AGENDA

California Avocado Commission
Production Research Committee Meeting

Meeting Information

Date: Thursday, July 25, 2024
Time: 9:00 a.m.
Location: Hybrid Meeting

Physical Meeting Location:
University of California Cooperative Extension Ventura County
669 County Square Drive, Suite 100
Ventura, CA 93003

Web Conference URL:
https://californiaavocado.zoom.us/j/5375836823?pwd=aURBZ3BEL29tclBRS1ZRY3QrMkhZQT09&omn=84486667572

Conference Call Number: (669) 900-6833
Meeting ID: 573 583 6823
Passcode: 348652

Meeting materials will be posted online at least 24 hours prior to the meeting at:
https://www.californiaavocadogrowers.com/commission/meeting-agendas-minutes

Committee Member Attendance

As of Friday, July 19, 2024, the following individuals have advised the Commission they will participate in this meeting:

- **Danny Klittich,** ***PRC Chair***
- **John Burr**
- **Jim Davis**
- **Allisen Carmichael**
- **Consuelo Fernandez**
- **Leo McGuire**
- **Daryn Miller**

- **Ryan Rochefort**

Time	Item
9:00 a.m.	**1. Call to Order** a. Roll Call/Quorum
9:05 a.m.	**2. Opportunity for Public Comment** Any person may address the Committee at this time on any subject within the jurisdiction of the California Avocado Commission.
9:10 a.m.	**3. Approval of Minutes** a. Consider approval of Production Research Committee Meeting Minutes of May 23, 2024
9:15 a.m	**4. Research Program Director's Report**
9:25 a.m.	**5. Discussion Items** a. Finalize list of research and grower education priorities b. Open discussion of new or old business from PRC members
11:00 a.m.	**6. Adjourn Meeting**

Disclosures

The times listed for each agenda item are estimated and subject to change. It is possible that some of the agenda items may not be able to be discussed prior to adjournment. Consequently, those items will be rescheduled to appear on a subsequent agenda. All meetings of the California Avocado Commission are open to the public and subject to the Bagley-Keene Open Meeting Act.

All agenda items are subject to discussion and possible action. For more information, or to make a request regarding a disability-related modification or accommodation for the meeting, please contact April Aymami at 949-341-1955, California Avocado Commission, 12 Mauchly, Suite L, Irvine, CA 92618, or via email at aaymami@avocado.org. Requests for disability-related modification or accommodation for the meeting should be made at least 48 hours prior to the meeting time. For individuals with sensory disabilities, this document is available in Braille, large print, audiocassette or computer disk. This meeting schedule notice and agenda is available on the internet at https://www.californiaavocadogrowers.com/commission/meeting-agendas-minutes and http://it.cdfa.ca.gov/igov/postings/detail.aspx?type=Notices.

If you have questions on the above agenda, please contact Tim Spann at tim@spannag.org or 423-609-3451.

Summary Definition of Conflict of Interest

It is each member's and alternate's responsibility to determine whether they have a conflict of interest and whether they should excuse themselves from a particular discussion or vote during a meeting. To assist you in this evaluation, the following ***Summary Definition of Conflict of Interest*** may be helpful.

A Commission *member or employee* has a conflict of interest in a decision of the Commission if it is reasonably foreseeable that the decision will have a material effect, financial or otherwise, on the member or employee or a member of his or her immediate family that is distinguishable from its effect on all persons subject to the Commission's jurisdiction.

No Commission member or employee shall make, or participate in making, any decision in which he or she knows or should know he or she has a conflict of interest.

No Commission member or employee shall, in any way, use his or her position to influence any decision in which he or she knows or should know he or she has a conflict of interest.

