CALIFORNIA OLIVE COMMITTEE
2565 Alluvial Ave. • Suite 182
Clovis, CA 93611
PHONE 559/456-9096 FAX 559/456-9099

AGENDA
Ripe Olive Research Subcommittee Meeting
Double Tree • Sonoma Room
Monday, April 11, 2016
10:00 a.m.

I. Call to Order

   a. Roll call
   b. Approval of 11-5-15 Research Subcommittee minutes (action item)
   c. Research Subcommittee Chairman comments (action item)

II. Discussion and Review of Proposals

   a. Hedge Rowing – Richard Rosecrance
   b. Black Scale - Kent Daane

III. Adoption of Proposals for 2016 (action item)

IV. Other Business

V. Adjournment

COC Subcommittees for 2015-2017

Executive Subcommittee:

12 Michael Silveira, G-1
Mark Hendrixson, G-2
Dennis Burreson, MUS
Vacant, BCF
Tim T. Carter, BCF
Ed Curiel, G-1
Janet Edwards, MUS
Felix Musco, MUS
Edward Garcia, G-1
Mark Heuer, G-2
Pat Ricchiuti, G-2
Doug Reifsteck, BFC

Marketing Subcommittee:

14 Bill McFarland, MUSCO
Vacant, BCF
Tim T. Carter, BCF
Ed Curiel, G-1
Wai Wu, MUS
Julia Inestroza, G-2
Pat Ricchiuti, G-2
Scott Hamilton, MUS
Mark Hendrixson, G-2
Maria Belshaw, BCF
Edward Garcia, G-1
Michael Silveira, G-1
Rick Benson, G-2
Pablo Nerey, G-1

Inspection Subcommittee:

16

Julia Tinsley, BCF
Paul Danielson, G-2
Julia Inestroza, G-2
Dennis Burreson, MUS
Pablo Nerey, G-1
Rick Benson, G-2
Janet Edwards, MUS
Ben Hall, MUS
Chris Henderson, G-1
Doug Reifsteck, BCF
Cody McCoy, BCF
Larry McCutchen, MUS
Scott Patton, G-1
Phil Quigley, BCF
Art Hutcheson, G-2
Edward Garcia, G-1

Research Subcommittee:

14

Dennis Burreson, MUS
Julia Tinsley, BCF
Art Hutcheson, G-2
Scott Patton, G-1
Bert Ouezada, G-2
Paul Danielson, G-2
Vito Deleonardis, G-2
Chris Henderson, G-1
Cody McCoy, BCF
Ben Hall, MUS
Phil Quigley, BCF
Felix Musco, MUS
Pablo Nerey, G-1
Ed Curiel, G-1

CALIFORNIA OLIVE COMMITTEE

Research Subcommittee Meeting Minutes
Thursday, November 5, 2015
11:00 a.m.
Double Tree- Modesto, CA
1150 9th Street

I. CALL TO ORDER

A meeting of the Research Subcommittee was called to order by Dennis BURRESON at 11:04 a.m., and the following members were present:

Members	Affiliation:
Dennis BURRESON	Musco
Bert QUEZADA	Grower
Cody MCCOY	Bell-Carter
Janet EDWARDS	Musco
Mike SILVEIRA	Grower
Pablo NEREY	Grower
Ed CURIEL	Grower
Phil QUIGLEY	Bell-Carter
Pat V. RICCHIUTI	Grower
Felix MUSCO	Musco
Carla ANDERSON	Bell-Carter
Julia TINSLEY	Bell-Carter
Rick BENSON	Grower

Others Present:	
Alexander OTT	COC
Denise JUNQUEIRO	COC
Liza RAMON	COC
Terry VAWTER	USDA
Kim BEDWELL	Fleishman Hillard
Dan BARBER	Fleishman Hillard
Adrienne YOUNG	CA GROWN

Charles PICKETT	CDFA
Peishih LIANG	USDA
Ron HAFF	USDA

With a majority of the Subcommittee members present, a quorum was established.

MOVED BY Pat V. RICCHIUTI, duly seconded by Ed GARCIA, and unanimously carried THAT the minutes of the July 30, 215 Research Subcommittee meeting be approved. (Motion 11-5-15 #1)

MOVED BY Pat V. RICCIUTI, duly seconded by Cody MCCOY, and unanimously carried THAT the Committee nominate Dennis BURRESON, and THAT the nominations be closed AND a unanimous ballot be cast for the Research Subcommittee Chairman. (Motion 11-5-15 #2)

II. DISCUSSION AND REVIEW OF 2015 PROJECTS

Today, the Subcommittee was provided with a brief progress of the projects which was included in the meeting packet.

