

2015-2016
CALIFORNIA OLIVE COMMITTEE
ANNUAL REPORT



2015-2016 ANNUAL REPORT

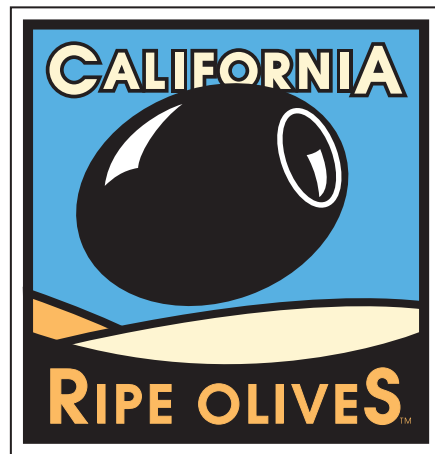


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MESSAGE FROM THE EXECUTIVE DIRECTOR



ALEXANDER J. OTT
EXECUTIVE DIRECTOR
CALIFORNIA OLIVE COMMITTEE

In 2016, the California Olive Committee (COC) continued its momentum from 2015 moving several industry items forward. These included: verifying the new optical sizer; obtaining Market Access Program (MAP) dollars for Japan; applying for Emerging Market Program (EMP) dollars for China and India; building upon last year's marketing program for California Ripe Olives, utilizing the message "from our table to yours"; and continuing valuable research for growers to reduce production costs and protect its crop. Lastly, the COC continues to confirm that its standards and sizing are maintained in order to ensure that all countries importing olives, as well as olives produced domestically, meet the same standards.

In 2017, the industry will continue to follow its 2014 Strategic Plan. The plan outlines the COC's marketing, research, inspection, and export programs. The COC continues to be diligently fund these programs with the goal to "Provide and maintain a viable and profitable table olive industry."

Increased production costs, more competition from foreign suppliers, lack of labor, and Mother Nature continue to place challenges on the industry. These global challenges dare farmers to become innovative and proactive in developing solutions, and, thanks to the COC, looking at areas that reduce these challenges and costs on the industry will only be proactive moving forward.

**"THESE GLOBAL CHALLENGES DARE
FARMERS TO BECOME INNOVATIVE
AND PROACTIVE."**

It is my pleasure to present you with the 2016 Annual Report. Contained in the report are the latest research programs, a summary of the COC marketing programs, updates on its export markets, standards, and statistics. The COC continues to work hard on behalf of the industry. Many thanks to the Board of Directors, staff, and USDA for assisting the industry in addressing the issues and goals of California black and green ripe olive producers and growers. Thank you for your continued support and for allowing me to serve as your Executive Director.

Highest Regards,

A handwritten signature in black ink, appearing to read "Alex J. Ott". The signature is fluid and cursive.

Alexander J. Ott

CHAIRMAN'S CORNER

"IT HAS BEEN A PRIVILEGE AND PLEASURE TO SERVE AS YOUR CHAIRMAN...AND I LOOK FORWARD TO ASSISTING OUR TABLE OLIVE INDUSTRY IN THE YEAR AHEAD."

The California Olive Committee (COC) is comprised of two canneries and nearly a thousand growers who are responsible for producing over 95% of ripe olives grown in the United States. The COC, founded in 1965, administers marketing order programs for olive growers and canners under Federal Marketing Order No. 932 and the Agricultural Marketing Agreement Act of 1937. The COC authorizes crop and processing research, crisis communication, and development projects, which include paid advertising.

In addition, the COC also has the authority, under a provision known as Section 8e, to implement grade and size regulations to ensure the standards of size, color and flavor are met by all olives entering the United States. The Section 8e essentially maintains the quality of olives shipped to consumers, and continues to be crucial to our ripe olive industry.

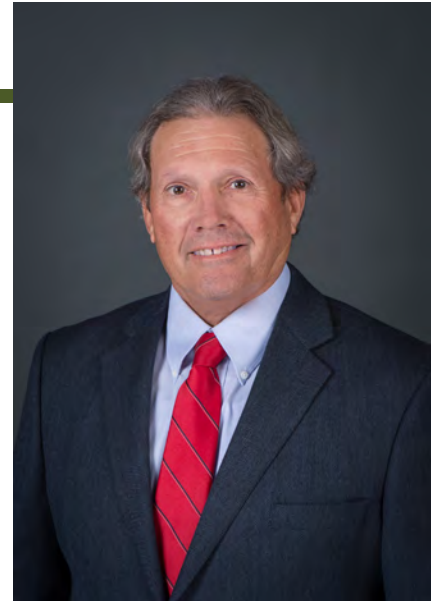
The Section 8e authorizes the COC to maintain grade, size and quality regulations for ripe olives being shipped to our consumers. To date, there are only 13 other Federal Marketing Order Commodity Groups that have this authority. This means that all imports of ripe olives into the United States must adhere to the same minimum standards, as specified by the COC. The Section 8e requirements are intended to help develop dependable marketing of ripe olives by enforcing the stated standards thus encouraging consumer satisfaction and repeat purchases. The Section 8e is also there to discourage a poor quality product which could cause disruption in the market place. In addition, violators of the Section 8e face penalties which include: an assessed daily penalty of one thousand one hundred dollars per violation per day, denied entry to future shipments of olives, and civil forfeiture of the value import. This is just another reason why the California Ripe Table Olive Industry's support of the COC has been so important in the past, and going into the future. With all of the changes that are happening at a record pace, it is important to understand what tools we have available to meet these challenges, and certainly the Section 8e is one of them.

Once again I want to close by thanking our Table Olive Growers and Ripe Olive Processors for supporting their Federal Marketing Order, the California Olive Committee. It is because of your support that we are able to ensure the success and vitality of our industry, and I once again want to state what a privilege and a pleasure it has been to serve as your Chairman these past years, and I look forward to assisting our Table Olive Industry in the year ahead.

Sincerely,



Michael Silveira



MICHAEL SILVEIRA
CHAIRMAN
CALIFORNIA OLIVE COMMITTEE

2015-2016

BOARD OF DIRECTORS

PRODUCERS

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

Members	Alternates
Ed Curiel	Chris Henderson
Edward Garcia	Scott Patton
Pablo Nerey	Michael Silveira

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

Members	Alternates
Mark Hendrixson	Vito DeLeonardis
Mark Heuer	Paul Danielson
Art Hutcheson	Bert Quezada
Julia Inestroza	Rick Benson
Pat V. Ricchiuti	Vacant

HANDLERS

Members	Alternates
Cody McCoy	Carla Anderson
Doug Reifsteck	Vacant
Tim T. Carter	Phil Quigley
Julia Tinsley	Vacant
Janet Edwards	Larry McCutcheon
Felix Musco	Benjamin Hall
Bill McFarland	Wai Wu
Dennis Burreson	Scott Hamilton

ALL ABOUT RIPE OLIVES

Olive Heritage

A History as Old as Western Civilization

The wild olive (oleaster) grows in most countries of the Mediterranean, even in Southeast Asia and other areas. It is an unimpressive straggly plant, with little resemblance to the olive tree, *Olea europaea*, which may have been first cultivated as early as five thousand years ago in Crete and Syria.



New World Transplant

The olive tree flourished in Spain, Tunisia, Morocco and Mediterranean countries for thousands of years, but it was not until the mid-sixteenth century that there is a record of cuttings being carried to Peru by the Spaniards. In the 1700s Franciscan monks brought the olive to Mexico and then north to California by way of the missions. The first cuttings were planted in 1769 at the San Diego Mission. However, it was not until the late 1800s that commercial cultivation began in warm, sunny valleys of Central and Northern California.

An Industry Founded by a Housewife

In the 1800s many acres of olive trees were planted because of the demand for olive oil. Freda Ehmann and her son, Edwin, purchased such an orchard in the Oroville area of Northern California around that time. Soon, with the trees barely producing and oil prices dropping, only their tough German heritage convinced them to continue to search for other outlets for their fruit. Consulting with a Berkeley professor on processing methods, Freda began experimenting with 280 gallons of olives in barrels on the back porch of her home. The black olives she produced were a decided success and the California Ripe Olive Industry was born. Freda Ehmann's grandson would later write: "Where science and chemical exactness had failed, the experience and care of a skillful and conscientious housewife succeeded."



The California Olive Industry Today

Today, the California Olive Industry consists of two canneries which process the 80,000 to 125,000 tons of olives produced by approximately 27,000 acres growing in the warm inland valleys of the state. There are about 1,000 growers with orchards varying from as few as five acres to multi-crop farms with over 1,000 acres. Tulare County in the central San Joaquin Valley has over 56 percent of olive acreage, while Kern, Fresno and Madera counties account for about 8 percent. In the Sacramento Valley to the north, Glenn, Tehama, Shasta and Butte counties represent about 36 percent of the acreage.

The California Varieties

California has two main varieties —Manzanillo, which represents most of the acreage; Sevillano, which produce the larger sizes. Approximately 95 percent of ripe olives grown in the United States come from California, and over 90 percent of the California crop is processed as black and green ripe olives. The remaining olives are processed into various specialty styles, or crushed for olive oil.

Cultivation and Harvest

The mild winters and hot dry summers of California's great valley are reminiscent of the olive's native Mediterranean home. The olive tree tends to be alternate bearing, producing a large crop one year with a smaller crop the next. Modern cultivation practices of pruning and thinning have helped to minimize this characteristic to some extent.