CALIFORNIA AVOCADO COMMISSION
PRODUCTION RESEARCH COMMITTEE
MEETING MINUTES

May 23, 2024

A meeting of the Production Research Committee (PRC) of the California Avocado Commission (CAC) was held on Thursday, May 23, 2024, with the following people participating:

MEMBERS PARTICIPATING:
Danny Klittich, Chair
John Burr (9:51)
Jim Davis
Allisen Carmichael
Consuelo Fernandez
Darren Haver
Leo McGuire
Daryn Miller
Ryan Rochefort
Jason Cole, *ex officio*

CAC STAFF PARTICIPATING:
April Aymami
Ken Melban

OFFICIALLY PARTICIPATING:
Dr. Tim Spann, Spann Ag Research & Consulting

GUESTS PARTICIPATING:
Victor Araiza
John Berns
Ben Faber
Jessica Hunter
Doug O'Hara

CALL TO ORDER

Danny Klittich, Production Research Committee (PRC) Chairman, called the meeting to order at 9:00 a.m. with a quorum present.

OPPORTUNITY FOR PUBLIC COMMENT

There were no public comments.

APPROVAL OF MINUTES OF MARCH 14, 2024 PRODUCTION RESEARCH COMMITTEE MEETING

MOTION
To approve the minutes of the March 14, 2024 Production Research Committee meeting as amended.

(McGuire/Haver) MSC – Vote Tally: Yea 6, Nay 0, Abstain 1

Motion 24-5-23-1

RESEARCH PROGRAM DIRECTOR'S REPORT

Dr. Spann informed the Committee that Jesse Landesman, graduate student at UC Santa Barbara, was awarded the FFAR Fellowship she had applied for and that CAC will be officially serving as her industry sponsor. Her research project will deal with salinity in avocados and is currently under development.

Dr. Spann also mentioned that Paloma Dadlani, M.S. student under Dr. Mark Hoddle, presented her final research seminar on her work on the avocado lace bug on May 14, 2024. CAC provided funding to Dr. Hoddle to support Ms. Dadlani's research. Dr. Spann briefly touched on the highlights from her seminar and told the Committee that summary articles of her work will be forthcoming in From the Grove.

DISCUSSION ITEMS

Danny Klittich opened the discussion by welcoming all the members to the Production Research Committee. He asked each member to take a moment to introduce themselves and briefly describe their role in the California avocado industry. Following introductions, discussion began on the agenda items.

A. Review and rank list of research and grower education priorities

Danny Klittich explained that he had sorted the list of research and grower education priorities into categories. He asked that the Committee members take the time to review the list and each member rank their top priority in each category and be prepared to discuss those rankings at a future meeting. Chairman Klittich also asked the Committee to select their top priority from each category for *From the Grove* articles and send those to Dr. Spann for article development in future issues.

B. Review draft request for proposals for management services for Pine Tree Ranch

Dr. Spann explained to the Committee that since the lease for Pine Tree Ranch had been renewed for a 5-year term CAC needed to put out a new request for proposals for management services for the grove. A copy of the previous RFP from 2019 had been shared with the Committee for their review and input. Dr. Spann explained that in 2019 the Committee was involved in reviewing the RFP responses and making a recommendation to the Board. Chairman Klittich expressed the opinion that he did not believe this was a matter for the Committee to be involved in, beyond providing input into the RFP, and that the decision should be made by CAC staff. Allisen Carmichael, current Pine Tree Ranch grove manager, said she would review the RFP and provide feedback to Dr. Spann to ensure it accurately reflected everything currently being done at the grove.

C. Open discussion of new or old business from PRC members

Consuelo Fernandez brought up the idea of talking with companies that have tree stress monitoring equipment to see if any of them would be interested in installing such equipment at Pine Tree Ranch for CAC to be able to share with growers during field days and offer opinions on the usefulness of such equipment. Dr. Spann stated that he had been approached by such a company in early 2023, but put them on hold until the lease renewal was finalized. Dr. Spann agreed to reach out to companies to see if there was any interest in them installing their equipment at the ranch.

Jim Davis mentioned that a lot of work has been done on other crops looking at the mycorrhizal and other soil microorganism communities that live in conjunction with plants. He asked if there would be any benefit to looking at old growth avocado forests in the native range of avocados to see if there would be anything that could help the trees in avocado groves. This would be similar to how entomologists explore the native range of new pests to find natural enemies.

