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WALNUT ORCHARD MANAGEMENT: PILOT PROJECTS, FIELD TESTING, ADAPTIVE RESEARCH, AND PROBLEM SOLVING BY UC FARM ADVISORS AND SPECIALISTS

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Objectives

This project supports applied and site-specific adaptive research statewide for farm advisors, specialists, and faculty working on walnut-related research projects. This includes projects conducted by farm advisors, other specialists, and faculty members statewide including cultivar and rootstock evaluation, tree training and canopy light interception, and irrigation-related projects. The mobile platform lightbar was used in approximately 21 walnut trials in 2020.

► Cultivar and Rootstock Evaluation

New walnut cultivars and advanced selections are being field evaluated at two sites with cooperating farm advisors. Field testing of putatively disease- and nematode-resistant walnut rootstocks (*Juglans* species) is also being conducted. Clonal rootstocks are being tested in Lake, Solano, Glenn, and Tulare counties. Growth and productivity of June-budded, unheaded Chandler walnut is being investigated on three clonal rootstocks in Sutter County.

► Tree Training and Canopy Light Interception

Four trials are being conducted in Yolo, Sutter, Lake, and Tulare counties with different heading heights at the time of planting. Another project is looking at growth and productivity responses of a mature Howard walnut planting to unpruned versus mechanical skirted versus mechanically hedged treatments. We recently completed and are summarizing results from a project looking at different hedging strategies in a hedgerow-planted Chandler orchard at Nickels Soil Lab as well as a trial looking at whisking back every other tree to improve light penetration. Both this and the previous hedgerow trial are sites for a *Botryosphaeria* trial. In addition, there are pruned versus unpruned trials being conducted in Glenn and Kings counties as well as a walnut heading trial in Tulare County. Trials investigating training methods in Chandler and Solano walnuts are being conducted at Chico State University Farm as well.

► Irrigation and Walnut Quality

A large number of irrigation-related projects have been conducted under this project. This has included work on investigating the role of excessively wet conditions on shoot bud and shoot development in walnut. In addition, a great deal of work has been done investigating the role of irrigation in walnut quality. Three

ongoing walnut irrigation projects are being conducted in Lake County looking at growth of Chandler walnuts in orchard sites impacted by irrigation management issues. We have also been working to summarize the seasonal patterns of midday stem water potential using over 15,000 measurements conducted under this project in the past 20 years.

As part of this project, a new mobile platform lightbar was constructed on a Honda ATV since the previous Kawasaki Mule-based platform was worn out and causing a lot of repair issues. Starting in the spring of 2020, all data was collected using this new system.

This project also provides support to farm advisors, specialists, and faculty regarding maintenance of plant pressure chambers and harvest support including maintenance of load cell-equipped harvest trailers. The processing and submission of samples to Diamond Walnut for quality analysis is also included under this project.

TABLE 1. Sites where the mobile platform lightbar was utilized and services provided as part of this project in 2020.

	Farm Advisor/Specialist	Location	Project Description
1	Katherine Jarvis-Shean, Bruce Lampinen and Sam Metcalf	Yolo/Solano	Walnut clonal rootstock trial
2	Bruce Lampinen and Janine Hassey	Nickels Soil Lab, Colusa	Chandler walnut hedging trial- continued PAR collection and final data analysis
3	Franz Niederholzer and Bruce Lampinen	Nickels Soil Lab, Colusa	Howard walnut long term light bar study continued PAR collection and final data analysis
4	Elkins, Rachel and Bruce Lampinen	Lake	Using a pressure chamber to aid in irrigation scheduling
5	Elkins, Rachel and Bruce Lampinen	Lake	Clonal rootstock trial at Indian 1 site
6	Elkins, Rachel and Bruce Lampinen	Lake	Clonal rootstock trial at Indian 2 site
7	Elkins, Rachel and Bruce Lampinen	Lake	SCRI rootstock trial
8	Lightle, Dani Rich Rosecrance and Bruce Lampinen	Butte	Chandler and Solano heading and painting trial at CSU Chico Farm
9	Lampinen, Bruce and Loreto Contador	UC Davis	Shoot growth on young walnuts as influenced by height of heading at planting on Chandler, Tulare and Howard walnuts- final data analysis
10	Milliron, Luke, Dani Lightle, Chuck Leslie, and Bruce Lampinen	Glenn	Pruning/training trial in grower Solano orchard
11	Hassey, Janine, Luke Milliron, Reid Robinson and Bruce Lampinen	Sutter	Clonal rootstock trial at Sierra Gold Nursery comparing unheaded June budded Chandler on VX211, Vlach and RX1 rootstocks
12	Hassey, Janine and Bruce Lampinen	Sutter	Clonal rootstock trial at Sierra Gold Nursery for SCRI project
13	Hassey, Janine and Bruce Lampinen	Sutter	Micrograft versus Junebud comparison trial at Sierra Gold Nursery
14	Arnold, Kara and Bruce Lampinen	Merced	Trial comparing different walnut spacings and rootstocks
15	Lampinen, Bruce and Mae Culumber	Kings	Pruning trial in grower Livermore orchard
16	Fichtner, Elizabeth and Bruce Lampinen	Tulare	Ivanhoe heading trial
17	Bruce Lampinen, Sam Metcalf, and Loreto Contador	Statewide	Provide mobile platform light bar support for walnut research projects by farm advisors, specialists and faculty trials statewide
18	Bruce Lampinen, Tran Nguyen, and Sam Metcalf	UC Davis	Evaluating within tree walnut quality as related to tree water status, location in tree and leaf area in Chandler and Howard walnuts
19	Westphal, Andreas, Luke Milliron and Bruce Lampinen	Butte	Nematode spray trial
20	Westphal, Andreas, Katherine Jarvis/Shean and Bruce Lampinen	Yolo	Nematode spray trial
21	Kisekka, Isaya, Luke Milliron and Bruce Lampinen	Tehama	Walnut precision irrigation trial at CAPEX

22	Lampinen, Bruce and Sam Metcalf	Statewide	Coordination of Diamond Walnut quality analysis
23	Bruce Lampinen, Sam Metcalf, Loreto Contador and Tran Nguyen	Statewide	Provide data processing support for mobile platform light bar research as well as other projects statewide
24	Bruce Lampinen and Sam Metcalf	Statewide	Provide calibration of plant pressure chambers
25	Lampinen, Bruce and Sam Metcalf	UC Davis	Annual maintenance project for GPS equipped supercart harvest cart as well as smaller harvest carts and mobile platform light bar
26	Walnut light bar project	Statewide	Mobile platform lightbar was used in approximately 20 walnut orchard trials in California
27	iPhone app development	Statewide	Continued work to integrate iPhone app with drone measurements with Ali Poueza