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AGENDA
California Ripe Olive
Full Committee Meeting
Double Tree Modesto
December 5, 2019
10:00 AM

Conference Call Line: 1-877-643-6951 Passcode: 21533162#

I. Call To Order

A. Roll Call – Confirmation of Quorum & Members who can vote
B. Approval of 7-23-19 Full Committee Minutes (action item)
C. Chairman's Comments

II. RESEARCH SUBCOMMITTEE

A. Review 2019 Projects
B. Proposals of 2020 Projects
   a. Combining trunk shaking and canopy shaking for a highly efficient, low cost olive harvester
   b. Evaluation of new chemistries to control Olive Fruit Fly
   c. Managing Alternate Bearing in Olive with Plant Growth Regulators (PGRs) and Pruning
   d. Control of overwintering olive fruit fly using pathogenic fungi
   e. Southern San Joaquin Valley Olive Fruit Fly Monitoring Project
   f. Sacramento Valley Olive Fruit Fly Monitoring Project
   g. Epidemiology and management of olive knot caused by Pseudomonas savastanoi pv. Savastanoi
   h. Management of foliar diseases of olive (peacock spot)
C. Approval of 2020 Research Budget (action item)
D. Delegation of Authority from the Committee to the Subcommittee to approve the contingency fund (action item)
E. Delegation of Authority from the Committee to the Executive Director with the oversight by the Chairman for inter-item transfers of the research budget (action item)

III. MARKETING SUBCOMMITTEE

A. Review 2019 Marketing Program
B. Presentation of 2020 Fleishman Hillard Plan & Budget
C. Approval of 2020 Plan & Budget (action item)

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D. Delegation of Authority from the Committee to the Executive Director with oversight by the Chairman for inter-item transfers of the marketing budget (action item)

IV. INSPECTION SUBCOMMITTEE

A. Review of 2019
B. Approval of 2020 Inspection Budget (action item)
C. Delegation of Authority from the Committee to the Executive Director with oversight by the Chairman for inter-item transfers of the inspection budget (action item)

V. EXECUTIVE SUBCOMMITTEE

A. Review of 2019 Export Program
B. Approval of 2020 Administrative Budget (action item)
C. Delegation of Authority from the Committee to the Executive Director with oversight by the Chairman for inter-item transfers of the administrative budget (action item)

VI. REVIEW OF FISCAL 2020 BUDGET

A. Approval 2020 Fiscal Budget (action item)
B. Approval 2020 Assessment Rate (action item)

VII. OTHER BUSINESS

VIII. ADJOURNMENT

CALIFORNIA OLIVE COMMITTEE

June 1, 2019 – May 31, 2021

PRODUCERS

DISTRICT #1 (Counties of Alpine, Tuolumne, Stanislaus, Santa Clara, Santa Cruz all counties north thereof)

Members	Alternates
Edward Garcia	Carolina Burreson
Ed Curiel	Michael Silveira
Pablo Nerey	Chris Henderson

DISTRICT #2 (Counties of Mono, Mariposa, Merced, San Benito, Monterey, and all counties south thereof)

Members	Alternates
Vito DeLeonardis	**Vacant**
Pat V. Ricchiuti	Mark Hendrixson
Galen Pfeiffer	**Vacant**
Rick Benson	**Vacant**
Giulio Zavolta	Mark Heuer

HANDLERS

Members	Alternates
Felix Musco	Bill McFarland
Dennis Burreson	Matt Miller
John Pieretti	Tracy Wood
Janet Edwards	Scott Hamilton
Colleen Morris	Sergio Mendez
Jacob Peters	Phil Quigley
Tim T. Carter	**Vacant**
Julia Tinsley	**Vacant**

California Olive Committee
Full Committee Meeting Minutes
Tuesday, July 23rd, 2019
DoubleTree Hotel – Modesto, CA

I. CALL TO ORDER

A meeting of the Full Committee was called to order by Mike SILVEIRA at 10:58 A.M., and the following members were present:

Members	Affiliation:
Mike Silveira*	PRODUCER
Edward Garcia*	PRODUCER
Pablo Nerey*	PRODUCER
Vito DeLeonardis*	PRODUCER
Mark Hendrixson*	PRODUCER
Galen Pfeiffer*	PRODUCER
Rick Benson*	PRODUCER
Giulio Zavolta*	PRODUCER
Felix Musco*	HANDLER
Dennis Burreson*	HANDLER
John Pierretti*	HANDLER
Janet Edwards*	HANDLER
Sergio Mendez*	HANDLER
Jacob Peters*	HANDLER
Tim T. Carter*	HANDLER
Julia Tinsley*	HANDLER
Mark Heuer	PRODUCER
Carolina Burreson	PRODUCER
Bill McFarland	HANDLER
Matt Miller	HANDLER
Phil Quigley	HANDLER

Others Present:	
Todd Sanders	COC
Elizabeth Carranza	COC
Lindsey Batty	COC
Janette Ramos	COC
Nicole Helms	COC
Kathie Notoro	USDA
Terry Vawter	USDA
Ryan Wilson	USDA
Michael Harutinian	USDA
Daniel Casaras	USDA
Allison Gregg	SAMPSON & SAMPSON

Shelly Kessen	FLEISHMAN HILLARD
Dan Barber	FLEISHMAN HILLARD
Jake Ferguson	FLEISHMAN HILLARD

*Denotes voting members for the Committee.

With the appropriate number of members from producers and handlers in, a quorum was established.

MOVED by Felix MUSCO, duly seconded by Pablo NEREY, and carried THAT the minutes of the 12.11.18 Full Committee meeting be approved. (7.23.19 #1)

II. Installation of 2019-2021 Committee

a. Nomination of Open Member Positions

The COC has 5 Alternate Member positions open for the COC Full Committee, 3 producer member positions and 2 handler member positions. In the past, the COC has nominated members to the open positions, and the Full Committee voted to appoint them. However, USDA did not allow the COC to conduct these proceedings.

b. Election of Officers

i. Chairman

MOVED by Dennis BURRESON, duly seconded by Felix MUSCO, and unanimously carried THAT Mike Silveira be nominated as Chairman. (Motion 7.23.19 #2)

ii. Vice-Chairman

MOVED by Vito DeLeonardis, duly seconded by Mark HENDRIXSON, and unanimously carried THAT Dennis Burreson be nominated as Vice-Chairman. (Motion 7.23.19 #3)

iii. Secretary/Treasurer

MOVED by Felix MUSCO, duly seconded by Vito DeLeonardis, and unanimously carried THAT Tim Carter be nominated as Secretary/Treasurer. (Motion 7.23.19 #4)

iv. Approval to empower the Chairman to appoint from its members and alternates to such subcommittees as deemed necessary.

MOVED by Mark HENDRIXSON, duly seconded by Janet EDWARDS, and unanimously carried THAT approval to empower the Chairman to appoint from its members and alternates to such subcommittees as deemed necessary. (Motion 7.23.19 #5)

III. Executive Subcommittee

a. Sampson and Sampson 2018 Audit Review

A representative from Sampson & Sampson has completed the California Olive Committee's 2018 fiscal audit. Allison GREGG, from Sampson & Sampson reviewed the audit to the Committee.

MOVED BY Galen PFEIFFER, duly seconded by Rick BENSON, and unanimously carried THAT the Committee approve the 2018 FY audit. (Motion 7.23.19 #6)

b. Approval of Sampson and Sampson for 2019 COC Audit

MOVED BY Janet EDWARDS, duly seconded by Mike SILVEIRA, and unanimously carried THAT the Committee approve the use of Sampson & Sampson to perform the 2019 COC audit. (Motion 7.23.19 #7)

c. 2019-2020 Crop Year Marketing Policy Statement

Each year, the California Olive Committee (COC) must approved a Marketing Policy Statement. The Marketing Policy Statement (MPS) is an annual analysis of the industry that is used by the U.S. Department of Agriculture (USDA) to determine the effectiveness of the Federal Marketing Olive Order 932 and its relationship to the requirement established by the Agricultural Marketing Agreement Act.

MOVED BY Rick BENSON, duly seconded by Mark HENDRIXSON, and unanimously carried THAT the Full Committee approve 2019-2020 amended Marketing Policy Statement. (Motion 7.23.19 #8)

d. Voting Procedures

The California Olive Committee currently requires that there be 5 producer members and 5 handler members of the Full Committee be present in order to establish a quorum at a Full Committee meeting. It was proposed to re-establish the quorum requirement that only a simple majority be present to establish a Full Committee quorum through informal rule making.

MOVED BY Mark HENDRIXSON, duly seconded by Galen PFEIFFER, and unanimously carried THAT the Full Committee approve the re-establishment of Full Committee quorum requirements to require only a simple majority be present to form a quorum through informal rule making. (Motion 7.23.19 #9)

e. E-compliance Plan and Annual Compliance Plan

Every year the California Olive Committee must approve the Annual Compliance Plan (ACP). The ACP describes compliance strategies, resources and activities for the current year. USDA requires that this program be established in order for the

industry to comply with the Oder and regulations. Additionally, the ACP must be in place to provide the COC the procedures needed should violations be brought forward before the Committee.

On a side note, in 2010 USDA required the Committee to file an E-Compliance Plan. The compliance plan is a USDA template staff completes for the Committee. By 2011 USDA requested the Committee to approve both the completed E-Compliance Plan and ACP Plan. Although both plans are similar and duplicative, USDA has stated that both plans have to be brought before the Committee for approval.

MOVED by Julia TINSLEY, duly seconded by Vito DELEONARDIS, and unanimously carried THAT the Committee approve the 2019-2020 amended Annual Compliance Plan and E-Compliance Plan. (Motion 7.23.19 #10)

f. Travel Policy Approval

USDA required that the COC adopt a Travel Policy independent of the Travel Policy used by the California Apple Commission. USDA requires that this program be established in order for the industry to comply with regulations.

MOVED by Rick BENSON, duly seconded by Julia TINSLEY, and unanimously carried THAT the Committee adopt the proposed COC Travel Policy. (Motion 7.23.19 #11)

g. Internal Control Policy Approval

USDA required that the COC adopt an Internal Control Policy independent of the Internal Control Policy used by the California Apple Commission. USDA requires that this program be established in order for the industry to comply with regulations.

MOVED by Janet EDWARDS, duly seconded by Mark HENDRIXSON, and unanimously carried THAT the Committee adopt the proposed COC Internal Control Policy. (Motion 7.23.19 #12)

IV. Inspection Subcommittee

a. Incoming and Outgoing 2019-2020 Inspection Charts

Each year the United States Department of Agriculture (USDA) provides the industry with an update on import inspection and inspection fees. Ryan WILSON from USDA provided information on the 2019-2020 import inspection and inspection fees. Additionally, a report on imported olives was also provided.

MOVED BY Dennis BURRESON, duly seconded by Felix MUSCO, and unanimously carried THAT the Committee adopt the 2019-2020 Incoming & Outgoing Inspection Requirements. (Motion 7.23.19 #13)

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V. Marketing Subcommittee

a. In November of 2018, the Subcommittee approved the 2019 marketing plan presented by Fleishman Hillard. Shelly Kessen, Dan Barber, and Jake Ferguson from Fleishman-Hillard presented a brief progress summary on the 2019 COC marketing activities. The presentation is also available in the meeting packet.

VI. Review Crop Estimates

a. The COC Full Committee members each presented a number to the Chairman of the 2019 Crop Estimate. After each member presented their number to the Chairman, the average of those numbers was taken to determine a 2019 Crop Estimate. The Crop Estimate for 2019 was 86,247 tons.

MOVED BY Felix MUSCO, duly seconded by Vito DELEONARDIS, and unanimously carried THAT the COC approve the 2019 Crop Estimate of 86,247 tons. (Motion 7.23.19 #14)

VII. Research Subcommittee

a. In 2017, the Research Subcommittee funded various projects for 2018. The final research reports, in addition to the no cost extensions, are included in the research addendum to the meeting packet.

Researcher	Project	Amount Funded
Ehsani	A New Fruit Removal Head for an Olive Harvesting System	$45,741
Rosencrance	Canopy Management: Tree Hedging and Topping to Optimize Yield	$31,075
Lovatt & Fichtner	Managing Alternate Bearing in Olive with PGRs and Pruning	$20,698
Wang	Evaluation of Several Promising Additives for Reducing Acrylamide in Black Ripe Table Olives	$53,280
Adaksaveg	Epidemiology and management of olive knot caused by Pseudomonas savastanoi pv. savastanoi	$16,500
Wang	Differentiation of Olive Cultivars using DNA and NMR-based fingerprinting methods	$67,433
Keenan	Evaluation of New Chemistries to Control Olive Fruit Fly	$25,000
Adaskaveg	Management of Foliar Diseases of Olive	$15,000
Simpson	Northern Fly Trapping	$6,500

Stewart	Southern Fly Trapping	**$6,400**

VIII. Adjournment

a. Chairman Mike Silveira adjourned the meeting at 1:00 P.M.

MOVED BY Dennis BURRESON, duly seconded by Julia TINSLEY, and unanimously carried that the meeting be adjourned at 1:00 P.M. (7.23.19 #15)

7/24/19

Date: July 24, 2019 Lindsey Batty, California Olive Committee

*******FOR YOUR INFORMATION*******

FROM: RESEARCH SUBCOMMITTEE

SUBJECT: PROGRESS REPORT FOR 2019

BACKGROUND: Provided in your packet is a chart displaying the current status of all 2019 COC Research Projects, including those that have applied for No-Cost Extensions (NCE).

2019 Research Projects

Updated 7/1/2019

Researcher	Project	Amount	Finalized MOU	Paid thus far	% Paid	No Cost Extension
Rich Rosecrance	Canopy Management, Tree Hedging and topping to Optimize Yield	$ 31,075.00	2/1/2019	$ 18,645.00	60%	3/1/2020
Debra Keenan	Evaluation of new chemistries to control Olive Fruit fly	$ 25,000.00	1/29/2019	$ 15,000.00	60%	
Carol Lovatt & Elizabeth Fichtner	Managing Alternate Bearing in olive with PGRs and Pruning	$ 21,570.00	1/28/2019	$ 12,942.00	60%	6/30/2020
Frank Zalom & Joanna Fisher	Control of overwintering olive fruit fly using insect pathogenic fungi	$ 19,678.00	2/11/2019	$ 11,806.80	60%	6/30/2020
Jim Stewart	Southern Fly Trapping	$ 6,400.00	1/28/2019	$ 3,840.00	60%	
Ernie Simpson	Northern Fly Trapping	$ 6,500.00	1/16/2019	$ 3,900.00	60%	
J. E. Adaskaveg	Epidemiology and management of olive knot caused by Pseudomonas savastanoi pv. Savastanoi	$ 16,650.00	2/25/2019	$ 9,990.00	60%	
J. E. Adaskaveg	Management of foliar diseases of olive (peacock spot)	$ 15,000.00	2/25/2019	$ 9,000.00	60%	
	Contingeny Fund	$ 200,000.00		$0.00	0%	
	Total	**$ 341,873.00**		$85,123.80	60%	

*******ACTION REQUIRED*******

FROM: RESEARCH SUBCOMMITTEE

SUBJECT: 2020 RESEARCH PROJECT PROPOSALS

RECOMMENDATION: THAT the Subcommittee approve research project for 2020.