Danny Klittich shared with the Committee a brief proposal from Andre Biscaro, irrigation farm advisor, to adapt a simple online irrigation calculator that Mr. Biscaro had developed for use with avocados. The Committee looked at the existing calculator, available for strawberries, celery and other row crops, and liked the simplicity of it compared to other tools currently available. The Committee also liked that the tool would be able to integrate the new crop coefficient being developed by Dr. Ali Montazar when that work is completed.

MOTION
To recommend funding the proposal "Adapting a user-friendly online irrigation calculator for avocados" in the amount of $7,236.

(Davis/Miller) MSC Unanimous

Motion 24-5-23-2

The Committee asked for an update on developing the searchable archive of *From the Grove* articles. Dr. Spann explained that the process was waiting for him to develop a list of all the articles to put into the database so it could be created.

Leo McGuire asked if there was any update on the registration of glufosinate for use on avocados in California. Ken Melban explained that the registration was waiting for action from the California Department of Pesticide Regulation, but due to outside issues the Department had become very politicized and the process was delayed, but CAC would reach back out to DPR to see if there are any updates.

Lastly, a brief discussion ensued about the benefits of past CAC efforts to fund pest exploration in other countries. Ken Melban and Dr. Spann explained that the USDA is currently working to allow imports from Guatemala and all the pest risks identified were only known because of the work that CAC funded over a decade earlier. The Committee asked what countries may be looking for US access next and would it be beneficial to conduct similar studies in those countries. Ken Melban and Dr. Spann agreed to have

those discussions with Dr. Mark Hoddle, UC Riverside entomologist, who conducted the Guatemala studies.

ADJOURN MEETING

Danny Klittich, Production Research Committee (PRC) Chairman, adjourned the meeting at 10:51 a.m.

Respectfully submitted,

_____
Timothy Spann

EXHIBITS ATTACHED TO THE PERMANENT COPY OF THESE MINUTES

EXHIBIT A May 23, 2024 Production Research Committee AB 2720 Roll Call Vote Tally Summary

EXHIBIT B Proposal: “Adapting a User-friendly Online Irrigation Calculator for Avocados”

CALIFORNIA AVOCADO COMMISSION

Production Research Committee

AB 2720 Roll Call Vote Tally Summary

To be attached to the Meeting Minutes

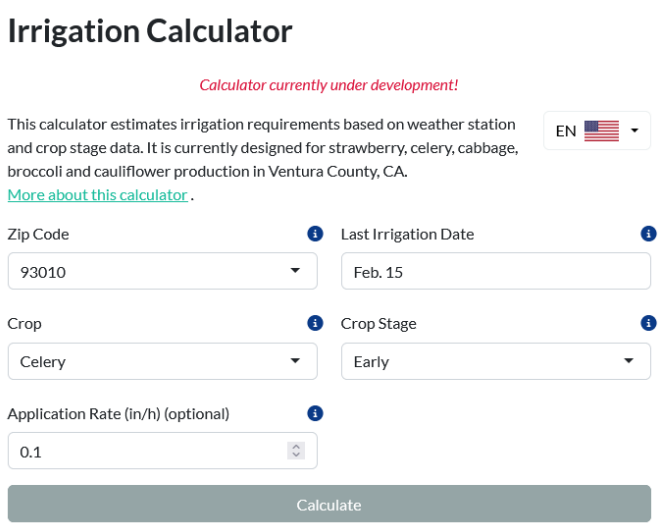
Meeting Name:	**Meeting Location:**	**Meeting Date:**
California Avocado Commission Production Research Committee Meeting	*Hybrid* *In-person – Ventura County Cooperative Extension Office, Ventura* *Online – Zoom*	*May 23, 2024*