Olive trees bloom in May with delicate, cream-colored flowers. By mid-September, the harvest begins. Olives destined for the canneries are picked when they are still green, but beginning to show a little color. Most olive orchards are picked by hand except for a few larger acreages, which are mechanically harvested by machines that shake the trees and catch falling olives in a frame. Dumped into bins, the olives are taken to the cannery where they are sorted, graded, and processed.

Curing

Olives, as they come from the tree, are too bitter to eat without some kind of curing. There are many different methods used around the world. In California, most olives become California black or green ripe olives, however, a few become specialty olives.

These olives are processed in a lye curing solution that leaches the bitterness out. California Ripe Olives have a firm texture and smooth, mellow taste. Once curing is complete, a series of cold water rinses removes every trace of curing solution. During the curing process, which takes several days, a flow of air bubbling through the olives produces the natural, rich dark color. In green olives, however, the oxygen step is omitted to retain the rich green coloring. A trace of organic iron salt (ferrous gluconate) is added to act as a color fixer so the olives will have less tendency to fade after the cans are stored.

Canning is the final step. Ripe olives are canned in a mild salt brine solution and, because they are a low-acid product, are heat sterilized under strict California State health rules.

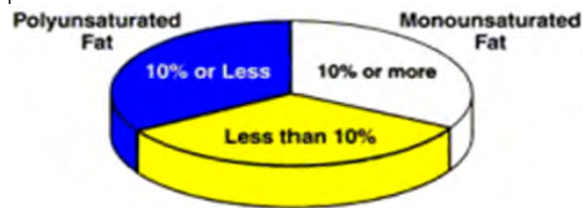
To ensure consistent quality, color, flavor and texture all canned Ripe Olives packaged in California are inspected by the U.S. Department of Agriculture. California Ripe Olives come whole, pitted, sliced, chopped, or wedged. They are readily available year round in the grocery store.



Monounsaturated Fats: A Nutritious Choice

Select your fat sources wisely, by decreasing consumption of foods high in saturated fats and choosing foods high in monounsaturated fats more often.

California Ripe Olives are a good source of monounsaturated fat. There are only two grams of fat in a 15 gram serving, with the majority of fat coming from monounsaturates and part of the remaining fats being essential fatty acids. One serving contains only three percent of your total fat intake for the day. Contrary to what you may think, olives are not high in calories. In fact, an extra large Black Ripe Olive has only seven calories and a serving equal to only 25 calories! This makes olives an ideal snack or ingredient for adding flavor and variety to the lower fat meals you prepare.



Fats are not Created Equally

It's important to understand the different types of fat and those foods most commonly associated with them. Fats are generally classified as saturated, polyunsaturated, and monounsaturated. While some fats - saturated - are linked to elevated levels of LDL-cholesterol ("bad" cholesterol) in the blood, monounsaturated actually lower "bad" LDL levels. It's critical to pay attention to the type of fat in various foods. Focus on decreasing saturated fats and choosing sources of monounsaturated fats like those found in olives and olive oil. Here are the basics:

Saturated Fat Most commonly found in foods of animal origin. Sources include red meats, poultry, dairy products, eggs, and coconut and palm oils.

Polyunsaturated Fat Most often found in foods of plant origin. Sources are corn, safflower, sunflower and sesame oils, and some nuts and seeds.

Monounsaturated Fat Also found in foods of plant origin. Sources include olives and olive oil along with canola oil, nuts, and avocados.

Recommended Sources of Fat Health experts recommend that no more than 30 percent of daily calories come from fat sources with most of your fat intake coming from polyunsaturated and monounsaturated fats.

Fat and Cholesterol: There is a Link

Simply put, cholesterol - made in the body primarily in your liver - is a "cousin" of fat belonging to a chemical group called lipids. Cholesterol and fat travel in the bloodstream in packages called "lipoproteins."

Medical experts are concerned about the two main ways that cholesterol is carried in your bloodstream. One is low-density lipoproteins, LDL-cholesterol is considered "bad," because a high level of LDL-cholesterol increases the risk of fatty deposits forming in the arteries, which in turn increases the risk of heart disease. The other way that cholesterol is carried in the bloodstream is in high-density lipoproteins, or HDL (good)-cholesterol. HDL seems to have a protective effect against heart disease. In fact, low levels of HDL (good)-cholesterol are related to an increased risk of heart disease.

Choose Your Fat Wisely

To protect against heart disease, it's important to lower LDL-cholesterol, and **not** the HDL-cholesterol. Polyunsaturated fats can help lower (bad) LDL-cholesterol, but at the same time, they have also been found to lower the (good) HDL-cholesterol. That's why nutrition authorities recommend that monounsaturated fats be the major source of fat in the diet. Monounsaturates, like the fat found in olives and olive oil, can help lower (bad) LDL-cholesterol while maintaining or raising the (good) HDL-cholesterol.

Identifying Fats - Being a Better Label Reader

Look for the Nutrition Facts panel, like the one shown here for ripe olives, to get information about the product's serving size and the amounts of nutrients like fat, sodium, and fiber. Remember all foods fit into a healthy diet as long as you balance your choices. A specific food is neither "good" nor "bad"; rather, it's your total daily diet that counts.

Nutrition Facts

Serving Size 4 Large Olives (15g)

Amount Per Serving

Calories 25 Calories from Fat 20

% Daily Value*

Total Fat 1.5g **4%**

Saturated Fat 0g **0%**

Trans Fat 0g

Polyunsaturated Fat 0g

Monounsaturated Fat 1.5g

Cholesterol 0mg **0%**

Sodium 115mg **5%**

Total Carbohydrate 1g **0%**

Protein 0g

Not a significant source of dietary fiber, sugars, vitamin A, vitamin C, calcium and iron.

*Percent Daily Values are based on a 2,000 calorie diet.

1. **Serving sizes** are now standard for similar foods. All other information on the label is related to serving size.
2. **Calories and Calories from Fat** are shown. The non-fat calories include carbohydrate and protein.
3. **Total Fat, Monounsaturated, Polyunsaturated and Saturated Fat** represent the grams of fat in a single serving. Some products may not have all of these listed. Look for the term monounsaturated and select the best sources like olives and olive oil.
4. **Total Carbohydrate** lists the amount in grams per serving.
5. **% Daily Value** shows how foods fit into a daily diet of 2,000 calories. For example, the % Daily Value column shows the fat in a serving compared to 65 grams of fat - the amount recommended for a 2,000 calorie a day diet.

Care and Storage

California Ripe Olives are packed in a light brine solution, not only to bring out the flavor of the fruit, but also to protect them in transportation. The recommended shelf life for unopened cans is 36-48 months. They may be stored at room temperature.

Once opened, store unused California Ripe Olives in their original brine in the open can and cover with plastic wrap to allow oxygen to permeate. Do not store California Ripe Olives in an airtight container as harmful toxins may develop. If the original brine has been discarded, replace with a solution of one cup of water and 1/2 teaspoon salt in order to keep the olives wet and free from external odors. Partially used cans of California Ripe Olives may be held in the refrigerator for up to ten days.

CALIFORNIA OLIVE COMMITTEE INFORMATION

Established Under A Federal Marketing Order

Federal Marketing Order No. 932 was established in 1965 by olive growers and canners under the Agricultural Marketing Agreement Act of 1937 to effect the orderly marketing of olives grown in California.

The California Olive Committee administers the Marketing Order programs. The Committee, serving for a period of two years, consists of eight producer members, plus 8 alternates, representing the growers from our olive growing districts. The remaining members include 8 handler members plus 8 alternates, representing the two canneries in California.

Decisions made by the Committee are subject to approval by the Secretary of United States Department of Agriculture. At the present time, provisions of the Marketing Order apply only to black and green canned ripe olives and not to tree-ripened, Spanish style, olive oil, Sicilian, Greek, or other styles of olive. The program is funded by an assessment, established every December, on each ton of olives received for use as canned ripe olives.

Committee Functions and Expenditures

Committee functions and expenditures fall into four main categories:

- Administrative;
- Crop & Processing Research;
- Incoming & Outgoing Inspection; and
- Marketing and Public Relations.

Administrative

The Committee employs an Executive Director and staff responsible for administering each and aspect of the program. Their duties include compiling statistical data for the industry, ensuring compliance with the Order, and overseeing marketing and public relations functions.

Crop and Production Research

Each year the olive industry funds research conducted by the University of California and others on various issues effecting the production. In recent years, funds have been allocated to combat the olive fly flavor profiling, mechanical harvesting, and disease prevention.

Incoming and Outgoing Inspection

1. Incoming regulations set up under the Order state that each lot of natural condition olives received by a handler, designated for canned ripe olives, are size-graded by California State inspectors and classified as canning, limited, undersize, or culls to ensure fair payment to the grower for his fruit.
2. Outgoing regulations require that inspection be made of canned olive products by inspectors of the U.S. Department of Agriculture to ensure standards of size, color and flavor are met. The outgoing inspection also ensures that handlers dispose of undersize and cull obligations into outlets other than canned ripe olives. Outgoing regulations also apply to imported canned ripe olives.

Marketing Program

The Committee executes various marketing and PR efforts to promote and build awareness about California Ripe Olives. Efforts include utilization of social media, partnerships, news media and special events.