III. PRESENTATION OF 2016 PROPOSALS

Today, the Subcommittee was provided with 2016 proposals from each of the researchers:

2016 RESEARCH PROPOSALS FOR THE CALIFORNIA OLIVE COMMITTEE

TOPIC	LEADERS	AMOUNT
Northern Valley Olive Fruit Fly Monitoring Project	Ernie Simpson	$6,500.00
Southern San Joaquin Valley Olive Fruit Fly Monitoring Project	Jim Stewart	$6,334.00
PGRs and pruning treatments to manage alternate bearing	Carol Lovatt Elizabeth Fichtner	$16,045.00
Real-time removal of insect damaged olives from the processing team	Ron Haff	$35,000.00
Epidemiology and management of olive knot	Jim Adaskaveg	$42,000.00
Biological control of olive psyllid (renewal)	Charlie Pickett	$31,680.00
Propagating Dwarfing Olive Rootstocks and Establishing a Long Term Orchard	John Preece, Louise Ferguson	$15,096.00
TOTAL		$152,655

Closed session was held and the following projects were reported favorably.

IV. APPROVAL OF 2016 RESEARCH BUDGET

2016 RESEARCH PROPOSALS FOR THE CALIFORNIA OLIVE COMMITTEE

TOPIC	LEADERS	AMOUNT
Northern Valley Olive Fruit Fly Monitoring Project	Ernie Simpson	$6,500.00
Southern San Joaquin Valley Olive Fruit Fly Monitoring Project	Jim Stewart	$6,334.00
PGRs and pruning treatments to manage alternate bearing	Carol Lovatt Elizabeth Fichtner	$11,045.00
Epidemiology and management of olive knot	Jim Adaskaveg	$21,000.00
Biological control of olive psyllid (renewal)	Charlie Pickett	$15,840.00
Propagating Dwarfing Olive Rootstocks and Establishing a Long Term Orchard	John Preece, Louise Ferguson	$15,096.00
Contingency		$135,000.00
TOTAL		$210,815.00

MOVED BY Mike SILVEIRA, duly seconded by Julia Tinsley, and unanimously carried THAT the following 2016 projects were approved with a contingency fund of $135,000. (Motion 11-5-15 #3)

V. APPROVAL OF AUTHORITY TO THE CHAIRMAN TO APPROVE NO-COST EXTENSIONS

Each year, researchers will request a no-cost extension should their program run past the Fiscal year. The committee adopted a policy a few years ago that allows the Executive Director in conjunction with the Chairman to approve such extensions.

VII. ADJOURNMENT

Chairman Dennis Burreson adjourned the meeting at 12:41pm.

I hereby certify that the above is full, true and correct copy of the minutes of the meeting held on November 5, 2015 in Modesto, California, by the Subcommittee.

November 9, 2015 — Liza Ramon

Date: November 9, 2015 — Liza Ramon, California Olive Committee

SUMMARY OF MOTIONS FOR NOVEMBER 5, 2015

Motion 11-5-15 #1 **APPROVED**

MOVED BY Pat V. RICCHIUTI, duly seconded by Ed GARCIA, and unanimously carried THAT the minutes of the July 30, 215 Research Subcommittee meeting be approved.

Motion 11-5-15 #2 **APPROVED**

MOVED BY Pat V. RICCIUTI, duly seconded by Cody MCCOY, and unanimously carried THAT the Committee nominate Dennis BURRESON, and THAT the nominations be closed AND a unanimous ballot be cast for the Research Subcommittee Chairman.

Motion 11-5-15 #3 **APPROVED**

MOVED BY Mike SILVEIRA, duly seconded by Julia Tinsley, and unanimously carried THAT the following 2016 projects were approved with a contingency fund of $135,000.