Attendees Who Voted	***MOTION 24-5-23-1***	***MOTION 24-5-23-2***
Danny Klittich, Chair	*Did not vote*	*Did not vote*
John Burr (9:51)	*Absent*	*Yea*
Jim Davis	*Abstain*	*Yea*
Allisen Carmichael	*Yea*	*Yea*
Consuelo Fernandez	*Yea*	*Yea*
Darren Haver	*Yea*	*Yea*
Leo McGuire	*Yea*	*Yea*
Daryn Miller	*Yea*	*Yea*
Ryan Rochefort	*Yea*	*Yea*
Outcome	***6 Yea, 0 Nay, 1 Abstain***	***Unanimous***

Adapting a User-friendly Online Irrigation Calculator for Avocados

Co-Principal Investigators:
Andre Biscaro, UC ANR Irrigation and Water Resources Advisor, Ventura County
Ben Faber, UC ANR Farm Advisor, Ventura County
Daniel Klittch, Director of Agronomy, Mission Produce
Andy Lyons, UCANR Program Coordinator, IGIS Statewide Program (programmer)

Irrigators and farm managers are the frontliners of irrigation management decisions and therefore essential parties for conserving water and optimizing crop yield and plant health. However, decisions on how long to irrigate a crop are made with no data in most cases. Significant improvements in water use efficiency can be achieved with increased adoption of data-driven irrigation decision frameworks. With weather conditions constantly changing, estimating crop water needs on a weekly basis can be a challenging task in the absence of relevant data such as weather associated with current crop coefficients.



To address this issue and to increase adoption of information-driven irrigation decisions, co-PIs Biscaro and Lyons have worked for the last few years to develop an user-friendly online irrigation calculator: https://ucanr-igis.shinyapps.io/irrigation-calc/. Please, check it out.

The calculator, which is currently developed for strawberries, celery, cabbage, broccoli and cauliflower, is still in its initial beta testing phase, where irrigation recommendations and user interface are being assessed by cooperating growers.

Figure 1. Print screen of the current format of the irrigation calculator.

The calculator presents a simple user interface to enter a location (via zip code), the crop, crop stage, application rate, and last irrigation date. When the user clicks 'Calculate', it connects to the CIMIS website, downloads the most recent reference ET and precipitation data from the station related to the zip code entered, and does all the calculations. This normally takes only 1-2 seconds, after which the user sees the recommended number of minutes to irrigate, with a link to view more details of the calculation. This simple design is intended to allow a user to get an irrigation recommendation quickly and with only a few clicks.

Adapting this concept to avocados will require additional meetings between co-PIs and the programmer and approximately 88 hours (11 days) of programing time to make the necessary changes, including troubleshooting it and adding improvements. Authors are also committed to present on the topic and write an article for trade publications.

Budget

UC ANR programmers have an approved recharge rate of $82.23/hour. The number of hours needed to complete the tasks envisioned for this project is 88 hours, coming out to a total of $7,236.

All,

Below is a combined list of 46 research topics of interest put forward by the members of the CAC Production Research Committee. These topics are not in any particular order but they have been organized into four general categories; Cultural Methods, Irrigation, Pests, and Ag Chem Products. In addition, a small list of topics for upcoming FTG articles can be found at the end of this list.

As this list is extensive, I propose each member of the committee pick one topic per category and highlight it in this document with their unique color. We will then make these the “high priority list”.

Thanks, Danny

Please indicate your highlighter color:
Danny
Consuelo
Darren
Daryn
Jim
John
Leo
Allisen
Ryan