MEET THE COC STAFF

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tsanders@calolive.org

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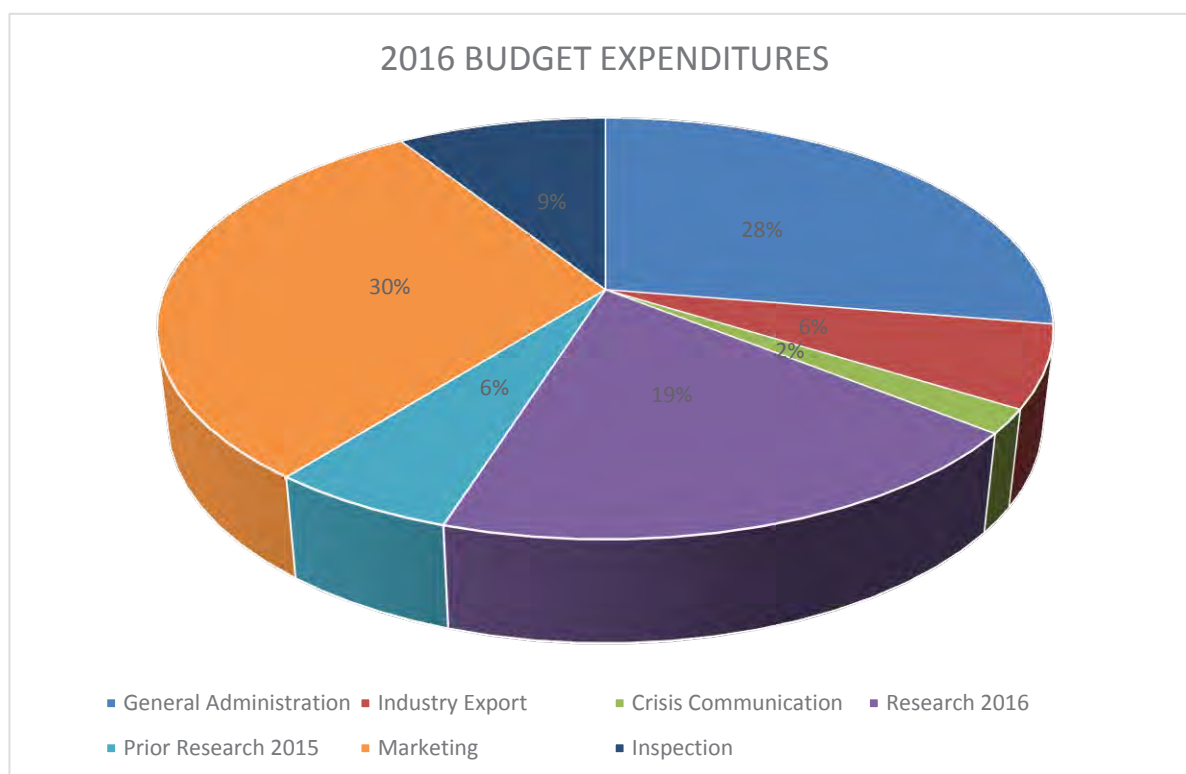
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BUDGET FOR ACTIVITIES

2016 Fiscal Year

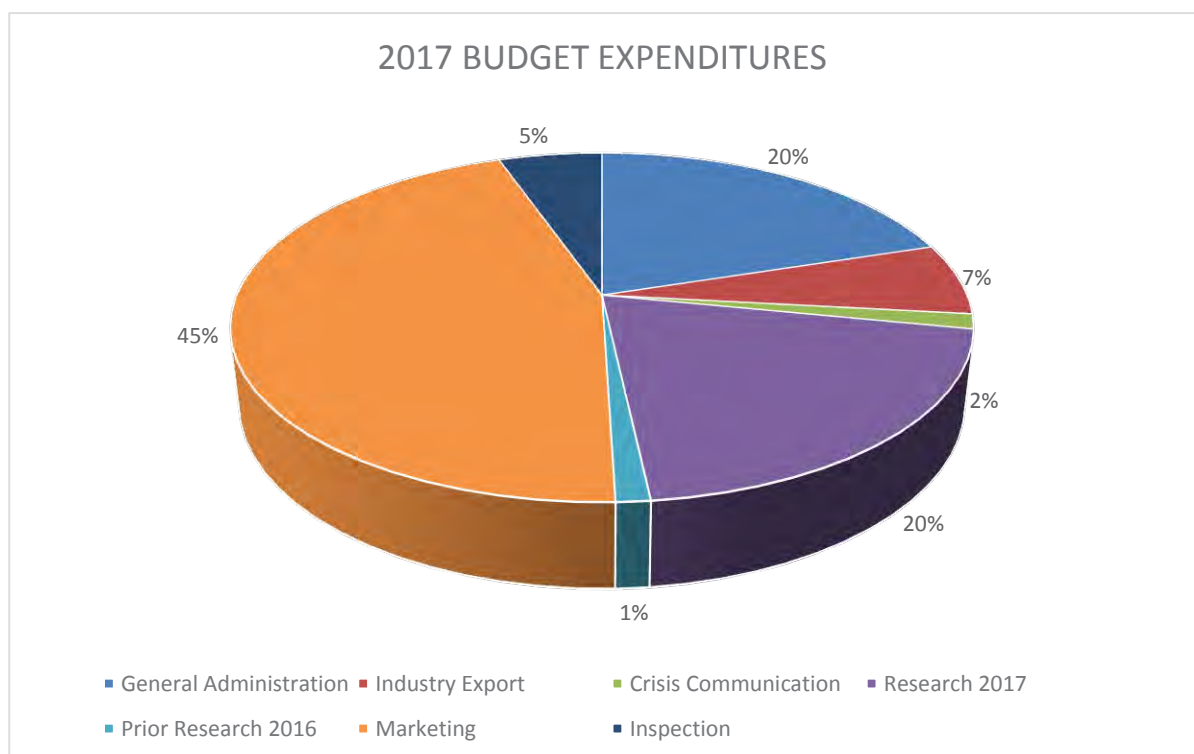
General Administration	\$484,800
<ul style="list-style-type: none"> General Administration Expenditures Crisis Communication/Attorney Industry Export Studies 	\$374,000 \$25,000 \$85,000
Research 2016	\$210,815
Prior Research 2015	\$33,541
Marketing	\$689,300
Inspection	\$102,000
TOTAL BUDGET	\$1,558,956



BUDGET FOR ACTIVITIES

2017 Fiscal Year

General Administration	\$513,000
<ul style="list-style-type: none"> General Administration Expenditures Crisis Communication/Attorney Industry Export Studies 	\$367,100 \$25,000 \$121,000
Research 2017	\$367,767
Prior Research 2016	\$23,063
Marketing	\$823,500
Inspection	\$98,000
TOTAL BUDGET	\$1,825,330



California Olive Committee

Assessment Rates and Budgets: 1965-2016

Crop	Assmt Rate per Ton (\$)	Assess Tons (\$)	COC Admin (\$)	Research (\$)	Marketing (\$)	Brand (\$)	Total Budget (\$)
1965-66	1.5	n/a	43,800	16,200			60,000
1965-67	1.75	49,298	65,500				65,500
1965-68	2.5	n/a	52,000				52,000
1965-69	6.5	69,218	80,617	17,075	232,580		330,272
1965-70	6.5	53,157	76,430	17,397	185,000		278,827
1965-71	9	36,730	80,472	15,000	219,528		315,000
1965-72	13	35,077	92,000	46,000	420,850		558,850
1965-73	13	20,009	84,595	22,500	160,000		267,095
1965-74	15	57,393	97,960	35,000	653,391		786,351
1965-75	15	48,939	97,550	43,000	1/ 624,945		765,495
1965-76	15	52,245	117,350	26,100	1/ 753,100		896,550
1965-77	14	62,151	127,526	22,000	741,474		891,000
1965-78	12	33,881	102,262	26,738	450,000		579,000
1965-79	15	102,959	117,350	35,000	1,017,650		1,170,000
1965-80	14.33	49,424	116,000	40,000	1,040,128		1,196,128
1965-81	16.73	71,447	114,859	44,775	1,330,991		1,490,625
1981-82	28.26	38,964	123,143	33,887	899,600		1,056,630
1982 Interim			58,450	47,868	250,780		357,098
1983-COC	12.65	114,622	142,250	50,242	1,299,030		2,544,222
1983-BC	8.93					1,052,700	
1984-COC	26.22	47,276	141,832	37,526	1,052,660		2,009,518
1984-BC	16.54					777,500	
1985-COC	19.8	79,118	150,700	60,000	1,316,060		2,162,360
1985-BC	8.25					635,600	
1986-COC	20.91	83,361	148,800	61,185	1,534,250		2,318,235
1986-BC	6.92					574,000	
Fiscal Year	Assmt Rate	Assess Tons	COC Admin	Research	Marketing	Capital	Total Budget
1987	20.03	95,424	189,550	80,500	1,592,350		1,862,400
1988	23.92	57,300	435,434	51,948	1,140,100		1,627,482
1989	25.39	74,200	312,014	79,032	1,511,250		1,902,296
1990	20.68	100,000	337,540	94,500	1,627,250	8,650	2,067,940
1991	20.23	104,600	353,545	126,000	1,635,000		2,114,545
1992	20.68	57,192	348,230	65,000	1,419,000		1,832,230
1993	25.75	147,000	393,000	80,000	2,323,000		2,796,000
1994	27.21	101,000	384,730	80,000	3,258,860	25,000	3,748,590
1995	30.04	69,300	389,650	80,000	2,412,000		2,881,650
1996	28.26	62,182	388,350	213,000	1,999,435		2,600,785
1997	14.99	144,075	390,890	173,375	1,595,000		2,159,265
1998	17.10	85,585	357,900	50,000	1,308,500	34,000	1,750,400
1999	26.18	67,990	352,685	466,150	1,123,640		1,942,475
2000	21.73	122,113	356,190	903,550	1,212,495		2,472,235
2001	27.90	46,374	343,490	408,337	596,415		1,348,242
2002	10.09	123,439	339,650	250,000	811,935	27,000	1,428,585
2003	13.89	89,006	347,090	250,000	633,500		1,230,590
2004	12.18	102,727	360,563	225,000	633,500	(Insp)50,000	1,269,063
2005	15.68	85,862	337,014	200,000	680,000		1,217,014
2006	11.03	114,761	290,421	210,000	800,700		1,301,121
2007	47.84	16,270	252,171	365,775	362,450		980,396
2008	15.60	108,059	288,552	500,000	750,000	(Insp)50,000	1,588,552
2009	28.63	49,250	359,549	495,000	627,800		1,482,349
2010	44.72	22,150	324,923	300,000	255,000	(Insp)50,000	929,923
2011	16.61	151,683	335,900	1,093,009	700,000	(Insp)75,000	2,203,909
2012	31.32	25,587	333,500	333,791	480,000	(Insp)50,000	1,197,291
2013	21.16	74,755	333,800	213,018	637,380	(Insp)105,000	1,289,198
2014	15.21	86,110	346,500	217,582	565,600	(Insp)37,800	1,167,482
2015	26.00	35,399	465,500	259,231	450,000	(Insp)122,000	1,296,731
2016	26.00	71,703	484,800	210,815	727,800	(Insp)10,2000	1,515,415