CALIFORNIA OLIVE COMMITTEE

PROJECT PLAN/RESEARCH GRANT PROPOSAL

Workgroup/Department: Olive / Plant Sciences College of Agriculture, CSU Chico

Project Year 2016 Anticipated Duration of Project: 4 years

Project Title: Canopy management, tree hedging and topping to optimize yield

Project Leaders:

Rich Rosecrance, Professor, California State University, Chico. College of Agriculture, 400 West First Street, Chico, CA 95929-0310: rrosecrance@csuchico.edu

William H. Krueger: Glenn County Farm Advisor (Emeritus): whkrueger@ucanr.edu

Louise Ferguson, Extension Specialist, Department of Plant Sciences, 2037 Wickson Hall, Mail Stop II, UC Davis, 1 Shields Ave., Davis CA 95616, (530) 752-0507 [Office], (559) 737-3061 [Cell] LFerguson@ucdavis.edu

Daniele Lightle: Glenn County Farm Advisor: DLightle@ucanr.edu

Cooperating Ranches and People:

Erik Nielsen Enterprises Inc. 4453 Co Rd O, Orland, CA 95963

Dennis Burreson, Musco Olives, 17950 Via Nicolo, Tracy, California 95377

Commodity: Olive Relevant AES/CE Project No.

Year Initiated: 2016 Current Funding Request: **31,075.00**

Problems and Significance:

Mechanical Hedging

Mechanical hedging and topping can be important tool in improving harvest efficiencies by affecting return bloom, helping to maintain trees in their allotted space and reducing hand pruning costs. Typically, hedging and topping result in smaller and more compact trees. Smaller trees will facilitate hand harvest by obviating the need for tall, cumbersome ladders and likely increasing the number of bins harvested per hour. Picking crews have repeatedly commented that they prefer to harvest from mechanically hedged and topped trees than from traditionally pruned trees (Louise Ferguson, personal communication). In oil olive orchards, mechanical hedging has resulted in increased harvest efficiency and reduced alternate bearing (Charlie

Garcia, California Olive Ranch, personal communication). However, timing of mechanical hedging is critical for optimal yields. Hedging too late in the season may not provide enough time for new shoots to grow and flower buds to initiate. Earlier work that we conducted on 'Arbequina' oil olives indicated that shoot growth that occurred after early July did not produce flowers the following year. Whether 'Manzanillo' olives will behave the same is unknown. Hedging too early in the season can cause extensive vegetative growth at the expense of fruit growth. Thus, finding 'the sweet spot' for the timing of mechanical hedging is important to maximize and help regulate yields.

Mechanical Topping

Unlike hedging, mechanical topping does not reliably produce a crop on shoots that grow in response to the topping. Our trials have demonstrated that topping produced vigorous growth with limited fruit and resulted in two problems: 1) The limited fruit in the upper canopy ripened sooner than the rest of the crop, producing overripe fruit that decreased grade and value by 25%, and 2) Vigorous vegetative growth that can shade fruitwood and decrease yields, even when the tree is topped every other year. The solution appears to be to top the tree annually with a gabled cut to eliminate this overly vigorous growth and overripe fruit.

Optimizing Tree Light Interception at different tree heights, and latitudes

A program that evaluates light interception at different tree heights, row spacings, and latitudes has been developed in Spain. We will be working with Dr. Francisco Rojo (post doc in Dr. Shrini Upadhyaya's lab, UC Davis) who recently developed a Matlab program for determining optimal tree spacing and height to maximize light interception at different latitudes.
This program will assist us in our hedging and topping treatment to increase light interception and yield.

Fruit Nutrient Removal Calculator

Significant quantities of nitrogen, phosphorus and potassium are removed by harvested portions of fruit crops. Thus, the nutrient removal rate is an important consideration for making fertilizer recommendations. Inadequate fertilization and/or nutrient imbalance can prevent growers from achieving desired fruit yields and quality. Recently, we developed a macro- and micro-nutrient removal calculator for 'Arbequina' oil olives (Figure 1). Oil olives, however, are smaller and have a greater pit to flesh ratio than 'Manzanilla' table olives, which influence fruit nutrient content. An online fruit nutrient removal calculator needs to be developed for table olives.

We propose to:

1. Investigate the effects of timing of mechanical hedging on return bloom, yield on mature trees. The objective is to determine the optimal timing of hedging for hedgerow plantings for generating a 5-ton or more per acre annual average crop.
2. Compare the effects of a mechanical pruning program that incorporates annual topping at two different tree heights to controlling the tree height. All of the treatments would

receive an every other row middle hedging. The objective is to determine the optimal hedgerow height for generating a 5-ton per acre annual average crop that can be produced with mechanical pruning. This data could then be used to evaluate the program for determining optimum tree height for hedgerow plantings.