CAC Production Research Priorities/Grower Outreach & Education Needs

Cultural Methods

1. Pollen sprays for avocado orchards: Do they actually work? Real proof needed, Embryo genotyping needed to verify cross pollination, Application methods; liquid (AvoSolutions) or Dusted. RYAN ALSO HIGHLIGHTED
2. Updated Cost Studies; Updated avocado cost studies - UC Davis, Riverside.. Cal Poly SLO for northern growing regions. Possible senior Projects using 2011 Cost study updated with pricing
3. Rootstock trials for high carbonate and salinity conditions (Do we have enough areas with high carbonates issues that would make it worth establishing a trial?)
4. Tree stress monitoring tools a review
5. Updated avocado cost studies - UC Davis or Riverside.. Cal Poly SLO could do one for Ventura county and SLO county
6. Use of sulfur for soil acidification. Rates and timing by soil general type
7. “Above Average Grower” Survey of conditions and practices
8. Does mulch have effects in frost areas? Does it make it colder or warmer?
9. Is pulse irrigation better than other methods? Do avocados like it or are their roots too saturated too often?
10. Can you apply too much fertilizer that it will harm the tree? Can you oversalt an avocado tree to the point of killing it?

11. Revisit recommendations for leaching fractions when utilizing reclaimed water and newer rootstocks.
12. Update fertilizer recommendations when using nitrogen-containing reclaimed water.
13. Nitrogen planning and nitrate credits (CalPoly DeCock)
14. Investigate and Evaluate Current Research into Soil Health; USDA has conducted considerable research into soil health, somewhat at the cornerstone of sustainability. The objective is the building of organic matter. Quantitatively OM translates into higher crop yields. How does this research relate to commercial avocado production in California, and if so the best approach to evaluate it and ultimately educate growers for their application.
15. Precision Farming; Introduce the concepts of precision farming into avocado production in California

Irrigation

15. Irrigation Planning/Management tool including water budgeting tool
16. Small farm automation cost analysis
17. Small farm automated valves
18. CIMIS support and advocacy RYAN ALSO HIGHLIGHTED
19. Update/code a simple irrigation calculator tailored for avocado growers (Andre at VC UCCE?) RYAN ALSO HIGHLIGHTED
20. Determine appropriate timing and duration of leaching irrigation for different levels of salinity in irrigation water, soil type, effects of winter rains, weather, etc. to maintain a healthy soil solution for avocado trees.
21. Determine practical cultural practices to help mitigate chloride in groves and pursue promising technologies for this problem. RYAN ALSO HIGHLIGHTED

Pest Research

22. Avocado Lace Bug; Contract with UCRiverside to evaluate potential candidate insecticides to Control Avocado Lace Bug, to also work out timing, application methods, etc.
23. Avocado Lace Bug - we need to take the biology data and experience collecting it to develop an efficient scouting method for this pest. From damage data, we need to develop a treatment threshold that anticipates likely damage in the near future if no action is taken so that we can implent timely control measures. Lastly we need to do pesticide trials of organic insecticides to find a product or tank mix that provides more thorough control than our current best option, Entrust.
24. Dotherello, Branch Dieback; Project to further evaluate Topsin for control and work with Syngenta to get it labeled for avocados.
25. Avocado thrips degree day model Allisen too!
26. Persea mite bio-control
27. Need for practical guidance on Botryosphaeria management considering we do not have registered chemicals. We have been contacted by growers, especially in the south, asking how to handle it/live with it… prune or not prune, how to prune? Should I remove the tree, if so when should I remove, etc.

28. ID what currant “fruit fly” quarantine do not affect Lamb, Gem, Reed?
29. Global survey of potential pathogen and other threats that are likely to survive in Ca climate
30. How can we measure overall tree stress levels to observe how heavy pest presence impacts productivity/fruitfulness? Dendrometers? NDVI?
31. Find out the impact on leaf productivity of both Persea Mite and Avocado Brown Mite in order to develop a treatment threshold to prevent both damage to tree health and over-spraying of miticides.
32. Make field studies to determine naturally occuring biocontrol agents currently active for both Persea Mite and Avocado Thrips as possible candidates for insectary mass-rearing and release.
33. Elucidate the role of Eusieus hibisci, a common predatory mite on avocados throughout California, in controlling Avocado Thrips and if there is a link between numbers of E. hibisci found in an orchard and the severity of Avocado Thrips pressure.