BACKGROUND: Each year the Research Subcommittee approves various research projects funded by the Committee. The Subcommittee recommended projects to Committee for funding. A budget of $275,606 is based on the submitted projects and no-cost extensions (NCE).

2020 RESEARCH PROPOSALS FOR THE CALIFORNIA OLIVE COMMITTEE

TOPIC	LEADERS	AMOUNT
Combining trunk shaking and canopy shaking for a highly efficient, low cost olive harvester.	Reza Ehsani Louise Ferguson	$92,699
Evaluation of new chemistries to control Olive Fruit Fly	Debra Keenan	$25,000
Managing Alternate Bearing in Olive with PGRs and Pruning	Carol Lovatt Elizabeth Fichtner	$23,232
Control of overwintering olive fruit fly using insect pathogenic fungi	Frank Zalom Joanna Fisher	$17,196
Southern San Joaquin Valley Olive Fruit Fly Monitoring Project	Jim Stewart	$6,400
Sacramento Valley Olive Fruit Monitoring Project	Ernie Simpson	$6,500
Epidemiology and management of olive knot caused by *Pseudomonas savastanoi* pv.*savastanoi*	J. E. Adaskaveg	$16,650
Management of foliar diseases of olive (peacock spot)	J. E. Adaskaveg	$10,000
Contingency Fund		$50,000
Remaining Funds to be Allocated for 2019 NCE		$27,929
Total		$275,606

The Committee must decide:

1) Research Budget
2) Recommend to the Committee to delegate authority to the Subcommittee to approve projects for contingency fund.
3) Recommend to the Committee to delegate authority from the Committee to the Executive Director with oversight by the Chairman, of the research budget.

FISCAL IMPACT: $275,606 for 2020 FY

CALIFORNIA OLIVE COMMITTEE

PROJECT PLAN/RESEARCH GRANT PROPOSAL

Workgroup/Department: School of Engineering – Mechanical Engineering

Project Year: Anticipated Period of Performance: 03/01/2020 – 02/28/2021

Project Title: Combining trunk shaking and canopy shaking for a highly efficient, low-cost olive harvester

Project Leaders: Reza Ehsani (Professor, University of California, Merced, 5200 N. Lake Road, Merced, CA 95343, (209) 228-3613, rehsani@ucmerced.edu)

Cooperators: Louise Ferguson, CE Pomologist, Department of Plant Sciences, UC Davis, Email: lferguson@ucdavis.edu, Phone: (559) 737-3061

Commodity: _____ Relevant AES/CE Project No.:

Year Initiated: 2020_Anticipated Duration of Project: one year

Problems and Significance:

Harvesting is a major cost of production for many crops including olive. Although some olive growers are using trunk shakers with some success, this method has not been widely utilized because the willowy characteristics of olive trees prevent the effective transmission of vibrational energy from the trunk to the small branches where the fruits are located. To remove the fruit, a trunk shaker requires a large amount of energy which can cause damage to the tree. Also, for some older orchards, the trunk shaker may not be an option due to the size and shape of the canopy.

Engineers at UC Davis developed a prototype of a canopy contact shaker that has been tested and has shown some level of success, which is very similar to the canopy shaker used in the harvesting of process oranges in Florida. Ehsani's group at UC Merced used an alternative design approach and developed a lighter weight (about 50% lighter) canopy contact shaker-based fruit removal system that can accommodate larger trees. This system has shown some promising results as well. The UC Merced design was able to produce the maximum shaking energy at the fruit level as opposed to the trunk, and hence, less damage to the tree. However, it took a longer time to shake each tree.

Based on some initial field testing conducted in the fall of 2019, it seems that a combination of trunk shaking and canopy shaking can provide the best fruit removal for olives. In this project, we propose to evaluate the effect of a combination of trunk and canopy shaking on olive fruit removal. We intend to conduct extensive field tests to assess the best design parameters, such as amplitude and frequencies. These parameters are needed for designing and building a system that combines both canopy and trunk shaking together.

Progress to Date:

Mechanical harvesting of olives was initiated in the US in the 1940s. The main goal was to develop a cost-effective technique to harvest olive fruit for both table and oil extraction purposes (Sola-Guirado *et al.*, 2014). Among all proposed methods, mechanical shaking has been the most successful approach for fruit removal. Different types of shakers such as a trunk shaker, branch shaker, and canopy contact shaker were developed (Jimenez-Jimenez *et al.*, 2015 and Famiani *et al.*, 2014). To increase the efficiency of using these shakers, previous research studies suggested high density hedgerow orchards with limited tree height. Trunk shakers had lower fruit removal efficiency due to the damping effect of branches (Castro-Garcia *et al.*, 2014 and Fergusen *et al.*, 2014). Besides the lower efficiency, damage to the bark of the trunk and branches causes lower yield in future years and increases the risk of infestation and disease in the trees (Jimenez-Jimenez *et al.*, 2015). For other types of shakers, especially canopy shakers, damage to the branches and leaves, and final fruit quality issues such as cuts and flesh injury should be taken into consideration (Fergusen *et al.*, 2010). All these types of damage reduce the market acceptability, especially of green processed table olives. To solve the issues with mechanical harvesting of traditional orchards, Fergusen *et al.* (2010) suggested considering modifications in both the canopy size of conventional trees and mechanical harvesters simultaneously.

This project is the continuation of a previously funded project by the California Olive Committee to UC Merced. Figure 1 shows the UC Merced canopy shaker fruit removal system.

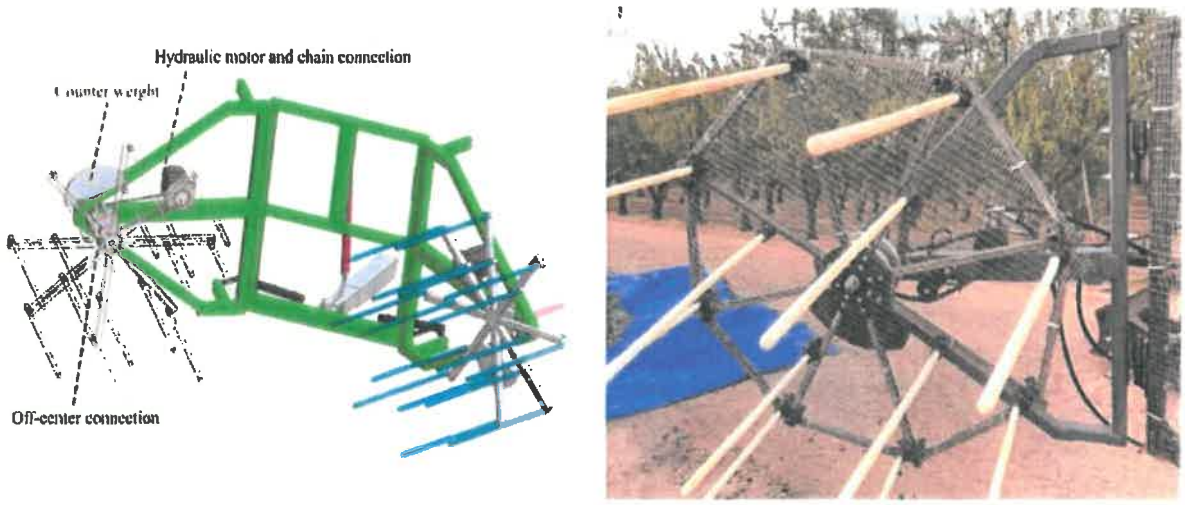
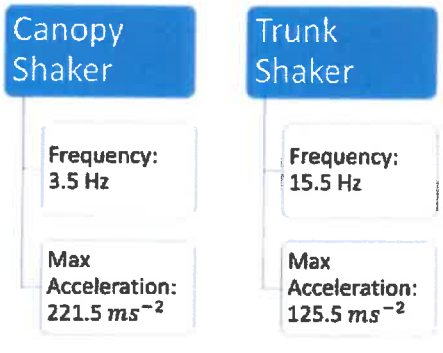


Figure 1. UC Merced fruit removal canopy shaking head

The UC Merced-designed canopy shaker was tested in an olive orchard in 2018 and 2019 during harvesting season. To measure and record vibration and force distribution throughout the canopy, we have developed and built a wireless sensor system consisting of a data logger unit and multiple sensing modules. Each sensing module has a built-in 3D accelerometer, wireless module, and a battery. The data logger unit connects wirelessly to all sensing modules and record their data on a flash card (Figure 2). Three accelerometer sensors were attached to a tree to monitor tree vibration. One sensor was attached to the tree trunk, one to the main branch, and

one to a secondary smaller branch. Using these sensors, we were able to compare the acceleration distribution throughout the tree canopy using both the UC Merced's canopy shaker and a trunk shaker harvester, which were available at the experimental site. Figure 3 shows the acceleration of each sensor for both of these harvesting machines. The data collected from the canopy shaker showed that the small diameter branches vibrate at a higher acceleration than the larger primary branches and trunk. Since the canopy shaker resulted in a higher amount of energy going through the small branch than the tree trunk and root system, this could result in less damage to the tree compared to a trunk shaker. Figure 4 shows the data collected for the trunk shaker. It shows there is a much higher acceleration in the trunk than the small branches, which means the UC Merced's canopy shaker applies most of the energy where the fruits are located and, therefore, is more efficient. It general, compared to trunk shaking, the amount of acceleration (force) reduced by 70% at the tree trunk, 57 % at the main branches, and increased by 134% at the small barnches.

Table 1 shows shaking frequency and maximum acceleration at small branches produced by the UC Merced canopy shaker and the trunk shaker. Figure 5 shows the results of the test in which a tree was shaken using both the canopy shaker and trunk shaker at the same. This figure reveals more insight that a combination method of shaking would be even more effective in fruit removal and reduced harvesting time per tree. It shows that there is a more uniform distribution of energy through the canopy. Visual observation indicated a very good fruit removal of about 80%. This test was very limited and was only on one tree, but the results showed the potential of this approach and indicated more tests are needed to find out the best combination of shaking parameters for both systems if it is decided to build a system based on a combination of trunk and canopy shaker.



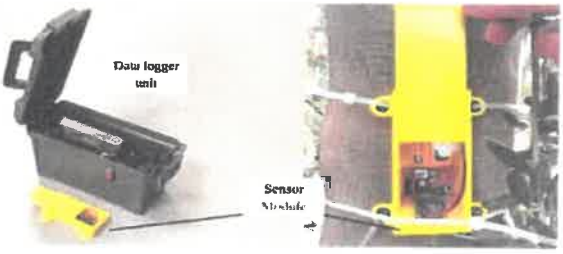


Figure 2 Wireless accelerometer sensor system contains multiple sensor modules (yellow boxes) and one data logger unit.

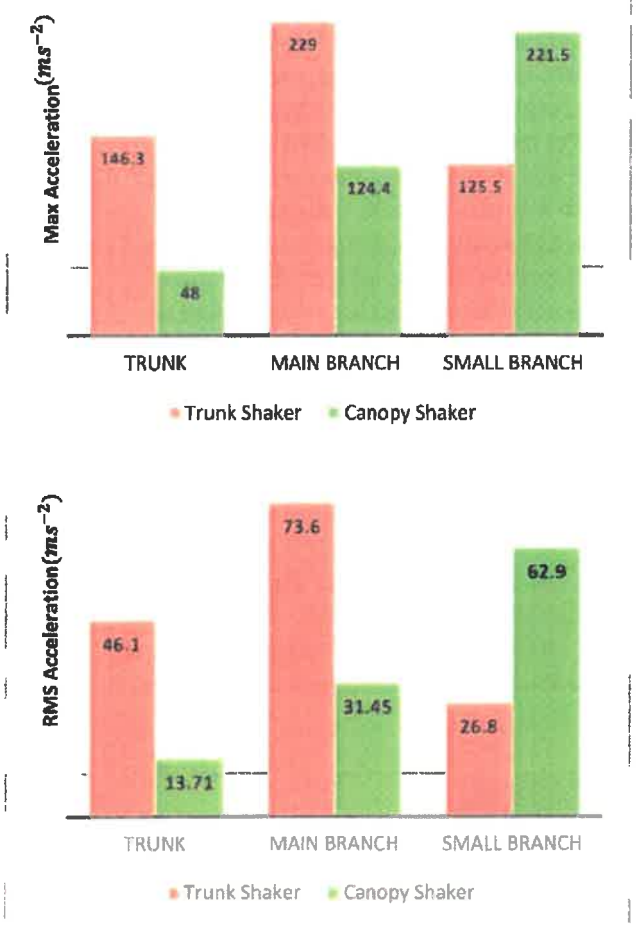


Figure 4. Maximum acceleration produced by the two harvesters at each part of a tree (top) Root Mean Square (RMS) of vibration measured at each part of a tree (bottom).

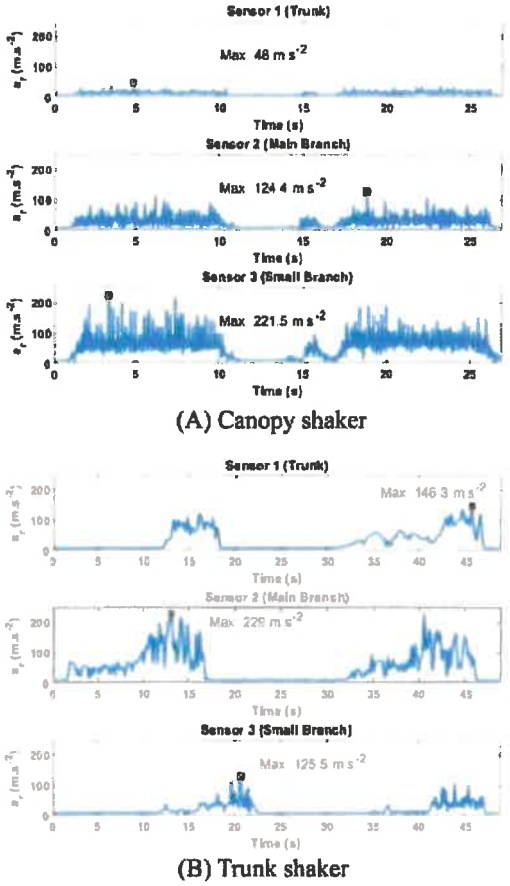


Figure 3. Vibration amplitude from our designed canopy shaker vs a trunk shaker

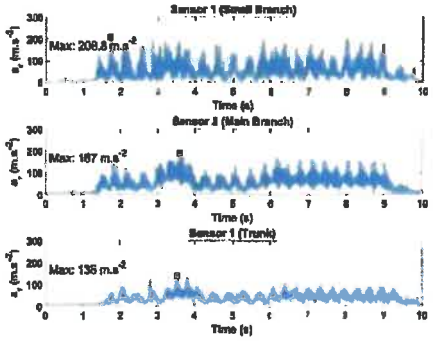


Figure 5 Effect of using both the canopy shaker and a trunk shaker at the same time.