DISTRICT MAP



STRATEGIC PLANNING



STRATEGIC PLANNING SUMMARY

In 2014, the California Olive Committee (COC) adopted and implemented a strategic action plan for the Committee. The meeting brought together all segments of the California table olive industry including: The California Olive Committee, the California Olive Growers Association, and the California Olive Growers Council.

The industry discussed all aspects of the industry and how all organizations could work together with the mission of the industry to: "Provide and maintain a viable and profitable table olive industry."

For the Committee's part, the COC will focus on eight items placed in five areas. The following document is the California Olive Committee's Strategic Action Plan that was adopted in July of 2014. For a copy of the full strategic planning session, please contact the Commission office.



CALIFORNIA OLIVE COMMITTEE

PROPOSED STRATEGIC ACTION PLAN

Prepared by

California Olive Committee Management & Staff

July 31, 2014

On May 6, 2014 the California Olive Committee's Strategic Planning Sub-Committee Committee approved nine strategic focuses. As requested by the Sub-Committee, management has outlined necessary items and objectives needed in order to implement the Strategic Focus of the Sub-Committee's Strategic Plan. The Proposed Strategic Action Plan (SAP) outlines: focus, specific items for each focus, timeline and budget in order to fund these activities. This document specifically outlines issues relating to each of the nine focuses and provides a roadmap to implement these items. **These items are specific to the Committee's responsibilities and do not factor the necessary budgets for the trade associations to do their assigned activities.** Although other issues may rise to the Committee's attention, the focuses provide management and staff guidance on what is important to the California olive industry while allowing for flexibility for the management and staff to address issues not necessarily identified in this paper.

This document is intended to be a tool for the Committee's Board of Directors, membership, management, and staff when approaching challenges to the California Olive industry. Additionally, this action plan should be monitored, updated and reviewed on a periodic basis to ensure that the Committee is staying the course.

APPROVED FOCUSES FOR COMMITTEE⁵

According to the Strategic Action Plan, eight focuses were approved. These included:

- *Maintain and address* Regulatory compliance, concerns, and issues;
- *Effective* Communication for the industry and its components;
- *Leverage* Quality (marketing);
- *Conduct* Research;
 - Improving Harvest Costs;
 - Modernization;

⁵ Dan Block, "California Olive Committee: Where do we go from here? 2006" (D.W. Block Associates, 2003) 6-7.

- *Maintain, address and implement* Federal Marketing Order, Grades, Standards (varieties & styles)
- *Apply, receive and implement* Grants, MAP, TASC, EMP dollars
- *Review and implement* Quality standards; and
- *Enforce* Standards (Section 8e).

ORGANIZATION OF FOCUSES

These eight focuses can be organized into five areas. Each area should have a Committee specifically to address the given areas, thus in turn assisting in implementing the focuses.

- Standards & Enforcement
 - *Enforce* Standards (Section 8e).
 - *Review and implement* Quality standards
 - *Maintain, address and implement* Federal Marketing Order, Grades, Standards (varieties & styles)
 - *Maintain and address* Regulatory compliance, concerns, and issues;
- Research
 - *Conduct* Research;
 - Improving Harvest Costs;
 - Modernization;
- Exports
 - *Apply, receive and implement* Grants, MAP, TASC, EMP dollars
- Marketing, & Education
 - *Leverage* Quality (marketing);
- Industry Relations
 - *Effective* Communication for the industry and its components

The following provides specific items for these areas. Each item contains specific issues that fall within the focus of the Committee. Several of these items are short-term goals while others will continue to be ongoing and will need staff to continually monitor the issue(s). It should be noted that these are items that are of current focus – meaning that as other challenges arise, the Committee should see how these challenges fit into the eight focuses of the Committee and then adopt an action plan for that specific issue(s).

1) STANDARDS & ENFORCEMENT

- Review of Federal Marketing Order and US Grading Standards;
- Research different varieties and potential standards for varieties;
- Review and research dollars and enforcement measures for rejected product;
- Implement electronic reporting; and
- Maintain communication with necessary government officials to enforce standards and enforcement.

2) RESEARCH

- Improving harvest costs;
- Modernization;
- Economic and Import analysis for table olives; and
- Pest and disease research

3) EXPORTS

- MAP & TASC applications
- Grants to assist in export markets

4) MARKETING & EDUCATION

- Quality;
- Buy California;
- Educating about availability; and
- Education on benefits of olive industry

5) INDUSTRY RELATIONS

- Outreach to industry on issues impacting industry; and
- Social media updating public on table olive industry

CALIFORNIA OLIVE COMMITTEE
STRATEGIC ACTION PLAN RECOMMENDATIONS

Prepared by Staff

July 31, 2014

The following recommendations have been suggested in order to implement the Committee's strategic plan as proposed by the Strategic Planning. Specifics of the plan are outlined within the comprehensive Strategic Action Plan Document.

Recommendations:

- Have Executive Committee provide guidance and parameters for all Sub-Committees.
- Add to the Executive Sub-Committee to identify export markets and be the lead on Market Access Program (MAP) and Technical Assistance of Specialty Crop (TASC) dollars.
- Fund the Export portion of the Sub-Committee to bring in the necessary experts for grant creation.
- Have the Executive Sub-Committee review table olive grades and standards and make a recommendation to the standards and enforcement Sub-Committees.
- As part of the Executive Sub-Committee, prepare a trip or two to D.C. to maintain relationships with the necessary government officials in order to communicate concerns or changes to standards and enforcement.
- Have a meeting with representatives of the other table olive entities to ensure that communication and issues are streamlined and shared.
- Continue to have Sub-Committees review their yearly objectives to achieve the Committee's strategic plan focuses.
- In order to ensure that the Committee is carrying out its goals, a review of the Strategic Plan should be held yearly by the Executive Sub-Committee.

INSPECTION



INSPECTIONS SUMMARY

The COC inspection programs continue to evolve, progress, and provide more value to the industry. The 2014 program year was the inaugural year for the Olive Electronic Reporting System (OERS). In 2016, the system was refined. The COC added more features to help with congestion at the scale house including: bin tag print outs, a new entry application, and im-provements for the users of the system.

OERS has a login and account feature for every grower. Growers now receive real time data and speak of its ability to create greater returns. Using the data, growers have better access for crop decision making. For example, growers may use this system to assist in timing of picking, identify accelerated ripening, or review crop "trash" reports at the receiving station. This technology, at the click of button, provides growers with the tools and opportunity to manage their orchards and review certificates with maximum efficiency.

Additionally, the industry continues to capitalize on technology in advancement of our process to provide real value. Currently, the industry started transitioning from using cable graders to opti-cal sizers on all varieties except Sevillano. The optical sizer cuts down on labor, processors time, and provides a higher degree of accuracy. Additionally, it decreases subjectivity.

If any growers have an interest in seeing the optical sizer at work, please contact your canner field representative. If you have any questions about OERS or would like to know how to use the system, please feel free to contact our office. User manuals for growers can also be found at calolive.org, within the industry section, under inspection.