Ag Chem Product Research

34. CDPR approval for Indaziflam (Alion) and Rimsulfuron (Matrix).
35. Project to further evaluate Topsin for control and work with Syngenta to get it labeled for avocados.
36. Herbicide Resistance Management; Survey industry for new herbicides with potential in avocados
37. Avocado thrips abamectin resistance; Avocado thrips are a primary pest of avocados in Ca. Abamectin has been the primary tool for control for decades. Some PCAs and growers have concerns with product efficacy. A survey of thrips populations would inform pest control decisions. (Daryn) Allisen too!
38. What alternative insecticides are proving more effective against avocado thrips & Persea mite in lieu of rotating out abamectin every season to minimize pesticide resistance. Products, Timing, rates, adjuvants to explore to minimize thrip population resistance.
39. Which new(er) bee safe products will be replacements for neonics - ie Sivanto, Movento or Sequoia to control thrips as neonics are phased out by CDPR
40. Chemigation of alternatives to neonics (IRAC 4A) to enable one less ground or aerial app of thrip/mite crop protection products? (potentially very useful in the future if lace bug populations control to grow!)
41. Need for getting fungicides for Botryosphaeria registered
42. IR-4 for Branch Canker
43. Evaluate Microbes that convert or fix atmospheric nitrogen to plant utilizable nitrate nitrogen. Rationale: Source of nitrogen with the potential of being more economical than nitrogen produced via petroleum and natural gas, both now and in the future. (ex: Pivot Bio, Kula Bio, Azotic Technologies, Joyn Bio, Max Plans Institute for Terrestrial Microbiology, New Leaf Symbiotic, Intrinsyx Bio, Novozymes, Corteva Utrisha)
44. Evaluate Microbes that enhance the availability and utilization of phosphate by plants. Phosphate is very immobile within the soil, certain microbes can enhance uptake and

reduce the quantities of phosphate applied. (ex: Novozymes, AgBiome, BioConsortia, Bayer, Stoller, Valent BioSciences, Verdesian, Lallemand Plant Care, Symborg)

45. Humic Acids; Humates are known to provide a carbon source for stimulating the soil microbiome, which in turn provides for enhanced uptake of macro, secondary and minor elements. Research into evaluating what microbes are stimulated (UC Santa Barbara Ph.d. project) and their efficacy in taking up nutrients by humic acid…objective is to reduce the quantities of fertilizer.
46. Deer Control; Deer cause significant damage to newly planted groves (and established) each year. Several candidate sprays are being advertised. Set up and evaluate deer repellants in randomized trials. Establish project to survey for potential repellants
47. Resistance management of phytophthora Phosphite/ Orondis/ Ridomil rotation. Fourth AI? Maybe an article in FTG.
48. Additional research into alternative weed control methods for new orchards.
49. Preemergent herbicide use on new orchards assessing impacts on tree establishment.

FTG Topics

1. Salt Management in drip and sprinklers
2. Continual education of application rates in ac-in/hr to compare to reference evapotranspiration combining the utilization of new crop coefficients, distribution uniformity, and irrigation management factor
3. Irrigation Education; Whether you have good, clean, affordable well water or you're paying through the nose for District water, the average grower can improve their irrigation practices.
    1. How to calculate ET,
    2. utilization of CIMIS,
    3. soil moisture monitoring systems, etc. could be helpful to many growers.
    4. grant funding available for the purchase and installation of systems that can help growers determine when and how much water to apply.
    5. The NRCS is available for emission uniformity evaluations of irrigation systems and they often have funding available to offset the costs for DU improvements.
4. Periodically highlight past research projects that growers may not be aware of.

PRC Discussion Topics

1. Avocado Cafe Sponsorship
2. Monthly production seminars/webinar. Rotating locations

CAC Production Research Priorities/Grower Outreach & Education Needs

Consuelo:

- Pollen sprays for avocado orchards: Do they actually work? (Real proof needed, paternity tests)
- Rootstock trials for high carbonate and salinity conditions (Do we have enough areas with high carbonates issues that would make it worth establishing a trial?)
- Need for getting fungicides for Botryosphaeria registered
- Need for practical guidance on Botryosphaeria management considering we do not have registered chemicals. We have been contacted by growers, especially in the south, asking how to handle it/live with it… prune or not prune, how to prune? Should I remove the tree, if so when should I remove, etc.