Objectives:
The ultimate goal of this study is to develop a highly efficient, low-cost fruit harvesting machine for olives by the 2021 harvest season. The specific objectives are as follows:

- Study whether a combination of canopy shaker and trunk shaker is a superior method to other alternatives in maximizing fruit removal and minimizing harvest time.
- Find the best shaking parameters (frequency, amplitude, duration) for a combination of trunk shaker and canopy shaker.
- Evaluate the effects of fruit removal using both shaking systems on fruit and tree damage.
- Based on the results from field tests, design a new harvesting system for an olive that uses widely available trunk shaking equipment modified with a relatively low-cost canopy-contact harvester and catch-frame system.

Experimental Procedures:
To achieve the objectives of the proposed project, the following specific tasks are planned to be done:

Task 1- Evaluate existing trunk shakers and decide the best one for this study. There are several trunk shakers commercially available, and we need to decide which one has the technical capabilities that are needed for this study. We will use the UC Merced canopy shaker for this study.

Task 2- Conduct a series of field tests, varying frequency, and amplitude of canopy shaker to find out optimal values for each system as well as for the combination.
Extensive field tests will be conducted at an olive orchard. Dr. Ferguson will help us to locate the best field for this study. Before the start of the harvesting season, we will do a series of tests on an olive tree to select the best range of amplitude and frequency for the canopy shaker and for the trunk shaker based on the data from the first trial. We will choose three rates of frequency for each system. Then we will use the nine combinations of shaking frequencies in three replicates (total of 27 trees). The field evaluations consist of quantifying the percentage of fruit removal in collaboration with a representative from industry, evaluation of damage to the tree branches and leaves, and visual assessment of damage to the fruit based on the guidelines that will be given to us by Dr. Ferguson. We will also install six accelerator sensors on each tree to measure the force distribution in the tree canopy during harvesting.

Table 2. Experiment design for selecting the optimum combined shaking frequency. Each treatment will be replicated three times.

Trunk shaker (Hz) / Canopy shaker (Hz)	Freq.-1	Freq.-2	Freq.-3
Freq.-1	Trial-1	Trial-2	Trial-3
Freq.-2	Trial-4	Trial-5	Trial-6
Freq.-3	Trial-7	Trial-8	Trial-9

Task 3- Design a machine that can work based on a combination of canopy and trunk shaker. If the results from task 2 are successful and confirm that a combination machine will be very efficient, then we will design a prototype. It will be similar to what is shown in Figure 4 but with more details and a catch frame system. In this process, we consider first how to utilize and modify the existing trunk shakers with catch frame that are commercially available and make modifications by adding the canopy shaker to it to be used for olive harvesting and.

Task 4- Write a final report for the first year of the project and summarize the results of machine evaluations.

Figure 1. Possible combination of canopy shaker and trunk shaker

Project Timeline:

Tasks	Month											
	1	2	3	4	5	6	7	8	9	10	11	12
Task 1												
Task 2												
Task 3												
Task 4												

Principal Investigator: Reza Ehsani — Budget Start Date: 3/1/2020

Sponsor: California Olive Committee — Budget End Date: 2/28/2021

Project Title: Combining trunk shaking and canopy shaking for a highly efficient, low-cost olive harvester

Salaries	Monthly Rate	Year 1	Year 2	Year 3	Year 4	Year 5	Total
PI - 1 Protected Time - Fall 2020	$ 23,810.17	23,810		-			23,810
Co-PI	$ -			-			-
Co-PI		-		-			
Co-PI				-			
Staff (Non-Exempt)	$ -			-			
Staff (Exempt)		-		-			
TBN GSR-AY LEVEL V - Fall 2020	$ 4,902.80	11,009		-			11,009
TBN GSR-AY LEVEL V - Spring 2021	$ 5,049.55	5,661		-		-	5,661
TBN GSR-Sumr LEVEL V	$ 4,902.80	7,354		-		-	7,354
Undergraduate		-		-		-	
Other Personnel		-		-		-	
Total Salaries		***47,855***	-	-	-	-	***47,855***
Fringe	**%**						
PI - 1 Protected Time - Fall 2020	42.0%	10,000		-		-	10,000
Co-PI	4.9%	-		-		-	-
Co-PI	4.9%	-		-		-	-
Co-PI	4.9%	-		-		-	
Staff (Non-Exempt)	60.0%	-		-		-	
Staff (Exempt)	47.6%	-	-	-		-	-
TBN GSR-AY LEVEL V - Fall 2020	4.9%	539	-		-	-	539
TBN GSR-AY LEVEL V - Spring 2021	4.9%	278	-		-	-	278
TBN GSR-Sumr LEVEL V	4.9%	360	-		-	-	360
Undergraduate	4.9%	-	-		-	-	
Other Personnel		-	-		-	-	-
Total Fringe		***11,178***	-	-	-	-	***11,178***
Total F & S		***59,033***	-	-	-	-	***59,033***
Equipment							
Equipment							
Equipment							
Equipment							
Total Equipment		-	-	-	-	-	-
Travel							
Travel-domestic		2,000					2,000
Travel-International							
Total Travel		2,000	-	-	-	-	2,000
Participant Support							
Stipends							-
Travel							
Subsistence							
Other							-
Total Participant Support		-	-	-	-	-	-
Subawards							
Subaward 1							
Subaward 2							-
Subaward 3							-
Total Subawards		-	-	-	-	-	-
Other Direct Costs							
Materials/Supplies		11,157					11,157
Publication Costs							-
Consultant Services							-
Facility Access							-
other							-

Other: GSR Tuition & Fees	Fall	Spring						
Tuition	8326	8326	9,486	-	-	-	-	9,486
Non-resident Supplemental Tuition	8309	8309	-	-	-	-	-	-
Student Services Fee	931	931	931	-	-	-	-	931
Health Insurance	1284	1789	2,148	-	-	-	-	2,148
Sub-Total Tuition & Fees			12,566	-	-	-	-	12,566
Total Other Direct Costs			23,723	-	-	-	-	23,723
Total Direct Costs			**84,756**	-	-	-	-	**84,756**
Portion of Sub-award to be charged IDC								-
MTDC (less: equipment, Stdnt fees, & SK's > 25,000)			72,190	-	-	-		72,190
Total Indirect Costs	0.11000		7,941	-	-	-		7,941
			92,699	-	-	-	-	92,699

GSR Salary Totals Per Year						
Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Total
24,045		-		-	24,045

	# Personnel Per Yr				
Personnel	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
PI - 1 Protected Time - Fall 2020	1				
Co-PI					
Co-PI					
Co-PI					
Staff (Non-Exempt)					
Staff (Exempt)					
TBN GSR-AY LEVEL V - Fall 2020	1				
TBN GSR-AY LEVEL V - Spring 2021	1				
TBN GSR-Sumr LEVEL V	1				
Undergraduate					
Other Personnel					

	# of Months Per Yr				
Personnel	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
PI - 1 Protected Time - Fall 2020	1				
Co-PI					
Co-PI					
Co-PI					
Staff (Non-Exempt)					
Staff (Exempt)					
TBN GSR-AY LEVEL V - Fall 2020	4.5				
TBN GSR-AY LEVEL V - Spring 2021	4.5				
TBN GSR-Sumr LEVEL V	3				
Undergraduate					
Other Personnel					

	% of Effort Per Month Per Yr				
Personnel	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
PI - 1 Protected Time - Fall 2020	100.0%				
Co-PI					
Co-PI					
Co-PI					
Staff (Non-Exempt)					
Staff (Exempt)					
TBN GSR-AY LEVEL V - Fall 2020	49.9%				
TBN GSR-AY LEVEL V - Spring 2021	25.5%				
TBN GSR-Sumr LEVEL V	50.0%				
Undergraduate					
Other Personnel					
Inflation	1.03				

	Fall Semester # GSR				
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Tuition	1				
Non-resident Supplemental Tuition					
Student Services Fee	1				
Health Insurance	1				

	Spring Semester # GSR				
	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5
Tuition	0.5				
Non-resident Supplemental Tuition					
Student Services Fee	0.5				
Health Insurance	0.5				
	Tuition Increase			1.1	

BUDGET REQUEST: Reza Ehsani

Budget Year: 2020 Funding Source: COC

Labor:	**Line 1**
Salary	
One Graduate Student Researcher	
Full-Time 1 Academic Term, 50% 1 Academic Term and 50% during Summer Term	$24,045
4.9% Benefit Rate	$1,178
Protected Time for One Semester for Professor Reza Ehsani	$23,810
42.0% Benefit Rate	$10,000
Subtotal 1	**Line 1 Subtotal $59,033**

Supplies:	**Line 2**
Supplies: Estimate for hauling the mechanical harvester to the field ($1,500), raw materials for fabrication ($2,000), hydraulic components, hosing and hydraulic motors, hydraulic valves ($1,500), consumable shop and welding supplies, supplies for field data collection supplies ($1,157), and renting a trunk shaker ($5,000)	
Subtotal 2	**Line 2 subtotal $11,157**

Travel:	**Line 3**
Vehicle Use: Truck use for two weeks for field trials ($190.00/week)	$380
For work site and COC meetings	$620
Dr. Ferguson travel charges, for work site and COC meetings	$1,000
Subtotal 3	**Line 3 subtotal $2,000**

Tuition/Fees:	**Line 4**
Graduate student fees and tuition for the 9-month academic year for a non-resident graduate student as indicated in accordance to full-time and part-time status.	
University policy requires the inclusion of tuition/fee remission for graduate student researchers employed 25% time or more during the academic year. These costs are based on published University rates with a 10% increase.	$12,568
Subtotal 4	**Line 4 subtotal $12,568**

Total of lines 1 through 4 above	**(Line 5) $84,758**
Modified Total Direct Cost	**(Line 6) $72,190**
UCD/ANR/UCR Overhead @ 11% IDC on MTDC (Line 6)	**(Line 7) $7,941**
Total to Primary PI	**(Line 5 + 7) $92,699**
TOTAL BUDGET REQUEST	**$92,699**

PRIMARY PI SIGNATURE PAGE: UNIVERSITY OF CALIFORNIA

Reza J Ehsani

Originator's Signature _10/30/2019__ Date

Jue C. Sun Digitally signed by Jue C. Sun Date: 2019.10.30 16:44:18 -07'00'

Director, Sponsored Projects Office Date

Liaison Officer Date

Project Year: 2020 Anticipated Duration of Project: 3 years
Principle Investigator: Debra Keenan, Research 2000
Project Title: Evaluation of new chemistries to control Olive Fruit Fly

Justification Background

The Olive Fruit Fly, *Bactrocera oleae*, has become a serious pest in olives. It was first seen in 1998 in Los Angeles. It quickly spread to the olive growing regions and has become a pest. The olive fruit fly causes a huge economic threat to the olive growers in the state. The larvae feed on the inside of the fruit. The larvae destroy the pulp and allow entry of secondary pests. The fruit rots and can cause the quality of the oil to degrade and cause the fruit to drop. Feeding damage can cause premature fruit drop and reduce fruit quality for both table olive and olive oil production. Large numbers of rotting fruit on the ground can create an unwelcome mess, especially in landscaped situations.

GF-120 NF Naturalyte Fruit Fly Bait, an organically acceptable product containing the biologically produced insecticide spinosad, recently has received registration for use on olives in California. GF-120 attracts olive fruit fly adults, which feed on the bait, and causes adult mortality. GF-120 is concentrated and needs to be diluted with water at 1:1.5 to 1:4 (GF-120 NF: water) before application. Follow label instructions for methods of dilution. GF-120 applications should commence when olive fruit fly adults are captured on the monitoring traps or at least 2 to 3 weeks before pit hardening. Repeat applications every 7 days until harvest when flies are captured on monitoring traps. GF-120 should be applied at a 2.5 to 7.5 ounce dilute spray per tree using a 1:1.5 dilution or at a 5 to 15 ounce dilute spray per tree using a 1:4 dilution with very large droplet size. Droplets should be 5 millimeters or more in size and uniformly dispersed around the tree. Other materials will be applied according to the label.

Data to Collect: Scout for adult flies that emerge from March to May and attack olives remaining on trees from the previous season. During early summer (June) as temperatures and day length increase and few mature fruit remain on trees, female flies do not lay eggs. Although few olives are present from the previous crop to host the egg laying, the adults remain active, and they may disperse to new locations such as citrus orchards or vineyards. By late June to the beginning of July as the new olive crop develops, females begin to lay eggs and are attracted to the fruit. Although eggs may be laid in small fruit, the larvae do not successfully develop until the ripening fruit grows to sufficient size. Eggs are laid just under the fruit's skin, often creating a dimple or brown spot. Will observe for the dimple or brown spot. The use of baited traps will be used to determine presence of the pest.

Research Objectives

1. Trap for the presence of the fruit fly. The most efficient trap for monitoring the olive fruit fly is the glass or plastic McPhail-type trap baited with torula yeast lures. Yellow sticky traps baited with sex-pheromone lures (attractive to male flies) and/or ammonium carbonate, ammonium bicarbonate food bait (attractive to both sexes) also are commonly used to monitor olive fruit fly populations, but these generally are less efficient than McPhail traps.
2. Apply materials to the olives for control of the olive fruit fly. Find new chemistries to control the pest. This will aid in resistance management.

Research 2000

Olive fruit fly control. Efficacy program to combat resistance.

Protocol Olive ID:FF OC
Trial ID:OFF-OC
Project ID:

Location:
By:Debra Keenan Research 2000
Study Director: COC

Trial Year: 2020 (year 3)

Trt	Treatment	Rate	Appl	Volume	Mix unit
1	Untreated				
2	GF120	1 fl oz/item	ABCDEF		
3	Danitol	16 fl oz/a	AB	100 GAL/AC	20 gallons
4	Harvanta FB GF 120	24 fl oz/a 1 fl oz	ABCDEF	100 GAL/AC	20 gallons
5	Assail FB GF 120	8 fl oz/a 1 fl oz	ABCDEF	100 GAL/AC	20 gallons
6	Avuant FB GF 120	5fl oz/a 1 fl oz	ABCDEF	100 GAL/AC	20 gallons
7	Minecto Pro FB GF 120	12 fl oz/a 1 fl oz	ABCDEF	100 GAL/AC	20 gallons
8	Sivanto FB GF 120	14 fl oz/a 1 fl oz	AB	100 GAL/AC	20 gallons

3. Find alternatives to the current program. This will allow for resistance management and allow for the olive growers to have more tools to control the olive fruit fly.
4. Provide efficacy data to support registration of new products for the control of olive fruit fly.
5. Updated treatment list from 2019, program will have GF 120 applications if flies are not present. Dropped the number of treatments to allow for more trees to be sprayed in a block design.