CALIFORNIA OLIVE COMMITTEE

INCOMING INSPECTION REQUIREMENTS

2015-2016

U.S Standards & Marketing Order Sizes		Acceptable Count Ranges and Mid-Points							
		(Per Pound)							
Size Designation	Average Count Ranges Per Pound	Variety Group 1				Variety Group 2			
		Sevillano		Ascolano**		Obliza		Mission/Manzanillo*	
		Acceptable Count Range	Mid Point	Acceptable Count Range	Mid Point	Acceptable Count Range	Mid Point	Acceptable Count Range	Mid Point
Undersize	226-up	Undersize 106 - Up		Undersize 181 - UP		Undersize 181 - Up		Undersize 206 - up	
Sub-Petite	181-225							181-205	193
Petite	141-180							158-174	166
Small	128-140							132-138	135
Medium	106-127							110-122	116
Large	91-105	91-105	98	91-105	98	95-101	98	91-105	98
Extra-Large Sev "L"	76-90	82-90	86	--	--	--	--	--	--
Extra-Large	65-90	--	--	67-85	72-80	65-88	72-80	65-88	72-80
Extra-Large Sev "C"	65-75	67-73	70	--	--	--	--	--	--
Jumbo	47-60	47-60	47-60	47-60	47-60	47-60	47-60	47-60	47-60
Colossal	33-46	33-46	33-46	33-46	33-46	33-46	33-46	33-46	33-46
Super Colossal	32 or less	32 or less	32 or less	32 or less	32 or less	32 or less	32 or less	32 or less	32 or less

* Manzanillo includes Haas

** Ascolano includes St. Agostino and Barouni

	Undersize
	Limited Sizes

CALIFORNIA OLIVE COMMITTEE

OUTGOING INSPECTION REQUIREMENTS

2015-2016

Size Requirements and Percentage Tolerances								
Size Designation	SEVILLANO		ASCOLANO*		OBLIZA		MISSION/ MANZANILLO**	
Undersize	Undersize		Undersize		Undersize		Undersize	
35% less than 1/205lb.								
Sub-Petite			35% less than 1/180lb.		35% less than 1/180lb.		128-140	
Petite								
Small								
Medium	35% Less than 1/105lb.		91-105		106-127		106-127	
Large							All sizes 5 % less than 1/ 140 lb.	
Extra Large							65-90	
Extra Large			65-75		All sizes 5 % less than 1/ 127 lb.		65-90	
Jumbo			47-60	All sizes 5% less than 1/ 75 lb.			47-60	
Colossal	33-46	33-46						
Super Colossal	32 or less	32 or less						
	Tolerance (by count) 35% under 1/ 75 but not more than 10% under 1/ 86		Tolerance (by count) 35% under 1/ 105 but not more than 10% under 1/ 113		Tolerance (by count) 35% under 1/ 127 but not more than 7% under 1/ 138		Tolerance (by count) 35% under 1/ 140 but not more than 7% under 1/ 166	

* Ascolano includes St. Agostino and Barouni

** Includes Haas variety

	LIMITED USE SIZE and PERCENTAGE TOLERANCES
	Tolerances apply to MINIMUM WHOLE OR PITTED CANNING SIZE: Sevillano- Extra Large "C"; Ascolano- Large; Obliza- Medium; Mission/Manzanillo- Small

FOOD SAFETY MODERNIZATION ACT

The Food Safety Modernization Act (FSMA) is still moving forward full speed. Under the law, the Food and Drug Administration (FDA) is focused on prevention and risk based food safety standards. Several of the key components in the mandate include:

- Mandatory preventative controls for food facilities;
- Mandatory produce safety standards;
- Authority to prevent intentional contamination;
- Mandated inspection frequency;
- Record access;
- Testing by accredited laboratories ;
- Greater response and enforcement;
- Importer accountability – including third party certification; and
- Enhanced Partnerships through state, local and foreign capacity building.

Currently, the Preventative Controls Rule is for handlers, packers, and shippers. It is drafted and is already expected to be implemented by the industry. The Produce rule, designed for growers, has one of three guidance documents drafted. However, it is still expected that the industry should have these mandates in place by January 1, 2018. Growers are encouraged to attend an acceptable certification course as required under the law, to ensure they are trained for the new requirements. Lastly, those that import fruit into the U.S. will have to comply with the new import rule. Although draft guidance has not been issued, brokers, handlers, or importers should have a Food Safety Import program to satisfy the FSMA requirement. FDA has stated that they are taking into account the industry's comments on all draft guidance documents. Growers who wish to comment should do so as a grower or work with one of the two olive associations that represent California table olives.

RESEARCH



2015-2016 RESEARCH SUMMARY

In 2015-2016, the California Olive Committee focused on eight research projects.

These projects are as follows:

- 1) **Epidemiology and management of olive knot caused by *Pseudomonas savastanoi* pv. *savastanoi***- J.E Adaskaveg
- 2) **Managing Alternate Bearing in Olive with PGRs and Pruning**- Carol Lovatt and Elizabeth Fichtner
- 3) **Biological Control of Olive Psyllid Parasitoid, *Psyllaephagus euphyllurae***- C.H. Pickett
- 4) **Propogating Dwarfing Olive Rootstocks**- Dr. John Preece, Dr. Louise Ferguson
- 5) **Canopy management, tree hedging, and topping to optimize yield**- Rich Rosecrance, William H. Krueger
- 6) **Northern Sacramento Valley Olive Fruit Fly Monitoring Project**- Ernie Simpson
- 7) **San Joaquin Valley Olive Fruit Fly Monitoring Project**- Jim Stewart
- 8) **Table Olive Production Cost Study**- D.W. Block Associates, LLC

ANNUAL RESEARCH REPORT
California Olive Board and California Olive Oil Commission
December 2016

Project Year: 2016

Principal Investigators: J. E. Adaskaveg

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

Cooperating: D. Thompson, K. Nguyen, H. Förster, D.M. Lightle (UCCE - Glenn Co.), and E. Fichtner (UCCE-Tulare Co.),

Keywords: Bactericides, Biological controls, and Systemic Acquired Resistance (SAR) compounds

BACKGROUND

Olive knot caused by the bacterium *Pseudomonas savastanoi* pv. *savastanoi* (Psv) occurs throughout olive (*Olea europaea*) growing regions of the world including California (Young, 2004). The pathogen enters through wounds causing hyperplastic outgrowths (knots, tumors, galls, etc.) on branches and occasionally on leaves and fruit. Olive knot is one of the most economically important diseases of olives as infection may lead to tree defoliation, dieback, and reduced tree vigor, which ultimately reduces fruit yield and quality (Schroth, 1973). Typically, Psv can be found in high concentrations in woody knots or galls on olive branches, but the pathogen can also be found in low concentrations as an endophyte and as an epiphyte of the olive phyllosphere. Inoculum production of the pathogen is promoted during wet periods. It is exuded from knots and disseminated by rain, wind, insects, birds, and by human activity. We demonstrated that inoculum is produced very rapidly after wetting olive knots. The opportunistic pathogen takes advantage of injuries caused by natural leaf abscission, frost, and hail damage, as well as pruning and harvesting practices. These latter orchard practices lead to direct mechanical damage of the knots and exposure of inoculum. After entering its woody host, the pathogen actively induces knot formation by production of indoleacetic acid (IAA) and cytokinins. 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 fairly low temperatures (5-10°C) and thus, wetness and recent injuries are the main limiting factors for the disease. Historically, the most susceptible olive cultivars were Manzanillo, Sevillano, Ascolano, and Mission, and none of the newer cultivars is resistant to the pathogen.

Formation of olive knots on wounded, inoculated branches depends on inoculum concentration as well as cultivar. In our studies we are using a table olive, ‘Manzanillo’, and an oil olive, ‘Arbequina’, that are both highly susceptible to the disease. Knot induction is usually localized to the initial entry point of the bacterium. Systemic movement of the pathogen has rarely been observed (Wilson and Magie, 1964). In spring 2014 evaluations of our fall 2013 trials in commercial and experimental olive plots, we noticed apparent systemic movement of Psv which we never observed in any of our previous trials. Infections caused bark blistering and cracking, as well as development of knots in proximity to and away from the initial point of inoculation, even on neighboring branches. In more severe cases, inoculated branches died. Potential causes of systemic movement have not been well characterized. Thus, one of our objectives was to determine environmental factors leading to these symptoms and whether the pathogen is migrating internally or externally on the host. In 2016, we continued these low-temperature studies to determine if Psv can move systemically and develop knots under these conditions.

Any horticultural practice that promotes tree health and minimizes tree stress will reduce infections. Sanitation and prevention are successful strategies for management of olive knot. Removal of knots during dry periods (i.e., summer until early fall) reduces inoculum and infection at pruning sites. Because the bacteria may be carried on pruning tools, frequent disinfection is necessary. In our research we demonstrated that quaternary ammonia compounds are highly toxic against the olive knot pathogen in laboratory studies. These sanitizers are volatile compounds that leave near zero residues and are not corrosive to equipment. We extensively tested Deccosan 321 (Maquat 615HD) for its effectiveness against olive knot and obtained federal registration as a sanitizer of field equipment for use on olives in 2015. In

2015/16, we continued testing this treatment. We again evaluated the efficacy of Deccosan 321 as a pruning tool disinfectant. We also determined the effect of pH on the efficacy of this sanitizer. This information will be useful to possibly improve the efficacy of Deccosan 321 by changing the acidity of the solution, and this is also important to know, because the pH of different water sources in California can vary widely.

Spray applications of copper-containing bactericides can be very effective, but they often need to be repeated to protect new wounds. A minimum of two applications per year is usually necessary: one in the fall after harvest and before the rainy season starts and one in the spring when leaves are shed. Additional applications may be needed during winter rains, after hedging, or after spring/summer hail storms. If hedging is timed during the late leaf-drop period, this timing can be combined. Our evaluations of copper sensitivity in populations of the olive knot pathogen indicated a reduced sensitivity of all strains, and several strains showed resistance to copper. These results demonstrate a potential risk for widespread resistance development of Psv to copper with its continual and often exclusive use. Although copper-mancozeb mixtures are highly toxic to strains of Psv that are less sensitive to copper, the EPA will not allow additional crops to be added to the mancozeb label.