3. Compare results from hedging and topping trials with the MatLab program which predicts optimal tree size and spacing to maximize light interception.
4. Develop a web-based fruit nutrient removal calculator for 'Manzanillo' table olives

Materials and Methods:

Experiment 1: Mechanical Hedging (possible sites include Erik Nielsen's and Dennis Burreson's orchard)

Hypothesis: optimal timing or mechanical hedging will not decrease yield and will facilitate mechanical harvesting.

Overall Objective: to determine the optimal timing of mechanical hedging for table olive productivity and fruit quality.

2016 Objectives:

I. Hedge Trees Monthly
II. Evaluate effect of pruning treatments on shoot growth, and return bloom and quality: perfect versus imperfect flowers.
III. Evaluate effect of pruning treatments on yield and fruit quality.
IV. Determine optimal timing of hedging treatment to facilitate high quality fruit production and return bloom.

Materials and methods:

Experimental Design:
Randomized complete block of four replications.

- Treatments: Evaluate timing by hedging the south side of the tree at monthly intervals starting in April and ending in August. Twelve trees from 4 tree rows will be hedged each month.
    - Hedging will aim to remove about 50 percent of the new growth
    - middle 10 trees of each treatment will be the data trees

- Data Collection:
- 100 fruiting and 100 non-fruiting branches will be tagged after hedging treatment
- Shoot growth will be measured at the end of the seasons
- At bloom the following season, flowering intensity (inflorescences per branch) will be determined from the tagged branches
- Following bloom, fruit set will be determined
- Measure fruit removal and yields following mechanical trunk shaking in the hedged trees.

- Data Analysis:
  - The following relationships will be evaluated statistically for the trial:
    - Effect of time of hedging on shoot growth in both fruiting and non-fruiting shoots.
    - Effect of time of hedging on flowering the next year from fruiting and non-fruiting shoots
    - Effect of time of hedging on fruit set the next year from fruiting and non-fruiting shoots
    - Evaluate the effects of the treatments of fruit removal and yields following mechanical trunk shaking.

Desired Results:
The goal of this experiment is to determine the most effective timing of canopy hedging to ensure return bloom and minimize excessive vegetative growth. We have conducted preliminary work on 'Manzanillo' trees and found that fruiting shoots did not growth if trees were hedged later than mid-August. These results need to be substantiated with further research. If time permits, we would also like to conduct a similar experiment on young trees. The goal of this experiment is to determine the most effective timing of shoot tipping to encourage early flowering and production and to develop short statured trees suitable for higher density plantings and capable of early production with easier hand harvest.

Experiment 2: Mechanical Topping

Materials and Methods:
Experimental Plot: Nickels Estate - 2 acre 'Manzanillo' orchard established in 2002.

Hypothesis: mechanically topping hedgerow olive orchards will not decrease yield and will reduce hand harvesting costs by producing shorter statured trees.

Overall Objective: to determine the optimal row height for table olive productivity and fruit quality at a 12 X 18' orchard spacing (202 trees/acre) and develop the formulas for applying this information to different latitudes and orchard spacing.

2016 Objectives:

V. Apply two different tree height pruning treatments and compare to controlling tree height with hand pruning
VI. Install sunlight exposure monitoring cameras
VII. Evaluate effect of pruning treatments on bloom quality: perfect versus imperfect.
VIII. Evaluate effect of pruning treatments on yield and fruit quality in upper and lower canopy at harvest.
IX. Correlate hours of sunlight exposure with fruit yield and quality.

Materials and methods:

Experimental Design:
Randomized complete block of four replications: map attached

- Treatments: three pruning treatments of three, 10 tree rows
    - topped at 10 and 13 feet in February 2015 and compared to pruning to lateral branches at 13 feet using thinning cuts
    - middle row of each treatment will be the data row
    - alternate row side hedging treatments will be applied

- Data Collection:
- Wingspan 24 hour monitoring cameras will be positioned at the northern end of 10-tree sets to monitor the E-W sun exposure of the canopies on both sides of the row.
- At bloom the canopy will be evenly divided into upper and lower quadrants
    - 5 shoots per tree will be collected at full bloom and evaluated for perfect vs. imperfect flowers
- A late-season mid-day light interception measurement will be done to determine the percentage of light each treatment is intercepting.
- Trees will be harvested and fruit quality will be assessed from samples taken from the upper and lower tree canopy.
- Yields will be compared with the MatLab program that predicts optimal tree size and spacing to maximize light interception.