Benefits to the industry.

Management of Olive Fruit Fly is very labor intensive. Currently growers do not have a lot of tools for the control of this pest. Researching new tools and new chemistries will help the growers. New tools will give them more ways to control this pest. The olive fruit fly poses a severe economic threat for the state's commercial olive growers. By finding new ways to control the pest industry may be able to register these products. New tools will allow for control of the pest and resistance management. The most effective strategy to combat insecticide resistance is to do everything possible to prevent it occurring in the first place. Crop specialists recommend Insect Resistant Management programs as one part of a larger IPM approach covering three basic components: monitoring pest complexes in the field for changes in population density, focusing on economic injury levels and integrating multiple control strategies.

Budget Request

Item	Total budget
Set up, spray, and evaluate the list of materials in the proposal – site 1 with crop purchase	$ 12,500.00
Set up, spray, and evaluate the list of materials in the proposal – site 2 with crop purchase	$ 12,500.00
Total	$ 25,000.00

This is the final year. In the following years the materials that are favorable in the screening will be looked at in greater depth. I feel that we should make the plots lager so maybe the fly counts would be more uniform.

Principle Investigator: Debra Keenan 10-30-2019

CALIFORNIA OLIVE COMMITTEE

PROJECT PLAN/RESEARCH GRANT PROPOSAL

Project Year: 2020 Anticipated Period of Performance: 3 years, FINAL proposal (Please see justification below)

Project Title: Managing Alternate Bearing in Olive with Plant Growth Regulators (PGRs) and Pruning

Project Leaders: Elizabeth Fichtner and Carol Lovatt

EF-Farm Advisor, Orchard Systems, Cooperative Extension, 4437 S. Laspina St., Tulare, CA 93274; Phone: 559-684-3310; Fax: 559-685-3319; Email: ejfichtner@ucanr.edu

CL-Professor of Plant Physiology, Emeritus & Professor in the Graduate Division, Botany and Plant Sciences-072, UC Riverside, CA 92521-0124; Phone: 951-827-4663; Fax: 951-827-4437; Email: carol.lovatt@ucr.edu

Cooperators: Kurt Schmidt, Lindcove Research and Education Center, 22963 Carson Avenue, Exeter, CA 93221; Phone: 559-592-2408, ext. 153; Email: krschmidt@ucanr.edu

Commodity: Olive Relevant AES/CE Project No.: 4556-H

Year Initiated: 2020 Anticipated Duration of Project: **3** crop years 2020 request: $23,232

Problem and Previous Research Accomplishments: ***Problem.*** Alternate bearing (AB), production of a heavy "on-crop" (high yield, ON-trees) followed by a light "off-crop" (low yield, OFF-trees), occurs in perennial fruit and nut crops, as well as forest species (where it is called "masting"). For tree fruit crops, alternating high and low yields cause significant economic problems. In ON-years, trees produce a large number of small size fruit with reduced commercial value. In OFF-years, a significant proportion of the fruit are too large, resulting in reduced economic value, and large fruit of OFF-crop trees turn black earlier in the season further exacerbating the problem of too few commercially valuable size fruit in OFF-crop years to provide growers with a good income. For olive, the ON-crop takes longer to mature, attain size and accumulate oil. The delayed harvest further reduces floral intensity the following spring. It is important to note that if AB is more or less industry-wide, the lack of fruit in the OFF-crop year and large proportion of small fruit in the ON-crop year have a negative economic impact on every step in the production chain from farm to consumer, including orchard management, harvesting, packinghouse operation, manufacture of value-added products, marketing, and consumer prices, which jeopardizes the stability and sustainability of tree-crop commodity-based industries such as olive. Since the major factor initiating AB is an adverse climate event (high or low temperature, excessive winter rain causing soil hypoxia etc.) that ultimately reduces yield and initiates AB, there is a reoccurring need for a management strategy to mitigate the severity of AB. ***Previous Research Accomplishments.*** Our research confirmed that the ON crop of fruit inhibits summer vegetative shoot growth, reducing the number of nodes that can bear floral buds the following spring (first reported by Sibbett, 2000) and was the first to document that the ON crop causes bud abscission of existing putative floral buds through harvest, inhibits the transcription of genes necessary for flower development even after harvest, and reduces bud

break in spring following the ON-crop (Fichtner and Lovatt, 2018; Fichtner et al., 2017). For ON-crop trees, our research results documented that the severity of these effects is greater for bearing shoots, the majority of shoots on ON-crop trees, than non-bearing shoots. Further, our research results demonstrated that plant growth regulator (PGR) treatments using a cytokinin and/or an auxin transport inhibitor significantly increased return bloom on non-bearing shoots, but were not effective on bearing shoots (Fichtner and Lovatt, 2018; Fichtner et al., 2017). Only non-bearing shoots on ON-crop trees, which are in the minority, contribute a significant number of inflorescences to spring bloom following the ON-crop year. Taken together, these results provide strong evidence that increasing the number of non-bearing shoots on ON-crop olive trees is required to increase return bloom and yield the following year. ***Accomplishments during the last 2 years.*** Our research during the last 2 years tested the efficacy of a PGR chemical flower thinning treatment (naphthaleneacetic acid [NAA], ALCO® Olive Stop™; AMVAC Corp., already registered for use on olive) at full bloom compared to mechanical pruning (hedging) after fruit set (28 days after full bloom) and both in comparison with untreated ON- and OFF-crop control trees. Trees in all treatments were topped to approximately 14 feet each year. Annual chemical flower thinning and pruning initiated in the ON-crop year and repeated the following year resulted in a low yield in year 2, suggesting that the contribution of the untreated putative OFF-side of the tree was needed for a good yield in the year following the ON crop and should not be removed. Thus, we also tested the efficacy of applying these two treatments to one side of the tree one year and the other side of the tree every other year. During the last 2 years, chemical flower thinning or fruit thinning by pruning in the ON-crop year and skipping the treatment in the following year increased yields to 67%-83% of the respective ON-crop control tree yields in each of the 2 years. In contrast, applying the two treatments annually produced yields that were 70% of the yield of ON-crop control trees in year 1, but only 22-39% of yields of the ON-crop control trees in year 2. Please note the following: (i) 2019 was an unusually high yield year; our 2018 ON-crop control trees produced a second ON-crop yield in 2019 rather than a low OFF-crop; (ii) the 2-year cumulative yield for the 2018 and 2019 crops tended to be greater for trees having their crop load reduced with NAA or pruning every other year rather than annually (Table 1); and (iii) whereas the results suggest that reducing crop load with NAA or pruning one side of of the tree and then the other side of the tree every other year may be the better strategy for evening out annual yield in an AB orchard (Table 1), the high yields obtained in all treatments in 2019 and the fact that second side of the trees have not yet been treated and are scheduled to be treated in 2020 makes it premature to draw a conclusion about the best frequency for crop thinning by NAA or pruning and reinforces the need for a third year of research.

Justification for 3 FINAL years of research. There are four reasons we are requesting 3 years of funding to complete our work to provide growers with best strategy/strategies for evening out alternate bearing yields and thereby increase annual yield of commercially valuable size fruit, reduce the proportion of black fruit and increase grower income. (1) As noted above, the unusually high yield in 2019 and maintenance of high yields into 2019 even for 2018 ON-crop trees made it impossible to draw a conclusion regarding the frequency with which crop reducing treatments should be applied. Similarly, whereas trees pruned on one side of the tree and then the other side every other year had the highest yield of medium size fruit, trees treated with NAA on one side of the tree and then the other side annually had the highest yield of medium plus large size fruit, making it impossible to draw a conclusion about the best treatment for increasing yield of commercially valuable size fruit (Tables 1 and 2). (2) The excessively high ON crop in 2019 across all trees is a perfect test of the ability of the strategies we are developing to mitigate AB

when it reoccurs. (3) AMVAC Corp. has developed a new NAA product (Mandolin™) that will replace ALCO® Olive Stop™ for use in commercial olive production. This product has been approved by the EPA and is expected to be approved by the California Department of Pesticide regulation within the next 2-3 years. Efficacy data supplied by University of California researchers may help this process. We are in discussion with AMVAC regarding the potential of financial support as well as their continued donation of product to reduce the cost of this project to the COC. We also believe it is important to test the efficacy of this new product in years 2 and 3 because it is significantly more active than ALCO® Olive Stop™ (a significantly smaller amount is used) and it will be the only product available to olive growers. We will also investigate the possibility of joint funding from the oil olive growers to reduce the cost to the COC. (4) Our final objective for this project has always been to combine the best strategy for crop thinning, which creates non-bearing shoots, with the best PGR treatment (a commercially available natural cytokinin product, which does not require registration as a PGR, [Fichtner and Lovatt, 2018; Fichtner et al., 2017]) for increasing summer vegetative shoot growth and spring bud break to increase flowering and yield following the ON-crop year. After identification of the best frequency for crop thinning in year 1, using ALCO® Olive Stop™ NAA, which was used in all previous years of research, we will initiate our final objective in years 2-3 of this proposal using Mandolin™ NAA, since it will be the only NAA available to olive growers in the future.

Research Goals, Objectives, Benefits and Anticipated Outcomes: The goals of this research remain the following: Goal 1 - to even out AB so there is a good crop annually by switching crop production from one side of the tree to the other side of the tree annually or every other year; Goal 2 - to sustain production each year at a level equal to 60% to 70% of the average ON-crop yield for an orchard, which will improve fruit size (increased annual yield of commercially valuable size fruit) and the proportion of green fruit (both aspects of fruit quality are crop load dependent), so growers have a stable and good income annually; and Goal 3 - to provide growers with a means to mitigate AB when it reoccurs. These goals will be achieved using 'Manzanillo' olive trees in a block, which includes 'Barouni' olive trees as the pollenizer planted at a ratio of one to ten, at the Lindcove REC in Exeter, CA. All trees are topped annually to maintain uniform tree height. ***2020 Objectives. Objective 1*** – (a) To reduce crop load (total number of fruit per tree) and increase the number of nonbearing shoots by removing inflorescences with a foliar application of the plant growth regulator (PGR) NAA (ALCO® Olive Stop™; AMVAC Corp., currently registered for use on olive) applied at full bloom at the manufacturer's suggested rate; and (b) removing fruit by pruning (mechanical hedging) one side of a second set of ON-crop 'Manzanillo' olive trees. Thereafter, the treatments are used to remove inflorescences or fruit on alternating sides of the tree annually. ***Objective 2*** – To apply the treatments to the second side of the tree every other year to obtain the crop contributed by the other, untreated (OFF) side of the tree in order to further increase total yield in the year following the ON-crop (year 2). ***Objective 3*** – To compare the efficacy of using NAA to remove inflorescences versus pruning (hedging) to remove fruit and to compare applying each treatment to the other side of the tree annually versus every other year in order to provide growers with a strategy to mitigate alternate bearing each time it is initiated. This objective was initiated in 2018, so that in 2019 we would be able to assess the contribution the OFF-crop side of the tree to total yield in year 2 and to 2-year cumulative yield. However, the excessively high yields obtained across all trees in 2019 compromised meeting this objective in 2019 and necessitate a third year of research to meet this objective. ***2021-2022 Objectives.*** The goals of the research for the final 2 years of research are the following: Goal 1 - To maintain uniform high yields of commercially valuable size fruit by

combining the best crop thinning strategies using NAA (the new commercially available AMVAC product, Mandolin™) and pruning identified in 2018-2020 with the best PGR strategy we identified in earlier research (a commercially available natural cytokinin product) (Fichtner and Lovatt, 2018; Fichtner et al., 2017) to increase increase fruit size and summer vegetative shoot growth during the initial ON-crop year and thereafter, but not in low crop years, and to increase floral bud retention and increase spring bud break annually to increase return bloom and yield. ***Objective 1*** – To achieve this goal, sets of trees will be treated only with Mandolin ™ NAA or pruned on one side and then the other side annually or every other year, whichever proves to be the best strategy at the end of year 1 (2020) and a second set of trees will also receive a foliar application of a commercially available natural cytokinin product (registration for use on olive is not required) just prior to summer vegetative shoot growth and again just prior to spring bud break. The experiment, which also includes ON- and OFF-crop control trees, is in a randomized complete block design with 16 individual tree replications per treatment using 'Manzanillo' olive trees in a block, which includes 'Barouni' olive trees as the pollenizer planted at a ratio of one to ten, at the Lindcove REC in Exeter, CA. Total yield and fruit size distribution as kg/tree will be determined and calculated as number per tree; fruit quality will be evaluated for the proportion of green, partially black and black fruit. ***Benefits of the proposed research***. (1) By chemically thinning only half of the tree with NAA in any given year, the impact of over-thinning on yield if a heat wave occurs is reduced. (2) In our experiment, pruning is delayed until after fruit set to enable growers to evaluate the crop set by their trees before deciding how much fruit to remove. This allows a grower to tailor the degree of pruning to accommodate years with a poor fruit set in spite of a heavy bloom. Reducing crop load on only one side of the tree reduces the negative effect of any subsequent adverse effects on fruit set and final yield compared to treating both sides of the tree in a given year. (4) Since the treatments increase the number of non-bearing shoots per tree, they will improve the efficacy of PGR treatments that increase summer vegetative shoot growth, bud retention and spring bud break to increase floral intensity and yield following the production of the ON crop and also the efficacy of PGR treatments designed to improve fruit set or size or delay fruit blackening (Fichtner and Lovatt, 2018; Fichtner et al., 2017). (5) In addition to shifting fruit into more commercially valuable size categories, evening out alternate bearing will ensure a greater proportion of green fruit (reduced proportion of black and partially black fruit) at harvest, which in some years is significant (2017). Both fruit size and percent green fruit are crop load-dependent, with OFF-crop trees producing fruit that are too large and have a greater proportion of black or partially black fruit.

Anticipated Outcomes.

- We will have data on the impact of different degrees of fruit thinning on only half of the tree on total yield, which will enable us to estimate the impact that over-thinning due to a heat wave would have on final yield, i.e., we will have some indication of the risk associated with the application of chemical thinning agents to only half of the tree.
- We will learn whether NAA inflorescence removal supports better summer vegetative shoot growth and return bloom and return yield than fruit removal by pruning (hedging).
- We will learn whether delaying pruning (hedging) to after fruit set to give growers the opportunity to evaluate their potential crop load to make a decision to prune or not to prune or how severely to prune, which is especially important in years with poor fruit set in spite of good blooms, is efficacious or has negative consequences.
- Note that we have already learned that pruning at the end of June is too late for stimulating summer vegetative shoot growth to increase return bloom and yield, the end of May (28 days after full bloom) is optimal.

