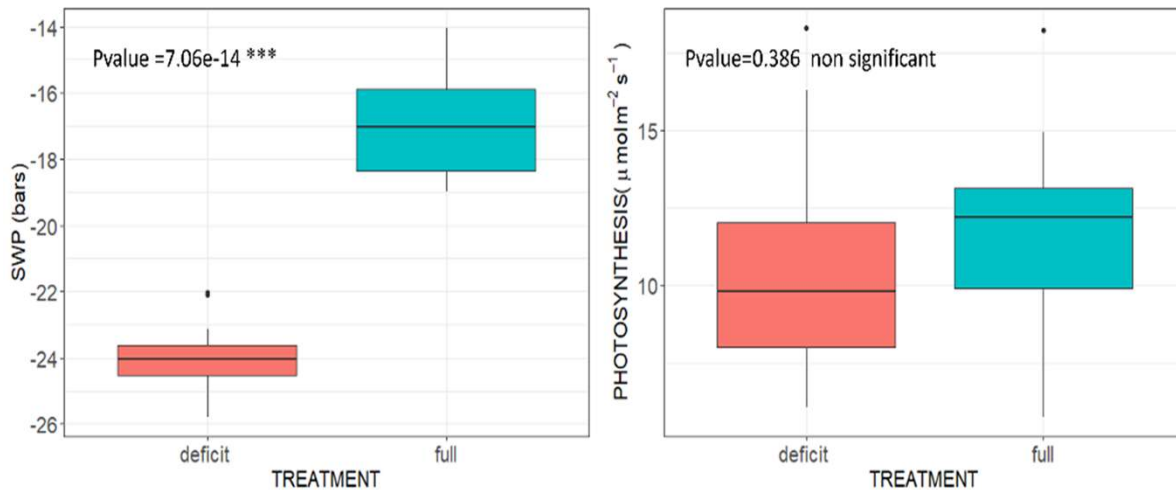

- More granular data than bud push in the field

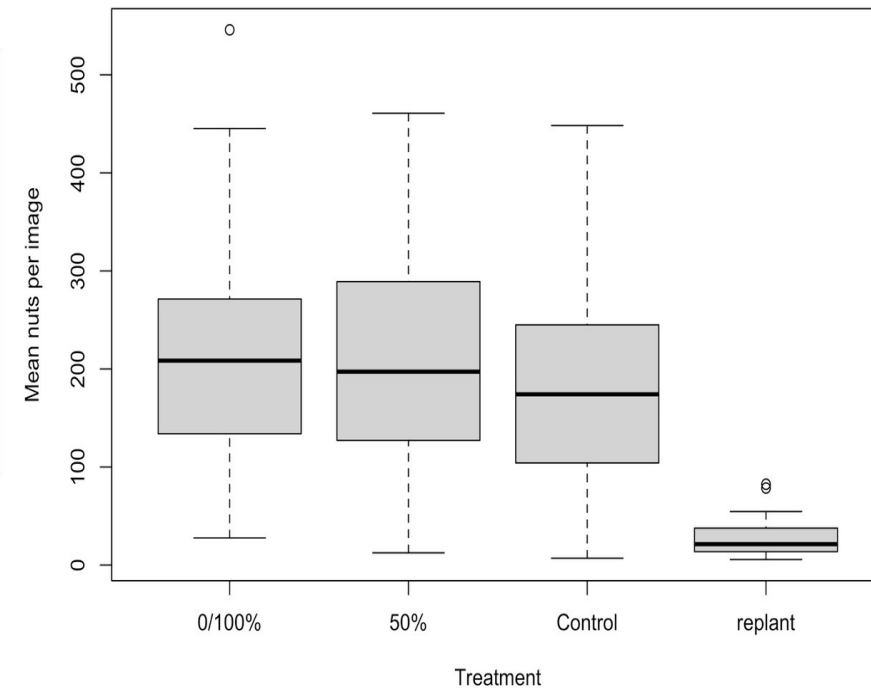- "Low chill" and "high chill" are simplifications

Can we maintain pistachio yields under long-term deficit irrigation?

Emily Santos, Amrit Pokhrel, Paula Guzman Delgado, Giulia Marino

Site 1: 50% reduction for two years;
Reduced stem water potential but little effect on photosynthesis

Site 2: two deficit treatments;
Yield not affected in first year

# Making genomics and biotechnology work for pistachio

Matt Davis, Ewelina Jacygrad, Grey Monroe, Richard Michelmore

- Ability to control flowering
  - Get new plants to flower within one year instead of 5
  - Accelerate breeding

- Ability to control sex
  - Ability to cross female X female (eg: Kerman X Golden Hills)
  - Would monoecious orchards yield more than dioecious orchards?