- Data Analysis:
    - The following relationships will be evaluated statistically for the east and west sides, within the three pruning treatments:
        - Effect of pruning treatment on ratio of perfect to imperfect flowers
        - Effect of pruning treatment on total yield and fruit quality; size and color
        - Correlation of each of the above parameters with total hours of light exposure through the season from bud swelling through harvest.

      Because the crop was extremely heavy in 2015 (Approximately 11 tons per acre) a light crop is expected in 2016.

Desired Results:
To determine how canopy management with mechanical topping and hedging affects total hours of canopy light exposure and therefore flower production, fruit yield and quality. The ultimate goal is to demonstrate how to calculate the optimal tree height for moderate density orchards at different latitudes.

Olive Nutrient Removal Calculator

At fruit maturity, fruit samples will be collected from a eight orchards up and down the state. Fruits will be dried, grown, and analyzed for maco- and mico-nutrients. We will use these data to develop a nutrient removal calculator. Growers will input their olive yield and this web-based tool will determine the amount of macro- and micro-nutrients removed in the harvested crop, similar to what is shown in Figure 1.

BUDGET REQUEST –

Budget Year: 2016-2017 Funding Source: COC

Personnel:

Rich Rosecrance, California State University, Chico, professor.	6,000.00
data collection and entry, harvest support. (~87 hrs @ $69/hr)	
Student (summer and fall; 375 hours at $12/hr)	4,500.00
Fringe @ 13.17%	1,383.00
Independent Contractor - Bill Krueger: Glenn County Farm Advisor (emeritus):	6,000.00
Technical Support - data collection and entry, harvest support.	
Sub 1	**17,883.00**

Equipment Supplies & Expenses:

24 Wingstop Time-Lapse Cameras @ 150.00/camera + peripherals	3,600.00
http://www.wingscapes.com/wingscapes-timelapsecam	
(monitor sun exposure of the trees throughout the day)	
Sub 2	**3,600.00**

Pruning and Harvesting Costs: (based on previous year's cost)

Hand pruning, brush shredding: Nickels Estate	1,500.00
Mechanical harvest (ENE Inc.) at Nickels Estate:	1,500.00
Hand harvest at Nickels Estate (post mechanical harvest)	1,000.00
Nutrient Analyses (18 samples x $56/sample)	1,000.00
Miscellaneous harvest supplies: water, gloves, tarps, buckets	1,000.00
Sub 3	**6,000.00**

Experimental Travel Costs:

Travel support for plot set-up, data collection, harvesting.	2,112.00
(8 months X 4 RT/month @ 120 miles/trip X .55/mile)	
Sub 4	**2,112.00**

Facilities and Admin @ 5%	**1,480.00**
TOTAL BUDGET	**31,075.00**

Scope of Work

Dr. Richard Rosecrance:
Responsible for overall coordination of the project, applying pruning treatments, executing harvest trials, developing fruit nutrient calculator, data collection and analysis and writing final report.

Bill Krueger, Louise Ferguson, and Dani Lightle: Responsible for assisting in the mechanical pruning treatment in Orland and Nickels trial and co-coordinator of harvesting the trials.

External Contractors: contracts to be secured after funding.

Pruning Contract at Nickels Soils Laboratory: Colusa, California
Hillary Nielsen Porter
ENE Inc.
4453 County Road O
Orland CA 95963
ENE@EneInc.com
Office: 800-844-9409
FAX: 530-865-4845

Figure 1. Nutrient removal calculator for 'Arequina', 'Arbosana', and 'Koroneiki' olive oil cultivars. Data will be collected to include 'Manzanillo' in the fruit nutrient removal calculator.

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

FROM: RESEARCH SUBCOMMITTEE

SUBJECT: 2016 RESEARCH PROJECT

RECOMMENDATION: THAT the Subcommittee approve the proposed research project for 2016.

BACKGROUND: The Research Subcommittee established a contingency fund of $135,000 for potential projects for the 2016 budget. Staff received two potential projects featured below and it is the Subcommittee job today to decide on the granting of funding.

2016 RESEARCH PROPOSALS FOR THE CALIFORNIA OLIVE COMMITTEE

TOPIC	LEADERS	AMOUNT
Canopy management, tree hedging and topping to optimize yield	Richard Rosecrance	$31,075.00
Black Scale	Kent Daane	$0
TOTAL		$31,075.00

FISCAL IMPACT: $ 31,075