- Through these comparisons, potential benefits can be verified, e.g., fruit removal in June before pit hardening increases floral bud retention and flowering, or potential problems can be identified, e.g., June pruning causes loss of carbohydrates resulting in poor shoot growth, small fruit size or too much shoot growth, leading to competition and small fruit size (these potential problems have not encountered thus far with the late June pruning).
- We will have data establishing the year-to-year variability in yield encountered using NAA to remove inflorescences versus pruning to remove fruit.
- We will have data to support or refute that reducing crop load on one side of the tree starting in the ON-crop year using the PGR thinning agent NAA or pruning (hedging) increases yield in the following OFF-crop year sufficiently to even out AB and provide growers with a good annual income the following year.
- The data will document whether reducing crop load on alternate sides of the tree should be done each year or every other year to sustain good yields, optimal fruit size and grower income annually.
- The harvest data will quantify the effect that removing fruit on one side of the tree and then other side annually or every other year has on average fruit size, fruit size distribution (pack out), proportion of black versus green fruit, and crop value.
- The data will document whether efficacy of the best crop thinning strategy using NAA or pruning is improved by combining it with a commercially available natural cytokinin product.
- The data will document the potential efficacy of the treatments to reduce the severity of alternate bearing (Alternate Bearing Index; ABI) in 'Manzanilo' olive orchards in California
- We anticipate that one or more of the strategies being tested will successfully mitigate alternate bearing and increase 2-year cumulative yield and grower income and thus, will be a strategy that can be successfully employed starting with the ON-crop each time alternate bearing is initiated by an adverse climate event or cultural problem that results in an OFF crop, which is then followed by an ON crop, and then be used on a regular basis to maintain high uniform annual yields of commercially valuable size fruit.

Select References:

Chao, Y.Y. 2014. Alternate Bearing in Olive (*Olea europaea* L.). MS Thesis. University of California, Riverside, CA.

Fichtner, E., Lovatt, C.J. 2018. Alternate bearing in olive. Acta Hortic. 1199:103-108. doi:10.17660/ActaHortic.2018.1199.17

Fichtner, E.J., Y.Y. Chao, L. Ferguson, J.S. Verreynne, L. Tang and C.J. Lovatt. 2017. Repeating cycles of ON and OFF yields in alternate bearing olive, pistachio and citrus trees — *Different mechanisms, common solutions*. Acta Hort. (in review)

Pearce, S.C. and S.Dobersek-Urbanc. 1967. The measurements of irregularity in growth and cropping. J. Hort. Sci. 42(3):295–305.

Sibbett, S. (2000). Alternate bearing in olive trees. California Olive Oil News. 3(12),1

BUDGET REQUEST: (Carol J. Lovatt)

Budget Year: 2020 Funding Source: COC

Labor:	**(Line 1)**		**$6,287**
Salary: T Khuong @ $60,300/yr x 5% = $3,015; Lab Asst. 1 @ $16.80/hr. x 100 hr. = $1,680		$A	$4,695
Benefits: TK= $3,015 x 51% = $ 1,538 Lab Asst. 1 = $1,680 x 3.2% = $54		$B	$1,592
Subtotal 1	**Line 1 subtotal:**		**$6,287**
Supplies, Equipment:	**(Line 2)**		**$6,750**
Supplies: *(be specific. Examples include tape, tags, buckets, traps, safety, chemicals, etc)*		$C	$0
Equipment: (*be specific. Examples include balances, meters, devices, etc*)		$D	$0
Individual contractors: Recharge to Lindcove REC – use of olive orchard, irrigation, weeding, pruning, pest control, application of PGRs = $6,750 (actual under new rates; includes harvest)		$E	$6,750
Subtotal 2	**Line 2 subtotal**		**$13,037**
Travel:	**(Line 3)**		**$2,487**
Vehicle Use: 5 roundtrips to Exeter (520 mi x 5 = 2,600 mi x $0.6014/mi = $1,564; UCR vehicle Rental 10 days x $47.268/day = $473; $90/day per diem (Lindcove REC trailer, plus meals) for 1 person x 5 trips (1.5 days each) = $450		$F	$2,487
Meeting attendance: (*be specific. anticipated travel to meetings such as COC meetings, professional society meetings*)		$G	$0
Subtotal 3	**Line 3 subtotal**		**$15,524**
Subcontracts: Elizabeth Fichtner	**(Line 4)**		**$6,000**
Collaborator A: Elizabeth Fichtner		$H	$6,000
Subtotal 4	**Line 4 subtotal**		**$21,524**
UCR Total	**(Line 5)**		**$15,524**
UCR Overhead on $15,524 @ 11% IDC	**(Line 6)**		**$1,708**
(Total to primary PI – Carol Lovatt)	**(Line 7)**		**$17,232**
TOTAL BUDGET REQUEST	**Line 4+Line 7**		**$23,232**

PRIMARY PI SIGNATURE PAGE: UNIVERSITY OF CALIFORNIA

Originator's Signature	Date
Department Chair/County Director	Date
Liaison Officer	Date

SUBCONTRACT BUDGET REQUEST: (*Elizabeth Fichtner*)

Budget Year: 2020 Funding Source: COC

Labor:	**(Line 1)**	**$4855.61**
Salary *(Junior Specialist at 7% FTE)*		$3495.76
Benefits (*38.9%*)		$1359.85
Sub 1		**$4855.61**
Supplies, Equipment:	**(Line 2)**	**$200.00**
Supplies: *(be specific. general field supplies (flagging tape, pruners, buckets, gloves. etc)*		$200
Sub 2		**$5055.61**
Travel:	**(Line 3)**	**$349.80**
Vehicle Use: (*Mileage from Tulare, CA to/from Modesto for COC meetings; 280 miles round trip @ $0.535/mile. Request partial funds ($200) toward attendance of Pomology Conference in Davis in March 2019.This is approximately 1/3 of the cost of attending the meeting; other costs would be contributed by walnut and pistachio accounts to share costs across main commodities that I serve.*		*$349.80*
Sub 3	**(Line 4)**	**$5405.41**
UCD/ANR/UCR Overhead @ 11%	**(Line 5)**	**$594.59**
Sub 4 (Total Subcontract)	**(Line 6)**	**$6000.00**

(Add Line 6 to primary PI budget in subcontract section 'H' and 'I')

SUBCONTRACT SIGNATURE PAGE: UNIVERSITY OF CALIFORNIA

Originator's Signature	Date
Department Chair/County Director	Date
Liaison Officer	Date

University of California
Entomology and Nematology

PROJECT PLAN/RESEARCH GRANT PROPOSAL

Project year 2020-21. Anticipated duration of project 1 year

Project leader Frank Zalom and Joanna Fisher Location UC Davis

Cooperating Personnel Emily Symmes (Area IPM Advisor) UC Cooperative Extension, Cindy Kron (Area IPM Advisor)

Project Title Control of overwintering olive fruit fly using insect pathogenic fungi (year 2 of 2)

Keywords Olive fruit fly, pest management, insecticide resistance management, overwintering population, insect pathogenic fungi

Commodity Olive Relevant COC Project No. Click here to enter text.
Budget requested for 2019-2020: $17,196

Overview

Olive fruit fly, *Bactrocera oleae,* is the most important insect pest of California table olives. Olive fruit fly is primarily managed with a single product, GF-120 spinosad bait, for which resistance is well documented. It is imperative that additional control strategies be developed. Particularly useful would be those that target the overwintering generation, which survive as pupae in the soil. We propose using fungal insect pathogens to control overwintering olive fruit fly populations. If successful, this control strategy would require minimal input (1-2 sprays per year) and utilize already available commercial products.

Last year, we proposed conducting lab assays and small field cage studies to test three commercial insecticide formulations of fungal insect pathogens to control overwintering olive fruit fly populations. These studies are currently underway. Wild flies have been captured to establish a lab colony, and initial results are expected after the first of the year. We are requesting additional funds from COC for fall 2020 to expand this project and test the efficacy of the most promising product in a field trial, which will be conducted on ~1 acre plots in olive orchards. We are also requesting funds to purchase supplies for a citizen scientist study with the goal of determining when olive fruit fly larvae drop out of infested fruit into the soil in the fall. The results of this study will be used to time fungal spray treatments in the fall.

The problem and proposed solutions

The olive fruit fly (OLF), can cause significant crop loss and damage in California table olive production systems and there is zero tolerance for larvae in table olives (Burrack, 2011). Feeding of the OLF larvae in the developing olive destroys the pulp, can cause premature fruit drop, and leads to fruit rot due to the entry of bacteria and fungi (Zalom et al., 2009). Until recently, its management has relied almost exclusively on the use of a single product, GF-120, a bait containing the insecticide spinosad. GF-120 must be applied multiple times during the growing season to keep populations below economically damaging levels. However, spinosad resistance in California olive fruit fly populations was first reported by Kakani et al. (2010).

Continued use of GF-120 bait could lead to the development of widespread resistance and eventually the loss of olive fruit fly control in many CA olive growing regions. The pyrethroid insecticide fenpropathrin (Danitol) has been registered more recently for olive fruit fly control. However, pyrethroids are well known to disrupt scale and mite biological control in other systems where they are used, leading to secondary pest outbreaks (Cobourn et al., 2014). Overuse of pyrethroids frequently leads to the development of resistant pest populations, which has already been documented in some European olive growing regions (Pavlidi, 2018). We believe the management strategy we are proposing has the potential to provide growers with another control option that could be used to help address current issues with insecticide resistance to GF-120 and disruption by pyrethroid insecticides.

Last year, we proposed evaluating Met52, a *Metarhizium brunneum* based product, and two *Beauvaria bassiana* based products, BioCeres and Mycotrol, that contain different strains of the fungus, to control overwintering olive fruit fly larvae and adults. Specifically, we proposed conducting lab bioassays and a small field trial using cages to test these products this fall and winter. Wild flies have been captured this Fall to start a lab colony and the lab bioassays are currently underway. In November we will begin the cage field trials as originally planned.

We are requesting additional funds for 2020 to conduct a field trial to test the efficacy of this strategy in reducing OLF presence and damage in infested orchards. We propose applying the most effective product, identified through the lab bioassays, to 1 acre blocks in orchards infested with olive fruit fly. The fungi would be applied to the soil prior to larval drop in fall 2020, and a second time prior to adult emergence in spring, 2021. We will assess the efficacy of the product by measuring adult trap catches and fruit infestation levels in comparison to control plots. We will also measure the persistence of the fungi in treated orchard plots. We have received authorization from the California Department of Pesticide Regulation to use Met52 in field trials since it is exempt from tolerance, and we anticipate the same authorization for BioCeres if necessary. Mycotrol is already registered for use on California olives. If our experiments indicate that one or both of these microbial products are effective, a label extension will be requested, Since these products are already registered on subtropical crops, they are biological products already exempt from tolerance, and in this instance are being applied after harvest, it is highly likely that the label extension would be approved.

A similar strategy using *Metarhizium brunneum* has previously been tested in Spain to control olive fruit fly (Yousef et al., 2017). When the fungi were applied twice per year it significantly reduced the number of OLF emerging in the Spring as well as trap captures by 50-70%. Overwintering OLF emerging in Spring directly contributes to the population that will affect fruit later in the season. The use of insect pathogenic fungi to reduce the number of overwintering OLF has the potential to save growers money by reducing the amount of in-season pesticide that is needed.

We are also requesting funds to purchase supplies for a citizen science project that will help us determine when olive fruit fly larvae drop into the soil in the fall. We know larvae in infested olives will leave the fruit to pupate in the soil in the autumn or early winter, but no studies have been conducted to determine more precisely when this occurs in California. We propose having interested growers and UC Master Gardeners monitor olive fruit fly larval traps in the fall to record when larvae begin to drop out of infested fruit. The data obtained from study participants will be used to determine when insecticides should be applied to the soil to kill overwintering OLF and how temperatures or other conditions influence when larvae drop out of fruit in the fall.

Three objectives will be addressed through this research: (1) Assess efficacy of using insect fungal pathogens to control OLF populations and fruit infestations in olive orchards, (2) Evaluate capacity of applied fungi to persist in CA olive orchards, and (3) Determine when olive fruit fly larvae drop out of fruit to pupate in soil to improve spray timing.

Objectives and anticipated outcomes

(1) Evaluate efficacy of using commercially available insect pathogenic fungi to control overwintering olive fruit fly, B. oleae, *populations.*

Outcome: Efficacy of insect pathogenic fungi for reducing overwintering olive fruit fly populations and decreasing fruit infestation in olive orchards.

(2) *Evaluate the capacity of insect pathogenic fungi to persist in olive orchards under California field conditions.*

Outcome: Determine how long commercially available insect pathogenic fungi persist in the soil in olive orchards. Use this information to determine the number of sprays needed to control overwintering olive fruit fly.

(3) Determine when olive fruit fly larvae drop out of infested fruit in the fall.

Outcome: Improve spray timing by determining when larvae drop from fruit into the soil in fall and how temperature affects the timing of larval drop.