Daryn Miller

- What alternative insecticides are proving more effective against avocado thrips & Persea mite in lieu of rotating out abamectin every season to minimize pesticide resistance. Products, Timing, rates, adjuvants to explore to minimize thrip population resistance.
- Which new(er) bee safe products will be replacements for neonics - ie Sivanto, Movento or Sequoia to control thrips as neonics are phased out by CDPR
- Chemigation of alternatives to neonics (IRAC 4A) to enable one less ground or aerial app of thrip/mite crop protection products? *(potentially very useful in the future if lace bug populations control to grow!)*
- How can we measure overall tree stress levels to observe how heavy pest presence impacts productivity/fruitfulness? Dendrometers?
- Continual education of application rates in ac-in/hr to compare to reference evapotranspiration combining the utilization of new crop coefficients, distribution uniformity, and irrigation management factor
- CDPR approval of Glufosinate (Rely, generics) as a replacement for glyphosate since the negative publicity is only growing!
- Updated avocado cost studies - UC Davis or Riverside.. Cal Poly SLO could do one for Ventura county and SLO county
- Explore if CropManage developed by Michael cahn would be worthwhile for Avocados

Danny

Make FTG articles searchable on grower page

Avocado thrips abamectin resistance

Update irrigation calculator

IR4 Marestail and fleabane

Small farm automation cost analysis

Small farm automated valves

Avocado Cafe Sponsorship

Monthly production seminars/webinar. Rotating locations

Tree stress monitoring tools a review

Potassium dynamics and strategies

Nitrogen planning and nitrate credits (CalPoly DeCock)

Irrigation Planning/Management tool including water budgeting tool

Zinc dynamics and demand

Salt Management in drip and sprinklers

Rootstock

resistance management of phytophthora Phosphite Orondis rotation third AI?

GEM market analysis

Avocado thrips degree day model

Persea mite bio control

Use of sulfur for soil acidification. Rates and timing by soil general type

Avocado scion breading with a target of a Hass fruit with better consumer and farming characteristics.

Global survey of potential pathogen and other threats that are likely to survive in Ca climate

IR-4 for Branch Canker

Cal DPR Registration of Glufosinate

CIMIS support and advocacy

Jason Cole

Avo Solutions type plination efficacy

Great grower survey of conditions and practices

Leo

ID what currant “fruit fly” quarantine do not affect Lamb, Gem, Reed?

Ryan
Irrigation. Irrigation. IRRIGATION!
Whether you have good, clean, affordable well water or you’re paying through the nose for District water, the average grower I speak with can improve their irrigation practices. How to calculate ET, utilization of CIMIS, soil moisture monitoring systems, etc. could be helpful to many growers. The Green Sheet and The Grove are great outreach tools that can be utilized for brief articles along with relevant links for more detailed information on these topics. There’s also grant funding available for the purchase and installation of systems that can help growers determine when and how much water to apply. The NRCS is available for emission uniformity evaluations of irrigation systems and they often have funding available to offset the costs for EU improvements.

Use our outreach tools to periodically highlight past research projects that growers may not be aware of.

CDPR approval for Indaziflam (Alion) and Rimsulfuron (Matrix).

Allisen

- Does mulch have effects in frost areas? Does it make it colder or warmer?
- Is pulse irrigation better than other methods? Do avocados like it or are their roots too saturated too often?
- Can you apply too much of any fertilizer that it will harm the tree? Can you over salt an avocado tree to the point of killing it?

Darren (The list generated above by experts in avocado production should guide the type of research being done for growers, regardless of the funding coming from CAC or some other source.)