- Ability to predict performance from DNA
  - Throw away inferior genetics; plant only the best
  - Good prediction models rely on LOTS OF DATA
  - DNA data much easier to collect than yield data!

Millions of seedling UCB-1 trees in California, each one is unique
Thousands of them are probably better than our best rootstock clones
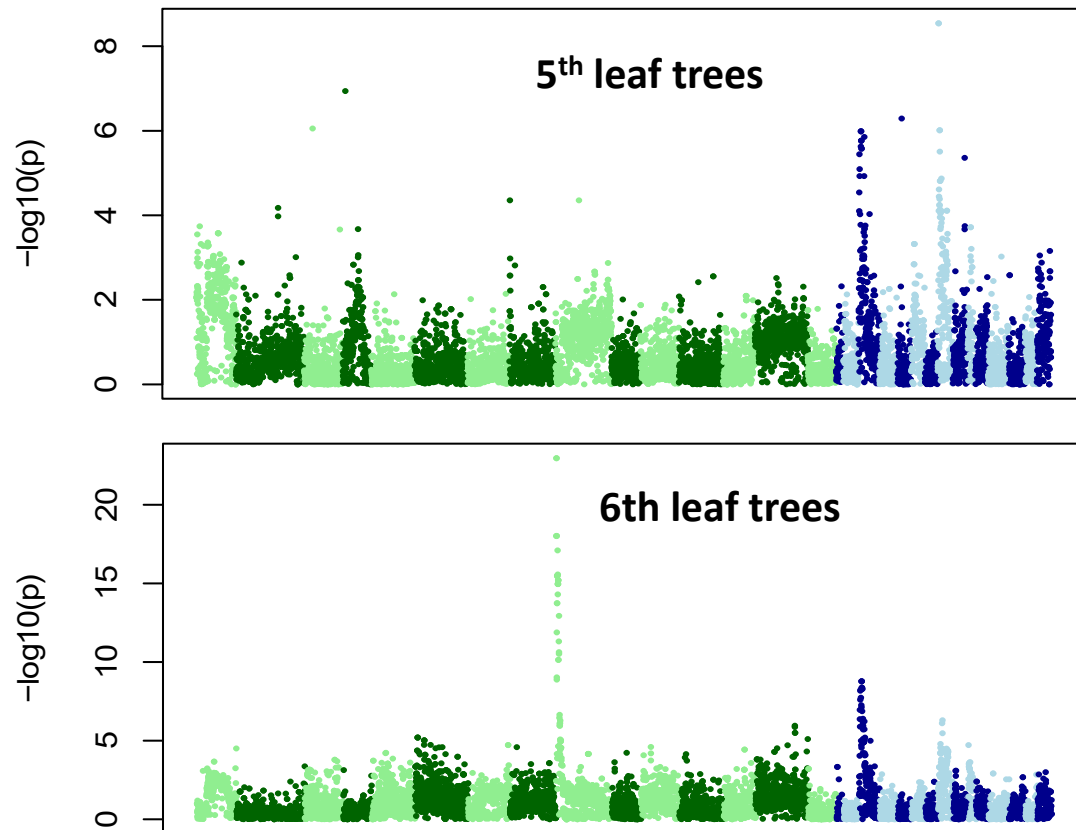If only we could measure yield on all of them….

Yield estimation on 2000 trees in a UCB-1 seedling orchard using pencil, paper, and eyeballs
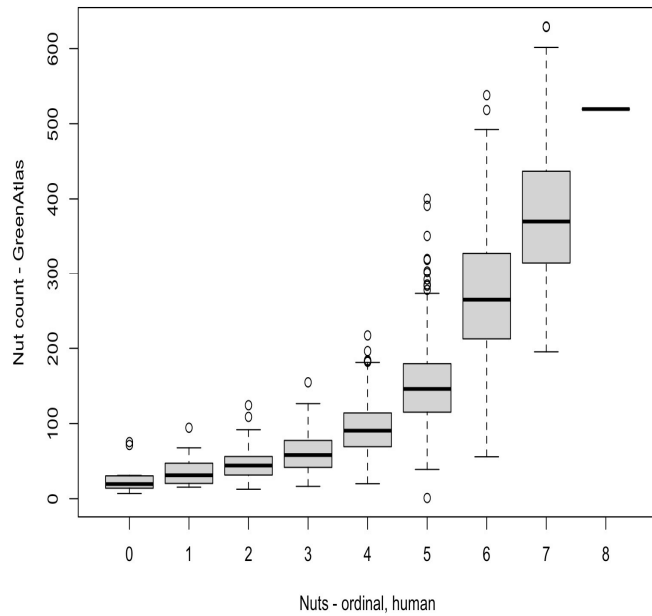
Yield estimated on 0-9 scale over 2 years