Plans and Procedures:

Activities	Timeline
Obj. 1: *Evaluate efficacy of using commercially available insect pathogenic fungi to control overwintering olive fruit fly, B. oleae, populations.* Prepare and spray ground in ~1 acre plots with the fungal product identified from year 1 studies at two field sites. Soil of plots will be sprayed twice. Once in the fall to target the overwintering larvae and a second time in the spring to target any emerging adults. Plots within sites will either be sprayed with the fungal product or sprayed with water for the control plots. Trap emerging adults weekly and measure olive fruit infestation in all plots several times during the growing season. Adults will be trapped using olive fruit fly traps and baits (McPhail traps baited with torula yeast).	**October 2020- October 2021**
Obj. 2: *Evaluate the capacity of insect pathogenic fungi to persist in olive orchards under California field conditions* At the sites treated with the fungal product in Obj. 1 take soil samples monthly and extract and quantify living fungi using standard insect pathology methods (plate soil on media selective for *M. brunneum* and *B. bassiana*).	**October 2020-May 2021**

Activities	Timeline
Obj. 3. *Determine when olive fruit fly larvae drop out of infested fruit in the fall* In October olive fruit fly larvae traps as well as temperature and humidity probes will be distributed to study participants. Participants will place traps (large metal baking trays) under the canopy of olive trees infested with olive fruit fly. Traps will be monitored twice per week until mid-December for larvae and pupae. Temperature probes will also be placed at study sites to record temperature data. Data from participants will be combined and analyzed by J. Fisher and used to inform spray timing.	**October 2020-Dec 2020**
Disseminate research findings Research findings will be disseminated through grower meetings, talks, trade journals and peer-reviewed journal articles	**Fall 2021-ongoing**

BUDGET REQUEST Budget Year 2020-21 (year 2 of 2)

	Salaries and Benefits			
	Field Assistant	8 hr/day for 34 days @ $20.80		$ 5,658
	Employee benefits	66.9%		$ 3,785
	Subtotal		**Sub 1**	$ **9,443**
	Supplies and Expenses			
	Metal pans	$7/pan x 24 pans		$ 169
	Fungal Products and associated application costs**			$ 4,330
1	Subtotal		**Sub 2**	$ **4,499**
	Travel	**(1 mi @ 58 cents/mi)**		
	Travel to field sites	2 sites, 34 trips=2,040 mi		$ 1,183
	Travel to extension meetings	2 trips = 633 mi		$ 367
	Subtotal		**Sub 3**	$ **1,550**
	Subtotal			$ 15,492
	Indirect Costs	11% of budgeted costs	**Sub 4**	$ **1,704**
	Cumulative Total			$ 17,196

** *We have asked the registrant for Met52 to donate their product for the field study but they would not agree to do this.*

Originator's Signature _____ Date 10/28/2019

Joanna Fisher Date 10/28/19

Entomology and Nematology Department Chair _____ Date 10/28/2019

Liaison Officer _____ Date

References

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AES/CE MAR 84

Workgroup: Olive
Department: Plant Pathology/UCR

University of California
Division of Agricultural Sciences
PROJECT PLAN/RESEARCH GRANT PROPOSAL

Project Year: 2020 Anticipated Duration of Project: 4th of 4 years

Principal Investigators: J. E. Adaskaveg

Cooperating: D. Thompson, H. Förster, and K. Nguyen

Project Title: Epidemiology and management of olive knot caused by *Pseudomonas savastanoi* pv. *savastanoi*

Keywords: Bactericides, copper enhancing compounds, antimicrobial natural products, biological controls

JUSTIFICATION/ BACKGROUND

Pseudomonas savastanoi pv. *savastanoi* (*Psv*), the causal agent of olive knot, is a serious disease of olives (*Olea europaea*) throughout all olive growing regions of the world (8). The pathogen enters through wounds causing outgrowths (knots, tumors, galls) predominately on trunks, branches and twigs. Olive knot is one of the most economically important diseases of olives. Infection may lead to tree defoliation, dieback, and reduced vigor, which ultimately lowers fruit yield and quality (6). *Psv* can survive epiphytically on olives but the main source of inoculum is bacteria living within knots (7). Large quantities of bacterial ooze can be exuded when knots become wet (12). This exudate is disseminated by rain, wind, insects, birds, as well as human activity. The opportunistic pathogen takes advantage of wounds caused by natural leaf abscission (4), frost, and hail, as well as cultural practices such as pruning and harvesting. These latter practices also lead to direct mechanical damage of the knots, exposing and spreading inoculum to healthy tissue. Sodium hypochlorite or quaternary ammonia that was recently registered based on this project can be used to sanitize field equipment and minimize the spread of the pathogen during harvest and pruning operations (10). After entering its woody host, the pathogen induces knot formation through the production of indoleacetic acid (IAA) and cytokinins (2). In California, infections occur mostly during the rainy season (late fall, winter, and spring) but knots do not develop until new growth starts in the spring. Infections can occur at low temperatures (-5°C) and thus, wetness is the main limiting factor for the disease. None of the currently grown olive cultivars is resistant to the pathogen (5).

Control of olive knot is difficult, and growers rely on applications of copper-based bactericides as the only effective foliar treatment. Manual application of cresol- and xylenol-based compounds (Gallex) to individual knots can eliminate the pathogen but is unfeasible on a commercial scale due phytotoxicity when applied as an air-blast foliar treatment. Copper has been extensively used in olive production for many years for the control peacock spot and olive knot. Reliance on a single active ingredient has led to our detection of copper resistance in *Psv* strains from a commercial olive orchard. Still, the incidence of copper resistance is currently very low, accounting for only 2% of the total strains collected in different olive growing regions of California. When resistant strains were inoculated to Arbequina and Manzanillo olive wounds, application of copper provided reduced or no control as compared to inoculation with a sensitive strain. Copper-resistant strains caused less disease on leaf scars as compared to Cu-sensitive strains, but still resulted in a high incidence of disease especially at higher inoculum concentrations. Therefore, there is a potential risk of copper resistance spreading with the continued and sole use of copper. This necessitates the development of new bactericides or copper-activity-enhancing materials to overcome resistance. The latter strategy has proven to be effective for walnut blight management where copper resistance in *Xanthomonas arboricola* pv. *juglandis* is common and copper-mancozeb mixtures have provided exceptional control for many years. Mancozeb can no longer be registered on new crops but other alternatives need to be evaluated. We conducted preliminary tests on olive and walnut with salicylidene benzoylhydrazone (SBH), an experimental copper enhancer on other crops, and some of its derivatives. Although our results were promising, the manufacturer of these compounds do not support research on olive. Thus, this strategy is not being pursued.

We have been instrumental in the development of the new agricultural antibiotic kasugamycin (Kasumin) for several bacterial diseases of agronomic crops in the United States. Kasugamycin has high

activity against *Erwinia* (1) and *Pseudomonas* (11) and moderate activity against *Xanthomonas* species and other plant pathogenic bacteria. Over several years of studies, we found it to be the most effective new treatment for preventing olive knot (11). Although kasugamycin had reduced efficacy when treating leaf made by the removal of green, healthy leaves, we demonstrated that it was highly effective in controlling olive knot on naturally formed leaf scars. Thus, it would be a beneficial treatment during spring leaf drop. Kasugamycin was first federally registered on pome fruits, followed by registrations on cherry and crops. Registration on peaches and almonds is pending for late 2019, and that on olives is expected for 2020/21 once new residue trials and laboratory analysis are completed in the fall of 2019. Kasugamycin would greatly complement current copper sprays and could be used in rotation or mixtures with copper. Oxytetracycline is also pursued for registration through the IR-4 program. We will conduct additional studies with oxytetracycline to potentially improve its efficacy by using selected UV-protecting adjuvants. New antibiotic registrations find little acceptance with regulatory agencies, and we are in discussion with EPA to develop a science-based approach on the use of antibiotics in plant agriculture.

Another strategy, the use of inhibitors of type III secretion systems of plant pathogenic bacteria, was explored in 2018, but these compounds performed poorly as compared to copper and kasugamycin treatments. Several natural products and biocontrols were also evaluated by us over the last years with limited success. Promising new treatments, however, are antibacterial food preservatives that are FDA 'generally recognized as safe' (GRAS) products. They are often naturally produced molecules of gram-positive *Streptomyces* species. Integration of these alternative materials with conventional treatments may improve disease control, reduce the risk of resistance development, and provide olive growers with more resources for managing olive knot. In 2018 and 2019, we evaluated the GRAS compounds nisin, Ɛ-poly-L-lysine, and organic acids including citric, lactic and the commercial product Dart containing capric/caprylic acids in field trials by themselves and in selected mixtures with other compounds. Although disease control was not comparable to that of copper or kasugamycin treatments, results indicate that these compounds deserve additional evaluation. We are also collaborating with a chemical company to develop agricultural formulations of nisin and Ɛ-poly-L-lysine that may be more stable in the environment. Additionally, another company has requested evaluations on a new FDA GRAS bactericide called TDA-NC. These registrants will support EPA biopesticide registrations.

Therefore, improvement in field performance will be necessary for the nisin and Ɛ-poly-L-lysine as part of an ongoing process of this project. Potential strategies for optimizing these compounds may include reformulation and the addition of adjuvants (9), or the use of these materials in mixed treatments with conventional products. This information is still valuable because rotational programs could be developed with different modes of actions for different phases of the disease, i.e., leaf scars or lateral wounds occurring during leaf drop or harvest and pruning, respectively. These materials are registerable as conventional and possibly organic treatments.

RESEARCH OBJECTIVES

1) **Evaluate new bactericides: GRAS food additives, sanitizers, and other experimentals against *Psv***
   a) Laboratory in-vitro sensitivity studies: nisin, Ɛ-poly-L-lysine, TDA-NC, and the sanitizers lactic and citric acid as well as capric/caprylic acids (DART) alone or combination and in mixtures with selected adjuvants (see below).
   b) Field efficacy studies with new bactericides in comparison with kasugamycin for the management of olive knot caused by copper-sensitive and -resistant strains of *Psv*.
      i) Oxytetracycline formulations in combination with selected UV-protecting adjuvants.
      ii) Nisin, Ɛ-poly-L-lysine, TDA-NC and Dart alone, in combination with each other, or in mixtures with antimicrobial acids (e.g., lactic, citric, and other acids).
3) **Continue to support the registration of the antibiotics kasugamycin and oxytetracycline**
   a) Administrative support to EPA and other regulatory agencies about registration concerns for kasugamycin including the repeated GLP field and lab studies in 2019 and other bactericides
   b) Optimizing the efficacy of oxytetracycline under field conditions (UV blockers and stabilizers) as it goes through the registration process at IR-4 and is currently pending registration on olives.

PLANS AND PROCEDURES

1) Evaluate new bactericides, food additives, GRAS sanitizers, and other experimentals against *Psv*.
a. To evaluate the in vitro toxicity of nisin, Ɛ-poly-L-lysine, TDA-NC, and the GRAS organic lactic, citric, and capric/caprylic (Dart) acids alone or combination with each other and selected adjuvants (see below), the spiral gradient endpoint (SGE) or direct contact methods will be used where bacterial strains are exposed to a bactericide concentration gradient on a single agar plate or in a solution with a single concentration for selected exposure times, respectively. This will allow the determination of minimal inhibitory values for *Psv* of products being evaluated that will help to calculate appropriate field rates.

b. Field studies will be done on Arbequina and Manzanillo olives at UC Davis. Treatments will include oxytetracycline formulations in combination with selected UV-protecting adjuvants, Nisin, Ɛ-poly-L-lysine, TDA-NC, and Dart either by themselves or in combinations or in mixtures with antimicrobial acids (e.g., lactic, citric, capric/caprylic acids). Adjuvants will also be continued to be evaluated to determine if the field efficacy can be optimized. Treatments will be compared to Kasumin and copper. Plants will be wounded and then treated. Lateral wounds on 1-2-year-old twigs will be made using a scalpel by removing the bark and exposing cambial tissue. Leaf scars will be made by pulling leaves off the same twigs. In addition, wounds from natural leaf drop will be used. Treatments will be sprayed onto wounds, allowed to air-dry, and inoculations will be done with a suspension of copper-sensitive or -resistant *Psv* strains. The efficacy of treatments will be assessed as the percent incidence of knots forming on treated, inoculated wounds as compared to wounds that are treated with water and inoculated (i.e., controls).

2) Continue to support the registration of the antibiotics kasugamycin and oxytetracycline. An inter-commodity and industry group will continue to work with the Minor Crop Farmer Alliance to recommend an EPA policy change towards the use of antibiotics in plant agriculture. Specifically, a new internal EPA Guidance Document (GD) for use of antibiotics in plant agriculture needs to be developed based on science. Historically, EPA GD 152 for registration of antibiotics in animal husbandry is used for all requests in agriculture. Additionally, we will continue to work with a USDA working group to address CODEX initiatives for establishing policies on all antibiotic use in agriculture including animal and plant uses.

Benefits to the industry

For management of olive knot, in addition to cultural methods, sanitation practices, and the labor-intensive Gallex, only copper materials and the natural product Regalia are currently available. We obtained improved performance of copper when applications were made within 24 h of wounding events (e.g., harvesting, pruning, hail storms, freezing) as compared to later applications, and with high labeled rates of copper. In our previous research, we showed that copper resistance is currently only found locally where copper has been used for many years. Because copper-resistant strains of *Psv* were found to be virulent and likely competitive, and because they were not genetically clonal, there is a risk of further spread of copper resistance. Therefore, alternatives are needed for a sustainable and effective management program for many years ahead. We initiated the registration of the new agricultural antibiotic kasugamycin that was registered in 2014 on pome fruits, and in 2018 on pome fruits, cherry, and walnuts in California. The olive registration is pending in late 2019/2020 together with almonds and peaches. Oxytetracycline for use on olive went through the IR-4 program, has been submitted to the EPA, and registration is pending. Kasugamycin showed high activity against olive knot especially in mixtures with copper. We will continue to explore and evaluate other potential bactericide products that can be registered under current regulatory policies. We also aim to optimize the natural GRAS products nisin, Ɛ-poly-L-lysine, TDA-NC, and the sanitizers lactic, citric acid, and capric/caprylic acids. The registration of several materials for olive knot management will allow the implementation of anti-resistance strategies and will prevent over-use of any single mode of action bactericide. Still, integrated practices will be critical for the successful management of the disease. Any bactericide treatment will be most effective when pathogen population levels are at a minimum and the host is less susceptible.

References

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Budget Request:
Funding Source: California Olive Commission and California Olive Oil Commission

Budget Request with UC indirect costs:

Budget Year: 2020 Funding Source*:	OOC	COC	Total Budget
Salaries and Benefits: Post-Docs/RAs	7,000	7,000	14,000
Lab/Field Ass't	1,000	1,000	2,000
Subtotal	8,000	8,000	16,000
Employees' Benefits**	4,500	4,500	9,000
Subtotal	12,500	12,500	25,000
Supplies and Expenses	0	0	0
University Land and Orchard charges	0	0	0
Operating Expenses/Equipment Travel	0	0	0
Travel	1,500	1,500	3,000
Direct Cost Totals Total	**$14,000**	**$14,000**	**$28,000**
Off Campus IDC @ 11%		1,650	1,650
Total Budget Requested	**$14,000**	**$15,650**	**$29,650**

J. E. Adaskaveg

Originator's Signature (PI) Date: Oct. 28, 2019

Katherine Borkovich

Dept. Chair (Riverside Campus) Date: Oct. 28, 2019

Liaison Officer Date:

AES/CE MAR 84

Workgroup: Olive
Department: Plant Pathology/ UCR

University of California
Division of Agricultural Sciences
PROJECT PLAN/RESEARCH GRANT PROPOSAL

Project Year: 2020 Anticipated Duration of Project: 3rd year of 3 years

Principal Investigators: J. E. Adaskaveg

Cooperating: H. Förster, D. Thompson (UC Riverside)

Project Title: Management of foliar diseases of olive – A. Olive knot (see separate submission) and B. Evaluation of new fungicides for control of olive leaf spot (Supplemental Proposal)

Keywords: Chemical and biological control

JUSTIFICATION/ BACKGROUND

Olive leaf spot or peacock spot, caused by the fungus *Fusicladium oleagineum* (syn. *Spilocea oleaginea, Venturia oleaginea*), is a sporadic disease of olive trees in California. In years with favorable environmental conditions, an orchard may lose 9 to 15% of its leaves and 10 to 20% of the fruiting twigs if the disease is not managed. Excessive leaf loss can also result in more olive knot because leaf scars are sites for bacterial infection. Symptoms most commonly develop on the leaf blade but are also found on petioles, fruit, and fruit peduncles (stems). At first, lesions are inconspicuous, superficial, sooty blotches. Later they become dark green to black circular spots containing mycelium and conidia (Fig. 1), and spots are surrounded by yellow halos. These lesions resemble the spot on the tail of a peacock, and hence the name peacock spot. With numerous lesions, the leaf becomes chlorotic and falls.