New copper formulations have been developed that possibly can be used at lower metallic copper rates while still maintaining efficacy. We tested several copper hydroxide formulations at the highest labeled rates which resulted in exceptional disease control, even when a copper-resistant Psv strain was used in inoculations. Selected copper mixtures improved copper performance in studies in 2015. To maintain efficacy and reduce resistance development, in 2016 we obtained additional data on using copper in mixed treatments with antibiotics and other compounds. Systemic acquired resistance (SAR) compounds were evaluated previously by us, and disease control was highly inconsistent. Therefore, this research was not further pursued.

We have been instrumental in the development of the new agricultural antibiotic kasugamycin (commercial name Kasumin) for several bacterial diseases of agronomic crops in the United States. Kasugamycin has high activity against *Erwinia* and *Pseudomonas* species and moderate activity against *Xanthomonas* species and other plant pathogenic bacteria. We found it to be the most promising new treatment for preventing olive knot in our field studies, including in a commercial application to inoculated branches. Kasugamycin is currently federally registered on pome fruit crops, whereas use on olives was approved as an “A” priority by IR-4 in Sept. 2014. Currently, the antibiotic is being submitted to the EPA by IR-4 for federal registration on olives. In the last several years of our studies, this has been an excellent treatment at 100 and 200 ppm (0.5-1 gal of Kasumin-2% formulation) for preventing olive knot when used as a protective treatment.

In Sept. 2015, we proposed and IR-4 accepted an “A” priority for oxytetracycline based on the need to develop several active ingredients that along with copper can be used in rotation or in mixtures. These antibiotics are considered low risk because their requested use is as after-harvest, dormant, and spring leaf drop treatments prior to the development of the crop in the current growing season. In 2016, we continued evaluating kasugamycin and oxytetracycline for managing olive knot caused by copper-resistant strains and at high concentrations of inoculum. Although copper-resistant strains of Psv have been detected, the incidence is still very low, accounting for about 2% of all strains collected in our surveys from commercial orchards in northern California (147 strains total).

In 2015/16, we continued our evaluations on the efficacy of new treatments for managing olive knot. We evaluated copper formulations, antibiotics, and selected mixtures. We determined if treatment persistence can be improved by the addition of oils or surfactants and if copper activity can be increased by using potential copper activity enhancers. This is important when copper-resistant strains of the pathogen have to be controlled. Additionally, in our 2016 studies, soil applications and trunk injections of kasugamycin were evaluated to determine if systemic uptake or eradication of the pathogen can be achieved. We also tried to improve the effectiveness of oxytetracycline because it demonstrated high activity against Psv in laboratory tests but we obtained inconsistent results in the field. This antibiotic is known to be rapidly degraded by sun light, and therefore, we evaluated the use of an ultraviolet-light (UV) protectant called Raynox that is used to prevent sunburn of apples to determine if we can improve the persistence and activity of the antibiotic against olive knot.

RESEARCH OBJECTIVES

- 1) **Continue quaternary ammonium compound (QAC) trials.**
 - a. Evaluate the performance of the quaternary ammonium compound Deccosan 321 as an equipment sanitizer under field conditions in comparison to chlorine by itself and in conjunction with additional foliar treatments (copper and kasugamycin).
 - b. Test the effect of pH on Deccosan 321 activity against Psv in direct contact assays.
- 2) **Efficacy of new bactericides.**
 - a. Optimize the efficacy of antibiotic treatments (kasugamycin, oxytetracycline, streptomycin) against Psv in greenhouse and field trials using various formulations (technical and commercial grades), application timings, and additives (UV blockers, buffering agents, etc.)
 - b. Develop copper activity-enhancing (CAE) materials such as Terrazole, Tanos, and amino-thiadiazole (ATD) when using maximum rates of copper.
 - c. Field trials on the persistence of copper-antibiotic mixtures after a rain event using stickers and oils vs. hydrated lime.
 - d. Field trials using high rates of copper mixed with antibiotics in tank mixtures as a resistance management strategy using copper-resistant strains of Psv.
- 3) **Epidemiology and management under different environmental conditions with copper-resistant strains of the pathogen.**
 - a. Continue to conduct growth chamber studies to reproduce systemic infections of Psv.
 - b. Determine if protective treatments can reduce infection of olives under low-temperature conditions using different rates and or application timings.
 - c. Greenhouse studies on soil drench application of antibiotics (e.g., Kasumin) against olive knot systemic infections using potted olive plants.

PLANS AND PROCEDURES

1) Continue quaternary ammonium compound (QAC) trials - Performance of Deccosan 321 as an equipment sanitizer under field conditions (simulation of commercial pruning practices). In springtime and fall studies, the hedging teeth of a handheld gas-powered hedger were sprayed with a suspension of Psv (1×10^7 CFU/ml) and then with 2,000 ppm Deccosan 321 or 50 ppm sodium hypochlorite to runoff using a hand-held sprayer. After 90 s, 3- to 4-year-old olive trees were pruned to create lateral cuts on larger limbs and terminal stub cuts of smaller branches. Pruning of olive branches with a non-inoculated hedger was used as a negative control and pruning with a contaminated non-sanitized hedger as a positive control. In some cases, trees wounded with a sanitized hedger received additional applications of foliar spray treatments 1 to 2 h after hedging using an airblast sprayer. These treatments included Kocide 3000 at 4,200 ppm (1,260 ppm metallic copper equivalent) or Kocide 4,200 ppm mixed with Kasumin 100 ppm. The trials were done using a randomized complete block design with four single-tree replications per treatment. Data will be evaluated using analysis of variance and mean separation procedures using SAS version 9.4.

Effect of pH on Deccosan 321 activity. A citric acid buffer was prepared containing 1.3 g anhydrous citric acid, 1.9 g glycine, and 1.9 g monobasic potassium phosphate in 50 ml of distilled water. A mixture of 1.9 ml sterilized buffer and 18.9 ml of sterile distilled water was adjusted to pH 5, 6, 7, 8, or 9 ± 0.1 with 1 N NaOH. Suspensions of Psv and solutions of Deccosan 321 (25 ppm) were prepared in each of the buffer solutions and mixed using components of the same pH. For the controls, Psv suspensions were mixed with the respective buffer solutions without QAC. After 60 s of incubation, suspensions were diluted 1:1000 with sterile distilled water, and viable Psv cells were enumerated by plating as described above. Sanitizer efficacy was determined as the \log_{10} reduction in CFU/ml by the sanitizer treatment as compared to the untreated control. Data will be evaluated using analysis of variance and mean separation procedures using SAS version 9.4.

2) Efficacy of new bactericides. In trials in the fall of 2015, eight replicates were used for each treatment on each of two types of injuries on 1- to 2-year-old twigs of 'Arbequina' and 'Manzanillo' olive trees. Lateral wounds were made by scraping off a section (10 to 20 mm long x 5 mm wide) of bark exposing cambial tissue (simulating mechanical damage) and leaf scar wounds were made by pulling off leaves by

hand (simulating leaf scar wound left after natural leaf drop). Treatments were applied directly to wounded twigs using hand-held spray bottles until runoff and allowed to dry (1-2 h). Treatments evaluated can be found in Figs. 3-6. After treatments were air-dried, inoculations were applied to run-off to wounds using a hand-held spray bottle. Inoculum consisted of aqueous suspensions of Psv at 2×10^7 (IR-4 study) or 1×10^8 CFU/ml (other studies). For the IR-4 efficacy study, previously wounded, treated, and inoculated twigs were retreated and inoculated when a new application was made, but not re-wounded (i.e., when application 2 was done on a new set of twigs, twigs that were previously wounded, treated, and inoculated in application 1, were retreated and re-inoculated). In the other studies, a copper-sensitive or copper-resistant Psv strain was used. Disease for all trials was evaluated in the spring of 2016.

Oxytetracycline has been reported to be sensitive to ultraviolet radiation present in sunlight. In order to test if this could be the reason that oxytetracycline sometimes lacks high efficacy in reducing disease in contrast to its high in vitro activity against Psv, a greenhouse study was conducted. Twigs of potted Arbequina plants were wounded, treated with 200 ppm oxytetracycline (Mycoshield), and incubated for 24 h in the dark or continuously under ambient light conditions. Some plants were also treated with a 5%-dilution of a carnauba-based sunburn protectant (Raynox) by itself or in mixture with Mycoshield. After air-drying of the treatments, treated wounds were inoculated with Psv.

To possibly improve copper efficacy, the fungicides Syllit (dodine), Terrazole (etridiazole), or Tanos (a mixture of famoxadone and cymoxanil), as well as amino-thiadiazole (ATD) were mixed with the maximum labeled rate of Kocide 3000 (i.e., 7 lb/A). The persistence of copper-lime and copper-antibiotic mixtures was evaluated under simulated rain conditions at UC Davis. Copper-antibiotic mixtures were applied in combination with NuFilm-P or Omni Supreme Oil. After application of treatments and air-drying, overhead irrigation was applied for 30 min, and wounds were then inoculated with a copper-resistant strain of Psv. Disease was evaluated in the spring of 2016 and data were evaluated using analysis of variance and mean separation procedures using SAS version 9.4.