UCB-1 markers associated with estimated yield
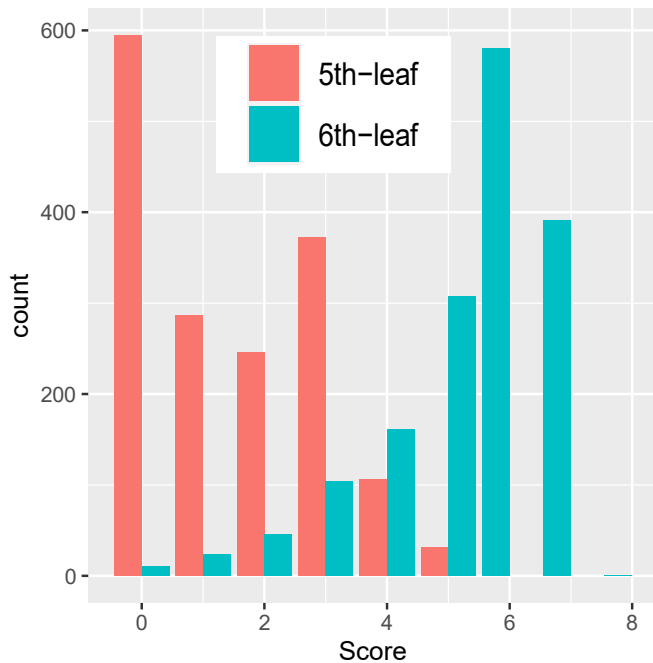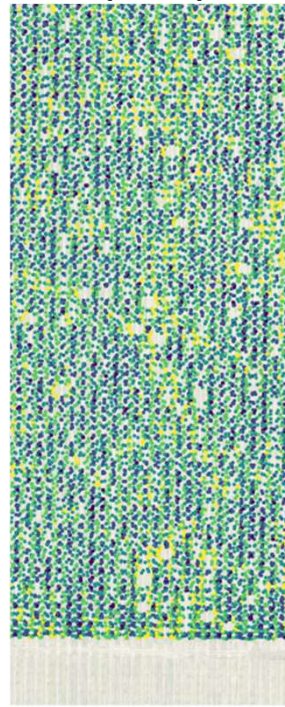

DNA from rootstock suckers

Scaling up the estimation of single tree yields

Matt Koball, Michael Winch, Reza Ehsani,

Man vs machine nut counts   **Canopy density (Lidar)**   **Nut counts (RGB)**
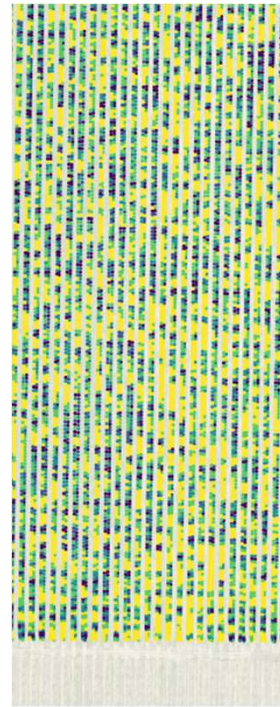

Find highest-yielding trees under pressure from salinity, deficit irrigation, flooding, Verticillium, Phytophthora, etc.

Canopy Density	
0.75+	5 %
0.58 - 0.75	29 %
0.42 - 0.58	30 %
0.25 - 0.42	29 %
0 - 0.25	7 %

Total (count / image)	
500+	9 %
367 - 500	11 %
233 - 367	18 %
100 - 233	28 %
0 - 100	34 %

How to get involved:

- If you manage an orchard on seedling rootstock (UCB-1, PG-I, PG-II, or atlantica) with any kind of biotic or abiotic stress (Verticillium, Phythopthora, salinity, water deficit, flooding, etc)…

- ..or if you are willing to try a deficit irrigation experiment …

- …then we would love to hear from you.

Our goal is to provide rootstocks and tools tailored to the specific challenges faced by growers.

pjbrown@ucdavis.edu