Leaves in the lower canopy are more severely affected where the humidity is higher, resulting in greater defoliation. Defoliated twigs often die later in the summer. Leaf infections occur on the upper surface and seldom penetrate beyond the epidermal layer. Once the leaf drops, however, the fungus colonizes the internal leaf tissues forming a dense mass of stromatic tissue. The sexual state of the pathogen has not been observed. Olive cultivars vary in their susceptibility. Mission is the most susceptible followed by Manzanillo and to a lesser extent Sevillano, but all cultivars are generally susceptible.

Leaf drop occurs mostly in late spring and summer. Infected leaves remaining on the tree start sporulating along the margins of lesions in the fall. Rainfall and wind-driven rain are the main dissemination methods; whereas wind alone is not effective in detaching and disseminating conidia. In California, lesions start forming in the fall and winter, but most disease develops in the spring. Rainfall is essential for infections to occur regardless of the season. Temperature is important but often is not limiting the development of the pathogen. High temperatures are more limiting to spore germination and mycelial growth than low temperatures. The optimum temperature for growth of the fungus is 21°C, but growth can occur at 6 to 28°C. The minimum duration of leaf wetness for spore germination is 48 h at 16°C, 24 h at 20°C, or 36 h at 24°C. The incubation period is 12 to 19 days over a temperature range of 10°C to 25°C.

Currently available chemicals for managing the disease are copper and lime sulfur. Bordeaux mixtures or fixed coppers are commonly used to prevent copper injury. Lime sulfur can also eradicate the fungus in leaf tissue, but lime sulfur is difficult to work with and requires extra protective equipment for workers. Other fungicides such as zineb are effective but no longer available. Timing of fungicide treatments in California include a postharvest application and an early spring application. Others, however, have indicated that spring treatments are less effective. Use of copper treatments at these time periods corresponds with olive knot management timings. With more regulations concerning the use of copper (new copper limits for agricultural uses) and lime sulfur, alternative fungicides are needed that are highly efficacious and persist for extended time periods to prevent infections over the winter and spring when rainfall results in infection periods. In 2018, the

multisite mode of action (MOA) fungicide Ziram and a pre-mixture of two single-site MOA fungicides, Inspire Super, were approved for residue trials at the IR-4 National Food Use Workshop in September for registration on olives. Strong support was provided based on the after-harvest and winter season usage with expected zero to limit-of-detection residues on the crop in the following harvest season. Ziram is a FRAC Code M3, whereas Inspire Super is a FRAC Code 3/9. Thus, integration of multi-site MOA for both products was also established as an effective anti-resistance strategy. Residue trials were conducted in 2019 and laboratory analyses will take place in 2020. Research on these and other fungicides needs to continue to identify other potential products and optimal use strategies (e.g., timing, adjuvants).

Fig. 2. Range of symptoms of Peacock spot caused by *Fusicladium oleagineum*.

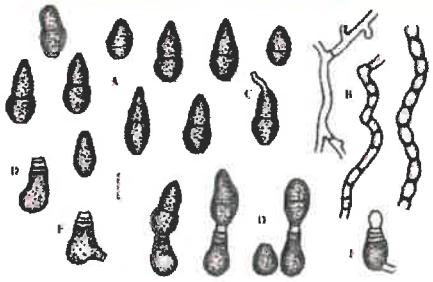


Fig. 2. *Fusicladium oleagineum*.
A - conidia. B - superficial septate hyphae, C - germinating conidium, D - conidiogenous cells with several conspicuous annellations, E – percurrent proliferating conidiogenous cell, F - conidiogenous cell arising from a hypha. Scale = 10 µm.

OBJECTIVES

1. Evaluate the performance of new and older fungicides in field trials.
    a) Multisite MOA fungicides - Dithiocarbamates (ziram) and chlorinated hydrocarbons (chlorothalonil), (FRAC Codes – M3, M5),
    b) Single-site MOA fungicides - DMIs (FC 3), polyoxins (FC 19), or mixtures such as FC 3/9, and FG 3 + 19.
2. Evaluate application timing and adjuvants of selected treatments.
    a) Timing: Fall, spring, or fall and spring.
    b) Adjuvants: NuFilm-17, capric/caprylic acids, oil (to increase persistence or activity over the fall/winter season)
3. Evaluate new fungicides for their in vitro activity.
    a) Determine the in vitro activity of selected fungicides that are effective in field trials.

PLANS AND PROCEDURES

1. *a,b. Evaluate the performance of new and older fungicides in field trials.* In studies in a commercial olive orchard where the disease is known to occur and in an experimental orchard at UC Davis, fungicides including ziram (FC M3), chlorothalonil (FC M5), difenoconazole (FC 3), and polyoxin-D (FC 19), or mixtures such as difenoconazole/cyprodinil (FC 3/9) and difenoconazole+polyoxin D (FC 3+19) will be applied using an air-blast sprayer. There will be four replications for each treatment in a randomized complete block design. Disease incidence and severity will be evaluated in late spring. Data will be analyzed statistically using ANOVA procedures and mean separation procedures of SAS 9.4.

2. *Evaluate application timing and adjuvants of selected treatments.* In field studies, selected fungicides will be applied at different timings to compare fall vs. spring or fall + spring timings. Additionally, capric/caprylic acids to improve pesticide performance will also be evaluated in combination with selected

treatments (e.g., Inspire Super, polyoxin-D, etc.). This will be compared to standard adjuvants such as oil, and Nu-Film17. There will be four replications for each treatment in a randomized complete block design for a factorial experiment. Disease incidence and severity will be evaluated in late spring. Data will be analyzed statistically using ANOVA procedures and mean separation procedures of SAS 9.4.

3. *Evaluate new fungicides for their in vitro activity.* Isolates of the pathogen will be obtained from several locations. To evaluate the in vitro toxicity of selected new fungicides with efficacy in field trials, the SGE method will be used. Agar media will be amended with fungicides in radial concentration gradients using a spiral plater. Suspensions of spores or mycelial strips will be placed radially onto the amended media. This will allow the determination of EC_{50} values for each fungicide and isolate using a computer program.

BENEFITS TO THE INDUSTRY

Little information is available on the management of peacock spot although the disease is widely distributed and causes sporadic losses in olive growing regions of California. Chemical management is currently based on the use of copper and lime sulfur, two materials that are increasingly being restricted by regulatory agencies at the state and federal levels. Thus, the evaluation of the efficacy and timing of new and older fungicides is needed to provide the industry with alternative treatments for peacock spot management. With Ziram and Inspire Super (difenoconazole+cyprodinil) accepted into the IR-4 program in September 2018, registrations are planned in 2022, and efficacy data needs to be expanded. Due to the small acreage of olive production in California, registration of any new material will be limited to registrants that are willing to cooperate and to registration processes though the IR-4 program. UPI (ziram) and Syngenta (Inspire Super) were very agreeable to our proposals for their respective products on olive. Still, the registration process will take several years to complete.

REFERENCES

1. Teviotdale, B. 2005. Diseases of olive. Pages 119-122 in: Olive Production Manual, 2nd Edition, G. S. Sibbett and L. Ferguson, technical editors. University of California ANR, Publication No. 3353.
2. Ogawa, J. M., and English, H. 1991. Diseases of Temperate Zone Tree Fruit and Nut Crops. University of California, DANR, Publication No. 3345.

Budget Request: (Supplemental to the Olive Knot Proposal)

Budget Year: 2020

Funding Source: California Olive Commission

Salaries and Benefits:	Post-Docs/RAs		7,000
	Lab/Field Ass't		0
	Subtotal		7,000
	Employees' Benefits		1,500
		Subtotal	8,500
Supplies and Expenses			0
Equipment and University Land and Orchard charges			0
Operating Expenses/Equipment Travel (Davis Campus only)			0
Travel			1,500
Department Account No. _____		**Total**	**10,000**

James E. Adaskaveg

Originator's Signature (PI) Date: Oct. 28, 2019

Katherine Borkovich

Dept. Chair, Kathy Borkovich (Riverside Campus) Date: Oct. 28, 2019

Liaison Officer _____ Date: _____

*******ACTION REQUIRED*******

FROM: RESEARCH SUBCOMMITTEE

SUBJECT: DELEGATION OF AUTHORITY FROM THE COMMITTEE TO THE SUBCOMMITTEE TO APPROVE THE CONTINGENCY FUND.

RECOMMENDATION: THAT the Committee to delegate authority to the Subcommittee to approve projects for contingency fund.

*******ACTION REQUIRED*******

FROM: RESEARCH SUBCOMMITTEE

SUBJECT: INTER-ITEM TRANSFERS OF THE RESEARCH BUDGET

RECOMMENDATION: THAT the Committee grant authority to the Executive Director and Chairman for inter-item transfers of the Research Budget.

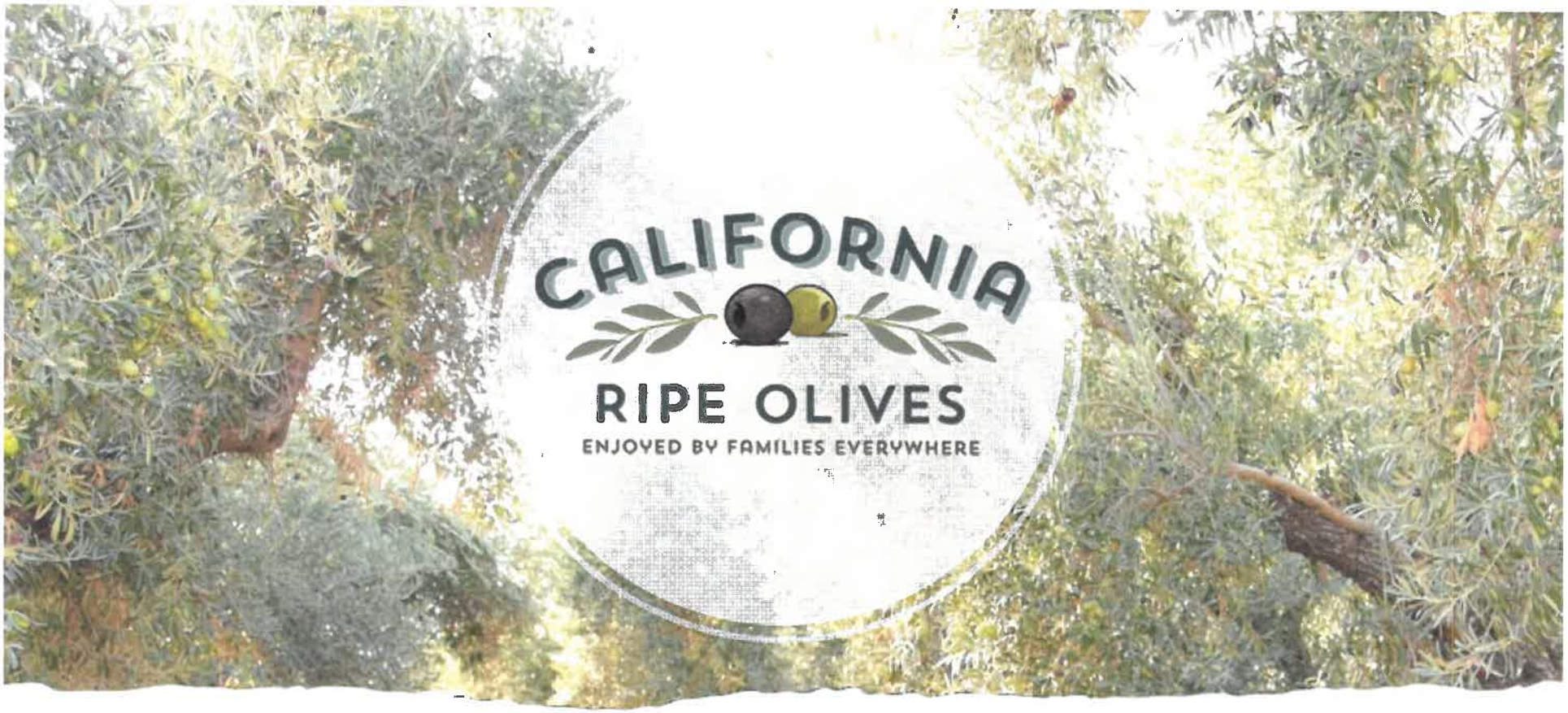
*****INFORMATION*****

FROM: MARKETING SUBCOMMITTEE

SUBJECT: 2019 MARKETING PROGRAM REVIEW

BACKGROUND: Fleishman Hillard will provide updates to on the current status of the 2019 marketing program and the activities that have gone on thus far.

FH Presentation



MARKETING PROGRAM

NOVEMBER 14, 2019

MARKETING PARTNERSHIPS 2019

- CA Grown
  - Increasing CA Ripe Olive Highlights
- Alliance for Food and Farming
  - Represent organic and conventional farmers of fruits and vegetables and farms of all sizes.
  - Deliver credible information about the safety of produce.
- CA Ag in the Classroom
  - Dedicated to educating youth throughout California about the importance of agriculture in their daily lives.

MARKETING 2019

PMA-International Reception
Olive Day
Crisis Communication

THANK YOU!

*******ACTION REQUIRED*******

FROM: MARKETING SUBCOMMITTEE

SUBJECT: INTER-ITEM TRANSFERS OF THE MARKETING BUDGET

RECOMMENDATION: THAT the Committee grant authority to the Executive Director and Chairman for inter-item transfers of the Marketing Budget.

*******ACTION REQUIRED*******

FROM: MARKETING SUBCOMMITTEE

SUBJECT: 2020 BUDGET

RECOMMENDATION: THAT the Committee adopt the Marketing Budget for the 2020 FY.

BACKGROUND: Each year, the Marketing Subcommittee approves a marketing plan with a contracted agency. The Subcommittee sent a request for proposals for the 2020 marketing program as required by USDA MOAD every five years. After reviewing the proposals, the Subcommittee chose to recommend to the Committee to continue with Fleishman-Hillard (FH) for the COC 2020 marketing program.

Additionally, the Committee needs to approve travel for staff, growers to various marketing events, association fees, and partnerships. These items total of $73,500.