3) Epidemiology and management of olive knot under different environmental conditions.

Investigate environmental factors that may lead to systemic movement of Psv. Young potted ‘Manzanillo’ olive trees were utilized in greenhouse studies to identify conditions that may lead to systemic movement of Psv. Multiple inoculation and wounding scenarios were tested. This included wounding and inoculating plants before placement into the cold chamber; spray inoculation of whole plants without wounds before placement into the chamber; wounding and placing plants into a chamber, inoculating wounds after cold exposure; and placing plants in a chamber followed by spray inoculation of the entire plant after cold exposure. Low temperature (-5°C) treatments were done for 2 h in 2016 because longer durations (i.e., 4 to 12 h) resulted in extensive dieback of plants previously. Plants were then transferred to the greenhouse and observed for disease development.

Kasugamycin soil applications and tree injections. In greenhouse trials, 50 ml of Kasumin at a rate of 100 ppm were applied as a soil drench to plants in 1-gal pots. Plants were wounded and inoculated after 3 or 6 days and evaluated for disease development after 3 to 6 months. Additionally, in field trials, Kasumin or Fireline were injected into branches or trunks of mature ‘Arbequina’ olive trees using an EnTree injection system (Brandt Consolidated, Inc.). Large branches were injected several inches below a large knot to test whether the treatment could reduce or eradicate Psv populations within the knot. Knots were sampled for Psv recovery several months after inoculation. Samples of knots from treated and non-treated trees were plated onto YDC agar media and Psv colonies were enumerated using standard laboratory methods.

RESULTS AND DISCUSSION

1) Continue quaternary ammonium compound (QAC) trials - Performance of Deccosan 321 as an equipment sanitizer under field conditions (simulation of commercial pruning practices). Sanitation of a Psv-contaminated hedger with sodium hypochlorite (50 ppm) or Deccosan 321 effectively and significantly reduced the incidence of disease on ‘Arbequina’ and ‘Manzanillo’ olives in studies done in the fall of 2015 and spring of 2016 as compared to not sanitizing the hedger before pruning a healthy olive tree (Fig. 1, Table 1). Deccosan 321 was significantly more effective than sodium hypochlorite in reducing knot formation on pruned trees in two of the four trials. Overall, reduction of knot formation from the

control was 79.1% vs. 100%, 47.6% vs. 54.8% on Arbequina, 71.4% vs. 87.3%, and 62.3% vs. 90.6% on Manzanillo for sodium hypochlorite vs. Deccosan 321, respectively. When the Deccosan 321 sanitation treatment of the hedger was followed by a foliar application with copper or copper-kasugamycin, knot formation was reduced by $\geq 86\%$ and both treatments were equally effective (Table 1). In these experiments, no disease was observed on pruning wounds created with a hedger that was not contaminated with the pathogen. These studies confirm that Deccosan 321 registered on olive as Maquat 615HD, can be used effectively as a sanitizer of orchard equipment to prevent the spread of the Psv. Deccosan 321 is non-corrosive and is still active in the presence of organic load. Combined with timely applications of foliar treatments of copper, kasugamycin, or copper-kasugamycin, this can be a highly effective strategy for the management of olive knot.

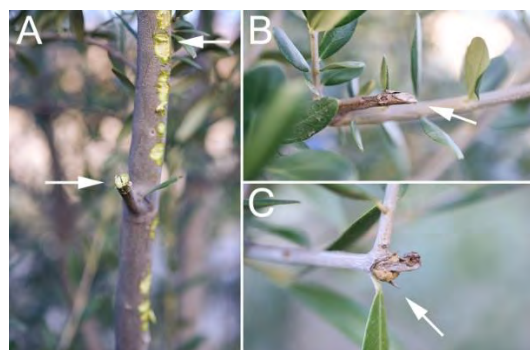


Fig. 1. Efficacy of a quaternary ammonium compound for decontamination of pruning equipment in a field trial. **A**, Hedger pruning wounds (arrows) on an 'Arbequina' olive branch; **B**, Terminal cut made with a hedger that was effectively sanitized and that healed without knot development (arrow); and **C**, A terminal cut made using a contaminated hedger that resulted in knot development (arrow).

Table 1. Efficacy of sodium hypochlorite and Deccosan 321 for sanitizing pruning equipment contaminated with *Pseudomonas savastanoi* pv. *savastanoi* before pruning 'Manzanillo' or 'Arbequina' olives in field studies.

Sanitization treatment ^a		Foliar treatment ^b		Reduction in knot incidence (%) ^c			
				Manzanillo		Arbequina	
Sanitizer	Rate (ppm)	Bactericide	Rate (ppm)	Spring 2015	Fall 2015	Spring 2015	Spring 2016
NaOCl	50	None	---	79.1 b	47.6 b	71.4 b	62.3 b
Deccosan 321	2,000	None	---	100 a	54.8 b	87.3 ab	90.6 a
Deccosan 321	2,000	Copper hydroxide (CH)	4,200	100 a	90.5 a	95.2 a	96.2 a
Deccosan 321	2,000	CH + kasugamycin	4,200 + 100	100 a	85.7 a	93.7 a	96.2 a

^aA gas-powered hedger was contaminated with *P. savastanoi* pv. *savastanoi* (2×10^7 CFU/mL), sanitation treatments were applied to runoff, and after 90 s, the hedger was used to prune healthy olive twigs and branches. NaOCl = sodium hypochlorite.

^b Additional foliar sprays were applied using a back-pack sprayer at 100 gal/A.

^c Evaluations were done after 7 to 9 months, and the number of knots that developed after sanitation on pruning wounds was enumerated and compared to that developing without sanitation. Values followed by the same letter are not significantly different based on general linear model and Fisher's LSD tests ($P \leq 0.05$).

Effect of pH on Deccosan 321 activity. In evaluations of the effect of pH, Deccosan 321 was highly effective over a wide pH range of 6-9. The performance was significantly less at pH 5 with a mean reduction in colonies of $0.5 \log_{10}$ as compared to mean reductions of $\geq 3.5 \log_{10}$ (99.9% growth reduction) at pH values of 6, 7, 8, or 9 (Fig. 2). Thus, Deccosan 321 remained effective over a wide range of pH. This is a valuable property when considering that the pH of water sources used for preparing tank mixes in the field can differ by location and that ground water in the main agricultural areas of California is commonly alkaline. In contrast, the performance of sodium hypochlorite is very pH dependent. Sodium hypochlorite loses biocidal activity above pH 8 and forms irritating volatiles (i.e., chloramines) below pH 7.

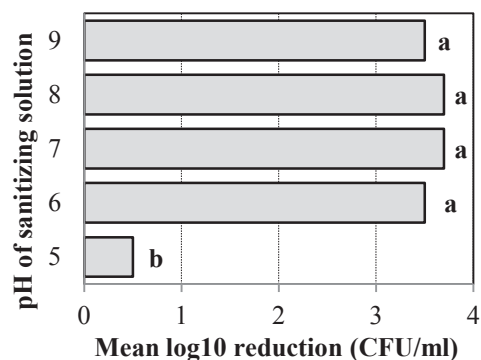


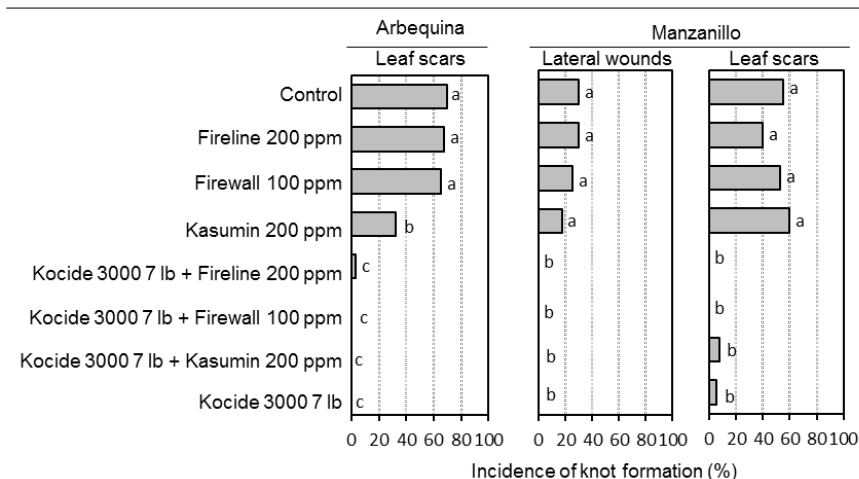
Fig. 2. Effect of pH on toxicity of Deccosan 321 against *Pseudomonas savastanoi* pv. *savastanoi* in direct contact suspension assays. Bacterial recovery was determined after exposure to 25 µg/ml Deccosan 321 for 60 s and expressed as mean log₁₀ reduction. Horizontal bars with the same letters are not significantly different based on ANOVA and Fisher's LSD tests ($P \leq 0.05$). Mean log reductions of ≥ 3.5 log₁₀ are equivalent to 99.9% growth reduction.

2) Efficacy of new bactericides

In comparing selected treatments for protection against olive knot, treatments were generally more effective on 'Arbequina' than on 'Manzanillo' (Figs. 4, 5, 6), and lateral wounds were often better protected by treatments than leaf scar wounds (Figs. 4, 5, 6). The leaf scar wounds we used did not develop naturally, but were created by mechanically removing leaves before abscission layers were formed. Removing healthy leaves before senescence perhaps allowed the bacteria to enter into exposed xylem vessels (tubes) that are not already partially healed or completely protected by the antibiotics or copper. Therefore, natural leaf drop injuries in the spring may be more effectively protected by bactericide treatments because, as Hewitt (1938) described, abscission layers are formed and wound healing responses occur very rapidly during natural leaf drop. This process restricts the entrance of bacteria into plant tissue.