- Revisit recommendations for leaching fractions when utilizing reclaimed water and newer rootstocks.
- Update fertilizer recommendations when using nitrogen-containing reclaimed water.
- Additional research into alternative weed control methods for new orchards.

John Burr

Evaluate Microbes that convert or fix atmospheric nitrogen to plant utilizable nitrate nitrogen. Rationale: Source of nitrogen with the potential of being more economical than nitrogen produced via petroleum and natural gas, both now and in the future.

Evaluate Microbes that enhance the availability and utilization of phosphate by plants. Rationale: Phosphate is very immobile within the soil, certain microbes can enhance uptake and reduce the quantities of phosphate applied.

Candidate Companies with nitrogen fixing microbial products:

1. Pivot Bio
2. Azotic Technologies
3. Joyn Bio
4. Max Plans Institute for Terrestrial Microbiology
5. New Leaf Symbiotic
6. Intrinsyx Bio
7. Novozymes
8. Corteva (Utrisha is a foliar applied nitrogen fixing bacteria)

Phosphate Solubilizing microbes:

1. Novozymes
2. AgBiome
3. BioConsortia
4. Bayer
5. Stoller
6. Valent BioSciences
7. Verdesian
8. Lallemand Plant Care
9. Symborg

Investigate and Evaluate Current Research into Soil Health

USDA has conducted considerable research into researching soil health, somewhat at he cornerstone of sustainability. Objective is the build organic matter. Quantitatively OM translates into higher crop yields. How does this research relate to commercial avocado production in California, and if so the best approach to evaluate it and ultimately educate growers for their application.

Humates are known to provide a carbon source for stimulating the soil microbiome, which in turn provides for enhanced uptake of macro, secondary and minor elements. Research into evaluating what microbes are stimulated (UC Santa Barbara Ph.d. project) and their efficacy in taking up nutrients by humid acid…objective is to reduce the quantities of fertilizer.

Weed Control:

Employ a consultant who works with IR4 registration process to get Glufosinate approved in avocados. Growers are using it illegally and the industry is at risk for an outrage response similar to Alar in applies. The residue work has been done, it is just sitting there waiting for a push from the industry expressing need to get it approved.

Survey industry for new herbicides with potential in avocados

Deer Control

Deer cause significant damage to newly planted groves (and established) each year.
Several candidate sprays are being advertised.
Set up and evaluate deer repellants in randomized trials
Establish project to survey for potential repellants

Spotted Lace Wing

Contract with UCRiverside to evaluate potential candidate insecticides to Control spotted Lace Wing, to also work out timing, application methods, etc.

Precision Farming

Introduce the concepts of precision farming into avocado production in California

Dotherello, Branch Dieback

Project to further evaluate Topsin for control and work with Syngenta to get it labeled for avocados.

Jim Davis

Avocado Lace Bug - we need to take the biology data and experience collecting it to develop an efficient scouting method for this pest. From damage data, we need to develop a treatment threshold that anticipates likely damage in the near future if no action is taken so that we can implent timely control measures. Lastly we need to do pesticide trials of organic insecticides to find a product or tank mix that provides more thorough control than our current best option, Entrust.

Find out the impact on leaf productivity of both Persea Mite and Avocado Brown Mite in order to develop a treatment threshold to prevent both damage to tree health and over-spraying of miticides.

Make field studies to determine naturally occuring biocontrol agents currently active for both Persea Mite and Avocado Thrips as possible candidates for insectary mass-rearing and release.

Elucidate the role of Eusieus hibisci, a common predatory mite on avocados throughout California, in controlling Avocado Thrips and if there is a link between numbers of E. hibisci found in an orchard and the severity of Avocado Thrips pressure.

Determine appropriate timing and duration of leaching irrigation for different levels of salinity in irrigation water, soil type, effects of winter rains, weather, etc. to maintain a healthy soil solution for avocado trees.

Determine practial cultural practices to help mitigate chloride in groves and pursue promising technologies for this problem.