1) Education and Partnerships - $73,500
    a. Alliance for Food and Farming
    b. CA Grown
    c. Partnerships
    d. Travel
    e. Olive Day
    f. Trade Show PMA
    g. Crisis Communication
    h. Ag in the Classroom

In addition, the Committee must approve the following:

1) Budget for the 2020 season; and
2) The Committee grant authority to the Executive Director and Chairman for inter-item transfers of the Marketing Budget.

FISCAL IMPACT: $73,500 for the COC Internal Marketing.
TBD for the 2020 COC Marketing Program (FH).
TBD Total COC 2020 Marketing Budget.

*******FOR YOUR INFORMATION*******

FROM: INSPECTION SUBCOMMITTEE

SUBJECT: ELECTRONIC REPORTING- OERS

BACKGROUND: In 2014, the Committee launched the Olive Electronic Reporting System (OERS). In 2015, the system was refined as the COC added additional features to aide with congestion at the scale house. In addition to the OERS system, the COC and the industry continue to capitalize on technology in an effort to provide real value by implementing usage of the Multiscan I5 Optical Sizing machines. The optical sizer cuts down on labor, processors' time, and provides a higher degree of accuracy while also decreasing subjectivity in the grading process. Going into year six of this technology's usage, we have continued confidence with the system, its functionality, and stabilization.

In 2019, we made number of enhancements such as:

1. Added capabilities to better manage growers' deliveries by variety. This includes:
    a. Adding Sevillano flag to the Grower page.
2. Troubleshooting and fixing:
    a. Issues with managing the Bins in and out counts.
    b. Issues with sample printer.
    c. COC-3 certificates.
    d. COC-5 data entry screen.
3. Enhancements made to:
    a. Weight Master screen, including validations and flow,
    b. Void certificates.
    c. The user set-up screen.
4. Created:
    a. logic/code to reset COC-3s and batch.
    b. COC-5 print/reprint capability along with the COC 5 report.
    c. Added capabilities to capture before and after changes to any COC-3 certificate.
5. Completed:
    a. 2020 harvest set-up.
    b. migration to Microsoft Azure server including database server, web server.
    c. the migration of the Reporting Services and emails to the new server.
6. Implemented:
    a. Secure Socket Layer (SSL) for the website.
    b. tested the new features on all the desktops and laptops: including uninstalling the old app, installing the new app from the secure server, troubleshooting and testing - mostly done on site and/or remotely

*******ACTION REQUIRED*******

FROM: INSPECTION SUBCOMMITTEE

SUBJECT: 2020 BUDGET

RECOMMENDATION: THAT the Committee adopt the Inspection Budget for the 2020 FY.

BACKGROUND: Last year, the Committee did not allocate additional dollars for inspection as electronic reporting and optical sizing projects were carried over from previous years. With the systems in place, the industry is seeing success in both the reporting and optical sizing. Adjustments and maintenance will be performed as needed for the program to maintain the integrity of the system and to ensure the technology keeps up with software and other items.

For the 2020 FY, below are the following expenditures for the COC Inspection program.

1. Travel - $3,000
2. ORES Maintenance - $40,000
   (Olive Electronic Reporting System)
3. Optical Sizer (misc. as needed) - $7,000
4. CA Grown Inspection - $5,000

Staff has put together a history of previous Inspection Committee Budgets.

FISCAL YEAR	2020 (Proposed)	2019	2018	2017	2016
INSPECT	$ 50,000	$ 58,000	$ 77,000	$ 98,000	$ 102,000
CA Grown*	$ 5,000	$ -	$ -	$ -	$ -
Differ	$ (8,000)	$ (19,000)	$ (21,000)	$ (4,000)	$ 102,000

*Contingent on the approval of the CA Grown marketing partnership.

The Sub-Committee must decide:

1) Approval of the 2020 Inspection Budget; and
2) Grant authority to the Executive Director with oversight by Chairman for inter-item transfers of the Inspection Budget.

FISCAL IMPACT: $55,000 for FY 2020.

*******ACTION REQUIRED*******

FROM: INSPECTION SUBCOMMITTEE

SUBJECT: INTER-ITEM TRANSFERS OF THE INSPECTION BUDGET

RECOMMENDATION: THAT the Committee grant authority to the Executive Director and Chairman for inter-item transfers of the Inspection Budget.

*****INFORMATION*****

FROM: EXECUTIVE COMMITTEE

SUBJECT: EXPORT PROGRAM UPDATE

BACKGROUND: In December of 2018, the Subcommittee approved the 2019 Export Program.

The COC staff will present a brief progress summary on the 2019 Export Program activities to date.

EC Export Update

*******ACTION REQUIRED*******

FROM: EXECUTIVE SUBCOMMITTEE

SUBJECT: 2020 BUDGET

RECOMMENDATION: THAT the Committee adopt the General Administration 2020 FY Budget.

BACKGROUND: The following is the General Administration Budget and Export Budget for the California Olive Committee.

Staff has put together a history of previous Executive Committee Budgets.

FISCAL YEAR	2020 (Proposed)	2019	2018	2017	2016
ADMIN	$ 357,800	$ 390,400	$ 401,200	$ 392,100	$ 399,800
$ Change	$ (32,600)	$ (10,800)	$ 9,100	$ (7,700)	$ 6,300
Sec. 8e Evaluation	$ -	$ 150,000	$ -	$ -	$ -
$ Change	$ (150,000)	$ 150,000	$ -	$ -	$ -
Exports	$ 173,500	$ 173,500	$ 186,000	$ 121,000	$ 85,000
$ Change	-	$ (12,500)	$ 70,000	$ 36,000	$ 13,000
MAP/EMP/ATP	$ 694,000	$ 801,000	$ 250,000	$ 236,000	$ -
$ Change	$ (107,000)	$ 551,000	$ 14,000	$ 236,000	$ -

The Sub-Committee must decide:

1) Approval of the 2020 Fiscal Budget
2) Recommend to the Committee to delegate authority from the Committee to the Executive Director with oversight by the Chairman, for Inner-Item transfer fund Authority

FISCAL IMPACT: $531,300 for FY 2020

GENERAL ADMINISTRATION BUDGET	Budget 2016	Budget 2017	Budget 2018	Budget 2019	BUDGET 2020	Diff.
Salaries	$ 118,000.00	$ 110,000.00	$ 118,000.00	$ 118,000.00	$ -	$ (118,000)
Attorney/crisis communication	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ -
Audit Fee	$ 8,500.00	$ 8,500.00	$ 8,500.00	$ 8,500.00	$ 8,500.00	$ -
Bookkeeper	$ 5,000.00	$ 8,000.00	$ 8,000.00	$ 9,500.00	$ 10,800.00	$ 1,300
Accounting Service	$ 1,800.00	$ 1,900.00	$ 2,000.00	$ 2,000.00	$ -	$ (2,000)
Vacation & Sick Leave Expense	$ 5,000.00	$ 5,000.00	$ 5,000.00	$ 5,000.00	$ -	$ (5,000)
FICA & Medicare Expense	$ 10,000.00	$ 10,000.00	$ 11,000.00	$ 12,000.00	$ -	$ (12,000)
Health Insurance	$ 28,000.00	$ 25,000.00	$ 25,000.00	$ 25,000.00	$ -	$ (25,000)
Disability Insurance	$ 3,000.00	$ 2,500.00	$ 2,500.00	$ 2,500.00	$ -	$ (2,500)
Pension Plan Contribution	$ 4,500.00	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ -	$ (4,000)
Storage	$ 1,100.00	$ 1,300.00	$ 1,300.00	$ 500.00	$ 500.00	$ -
Telephone	$ 5,500.00	$ 5,500.00	$ 5,500.00	$ 5,500.00	$ -	$ (5,500)
Travel Committee	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ 12,000.00	$ 12,000.00	$ -
Travel Office	$ 15,000.00	$ 15,000.00	$ 15,000.00	$ 15,000.00	$ 15,000.00	$ -
Travel Insurance	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 1,800.00	$ 1,500.00	$ (300)
General Insurance	$ 6,900.00	$ 6,900.00	$ 6,900.00	$ 6,900.00	$ 4,000.00	$ (2,900)
Insurance-members/management	$ 10,000.00	$ 11,000.00	$ 11,000.00	$ 11,000.00	$ 11,000.00	$ -
Postage	$ 7,000.00	$ 7,000.00	$ 7,000.00	$ 7,000.00	$ 6,000.00	$ (1,000)
Office supplies	$ 4,700.00	$ 4,700.00	$ 4,700.00	$ 4,700.00	$ 3,500.00	$ (1,200)
Maintenance	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 1,000.00	$ 500.00	$ (500)
Printing - Admin	$ 11,500.00	$ 11,500.00	$ 11,500.00	$ 10,000.00	$ 10,000.00	$ -
Equipment, Software,Furniture	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 2,500.00	$ 1,500.00	$ (1,000)
Crop Estimate	$ 6,500.00	$ 6,500.00	$ 6,500.00	$ 6,500.00	$ 6,500.00	$ -
Misc. Admin Expense	$ 2,000.00	$ 2,000.00	$ 2,000.00	$ 1,500.00	$ 1,500.00	$ -
Education Training	$ 4,000.00	$ 4,000.00	$ 4,000.00	$ 3,000.00	$ -	$ (3,000)
Crisis Communication	$ -	$ -	$ -	$ -	$ -	$ -
California Apple Commission	$ 90,000.00	$ 90,000.00	$ 90,000.00	$ 90,000.00	$ 240,000.00	$ 150,000
Exports/Industry Studies	$ 85,000.00	$ 121,000.00	$ -	$ -	$ -	$ -
Section 8e evaluation	$ -	$ -	$ -	$ 150,000.00	$ -	$ (150,000)
						$ -
TOTAL	$ 484,800.00	$ 513,100.00	$ 401,200.00	$ 540,400.00	$ 357,800.00	$ (182,600)

TOTAL FOR G&A =	$357,800
Total for Exports =	$173,500

		Budget 2017	Budget 2018	Budget 2019	Budget 2020	DIFF
EXPORTS:						
Asia Logistica		$ 10,000.00	$ 15,000.00	$ 12,000.00	$ 12,000.00	$ -
Industry Relations	**TOTAL FOR**	$ 15,000.00	$ 15,000.00	$ 12,000.00	$ 12,000.00	$ -
BCI	**MAP &**	$ 45,000.00	$ 45,000.00	$ 45,000.00	$ 45,000.00	$ -
Misc.	**TASC DOLLARS**	$ 5,000.00	$ 5,000.00	$ 2,500.00	$ 2,000.00	$ (500)
FAS/USADEC	**FOR MATCH**	$ 3,000.00	$ 3,000.00	$ 3,000.00	$ 3,500.00	$ 500
Japan		$ 10,000.00	$ 20,000.00	$ 20,000.00	$ 20,000.00	$ -
India/SEA		$ 12,000.00	$ 10,000.00	$ 7,500.00	$ 7,500.00	$ -
China/SE Asia		$ 15,000.00	$ 15,000.00	$ 10,000.00	$ 10,000.00	$ -
Canada		$ 3,000.00	$ 3,000.00	$ 3,000.00	$ 3,000.00	$ -
Fruit Logistica		$ 10,000.00	$ 15,000.00	$ 12,000.00	$ 12,000.00	$ -
Mexico		$ 3,000.00	$ 5,000.00	$ 3,000.00	$ 3,000.00	$ -
Management		$ -	$ 35,000.00	$ 35,000.00	$ 35,000.00	$ -
ATP		$ -	$ -	$ 8,500.00	$ 8,500.00	$ -
						$ -
TOTAL		$ 121,000.00	$ 186,000.00	$ 173,500.00	$ 173,500.00	$ -
MAP DOLLARS						
CANADA		$ -	$ -	$ 15,000.00	$ 90,000.00	
MEXICO		$ -	$ -	$ -	$ 120,000.00	
JAPAN		$ 100,000.00	$ 100,000.00	$ 100,000.00	$ 255,000.00	
SE ASIA		$ -	$ -	$ -	$ 110,000.00	
TOTAL		$ 100,000.00	$ 100,000.00	$ 115,000.00	$ 575,000.00	
EMP						
India		$ 68,000.00		$ -	$ -	
China		$ 68,000.00		$ -	$ -	
Mexico		$ -	$ -	$ -	$ -	
Canada		$ -	$ -	$ -	$ -	
TOTAL		$ 136,000.00	$ -	$ -	$ -	

ATP					
UK	$ -	$ -	$ 48,000.00	$ -	
SE ASIA	$ -	$ -	$ 48,000.00	$ 119,000.00	
TOTAL	$ -	$ -	$ 96,000.00	$ 119,000.00	
TOTAL MAP/EMP/ATP/TASC	$ 236,000.00	$ 100,000.00	$ 211,000.00	$ 694,000.00	

MAP/EMP/ATP/TASC are all reimbursable dollars

*******ACTION REQUIRED*******

FROM: EXECUTIVE SUBCOMMITTEE

SUBJECT: INTER-ITEM TRANSFERS OF THE EXECUTIVE BUDGET

RECOMMENDATION: THAT the Committee grant authority to the Executive Director and Chairman for inter-item transfers of the Executive Budget.

*******ACTION REQUIRED*******

FROM: CALIFORNIA OLIVE COMMITTEE

SUBJECT: 2020 BUDGET

RECOMMENDATION: THAT the Committee adopt the 2020 FY Budget.

BACKGROUND: The following is the proposed total 2020 FY Budget.

TOTAL 2020 BUDGET

BUDGETS	MARKETING	RESEARCH	INSPECTION	EXECUTIVE	TOTAL
2020	**TBD + $73,500**	**$275,606**	**$55,000**	**$531,300**	**TBD**

FISCAL IMPACT: $TBD for FY 2020.

*******ACTION REQUIRED*******

FROM: CALIFORNIA OLIVE COMMITTEE

SUBJECT: 2020 ASSESMENT RATE

RECOMMENDATION: THAT the Committee adopt the 2020 Assessment Rate.

BACKGROUND: The following is the proposed 2020 Assessment Rate.

HISTORIC BUDGET, TONNAGE, & ASSESSMENT COMPARISON

FISCAL YEAR	*2020 (Proposed)*	*2019*	*2018*	*2017*	*2016*
Budget	TBD	$ 1,628,923	$ 1,795,477	$ 1,752,366	$ 1,525,415
$ Change	TBD	$ (166,554)	$ 43,111	$ 226,951	$ 228,684
Tonnage	$ 81,689	$ 17,953	$ 90,188	$ 63,000	$ 77,977
Assessment Rate	TBD	$ 44	$ 24	$ 26	$ 26

FISCAL IMPACT: TBD per ton for FY 2020

2020 (Proposed)	
Budget	
$ Change	
Tonnage	
Assessment Rate	