Copper and antibiotics. Kasumin significantly reduced the incidence of knot formation on 'Arbequina' but not on 'Manzanillo' when lateral or leaf scar wounds were inoculated with very high concentrations of copper-sensitive (Fig. 3) or -resistant (Fig. 4) strains of Psv; whereas Fireline and Firewall (oxytetracycline and streptomycin formulations, respectively) were not effective. Still, under these high inoculum concentrations, Kocide 3000 at 7 lb/A was highly effective by itself or in mixture with Kasumin, Firewall, or Fireline after inoculation of leaf scars and lateral wounds of both cultivars with a copper-sensitive (Fig. 3) or with a copper-resistant strain (Fig. 4). As discussed above,

Fig. 3. Efficacy of copper and antibiotic treatments for managing olive knot of 'Arbequina' and 'Manzanillo' olives inoculated with a copper-sensitive Psv strain - Field studies at UC Davis - Fall 2015 -

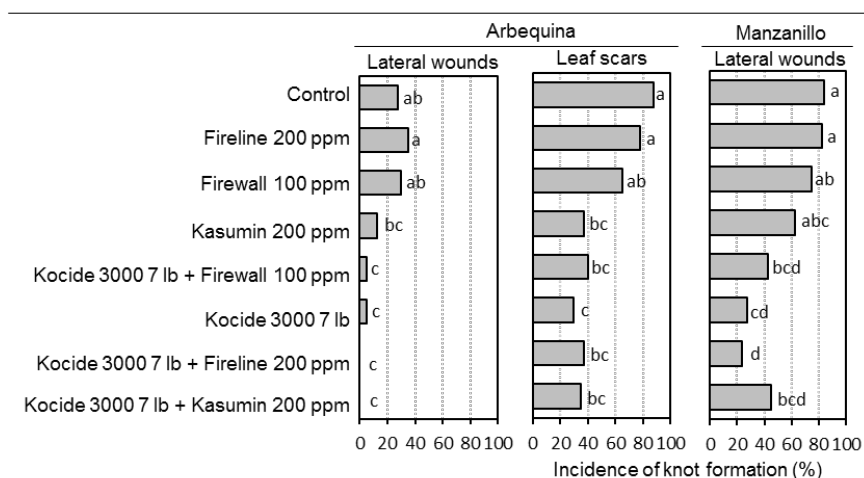


Olive twigs were wounded laterally or as leaf scars, spray-treated, allowed to air dry, and were then inoculated with a copper-sensitive Psv strain (1×10^8 CFU/ml). Disease was evaluated in the spring of 2016. Treatments with the same letters are not significantly different based on Fisher's LSD test ($P \leq 0.05$).

higher levels of disease occurred on leaf scars than on lateral wounds of both cultivars probably because of a lack of an abscission layer or rapid wound healing response of mechanically removed, healthy leaves. In 2015, the efficacy of Kasumin was higher when lower inoculum levels (e.g., 10^7 or 10^6 or 1 to 10 million cfu/ml) were used. In contrast, Kasumin and the other antibiotics showed reduced effectiveness on 'Manzanillo' in 2016 at very high inoculum levels (e.g., 10^8 or 100 million cfu/ml). Actual inoculum levels on hydrated knots are high, but with rain, inoculum concentrations become extremely diluted as distance (several feet) from the knot increases. Thus, based on data from the last three years, Kasumin will be a valuable treatment on its own, in rotation with copper, or as a mixture partner with copper once registered on olives. Additional research is needed to determine the effect of inoculum concentration on the performance of the other antibiotics evaluated.

In an IR-4 efficacy trial at UC Davis, kasugamycin was significantly more effective than oxytetracycline, providing management of olive knot similar to copper (Table 2). The Mycoshield formulation of oxytetracycline provided moderate control of olive knot when applied as a pre-infection treatment. Mycoshield significantly reduced the incidence of lateral wound/leaf scar infections from 27.5%/72.5% in the control to 5%/47.5% in Application 1, respectively. In Application 2, Mycoshield reduced leaf scar infection from 62.5% to 22.5%. In two of the four inoculations, copper and kasugamycin demonstrated significantly better control on both lateral and leaf scar wounds when compared with Mycoshield.

Fig. 4. Efficacy of copper and antibiotic treatments on knot formation of 'Arbequina' and 'Manzanillo' olives inoculated with a copper-resistant Psv strain
- Field trials at UC Davis - Fall 2015 -



Olive twigs were wounded laterally or as leaf scars, spray-treated, allowed to air dry, and were then inoculated with a copper-resistant Psv strain (1×10^8 CFU/ml). Disease was evaluated in the spring of 2016. Treatments with the same letters are not significantly different based on Fisher's LSD test ($P \leq 0.05$).

Table 2. Efficacy of kasugamycin, oxytetracycline, and copper for the management of olive knot caused by *Pseudomonas savastanoi* pv. *savastanoi* *

Treatment	Rate (ppm a.i.)	Incidence of knot formation (%)***			
		Application 1		Application 2	
		Lateral wound	Leaf scar	Lateral wound	Leaf scar
Untreated	—	27.5 a	72.5 a	52.2 a	62.5 a
Champion++	4,200	0 b	0 c	0 b	0 b
Kasumin	200	0 b	2.5 c	17.5 b	12.5 b
Mycoshield	200	5 b	47.5 b	52.5 a	22.5 b

* - For inoculation, a copper-sensitive Psv strain was used at a concentration of 2×10^7 CFU/ml

** - Values in each column followed by the same letter are not significantly different from each other based on general linear model and LSD mean separation tests ($P < 0.05$).

In an effort to better understand the light sensitivity of oxytetracycline, lateral wounds that were treated with oxytetracycline were either exposed to sunlight or kept in darkness for 24 h before inoculation. Under no sunlight conditions, Mycoshield significantly reduced disease incidence from that of the control, but not under sunlight conditions (Fig. 5). A mixture of Mycoshield with Raynox significantly reduced the level of disease from the sunlight control, but only numerically from the Mycoshield treatment by itself.

Fig. 5. Effect of sunlight and a sunburn protectant on the performance of Mycoshield in greenhouse studies

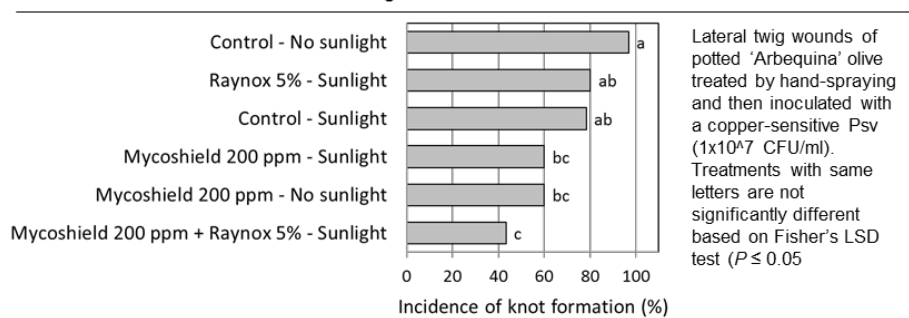
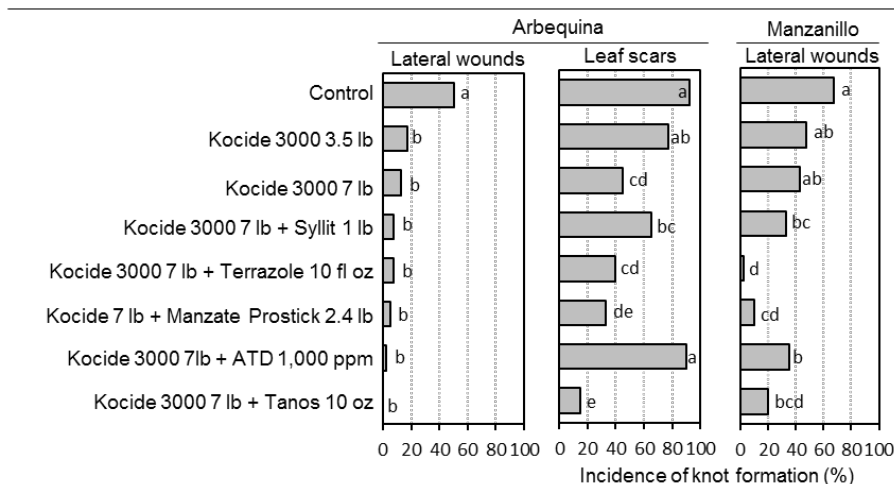


Fig. 6. Efficacy of copper activity-enhancing compounds on knot formation of 'Arbequina' and 'Manzanillo' olives inoculated with a copper-resistant Psv strain - Field trials at UC Davis - Fall 2015 -



Olive twigs were wounded laterally or as leaf scars, spray-treated, allowed to air dry, and were then inoculated with a copper-resistant Psv strain (1×10^8 CFU/ml). Disease was evaluated in the spring of 2016. Treatments with the same letters are not significantly different based on Fisher's LSD test ($P \leq 0.05$).

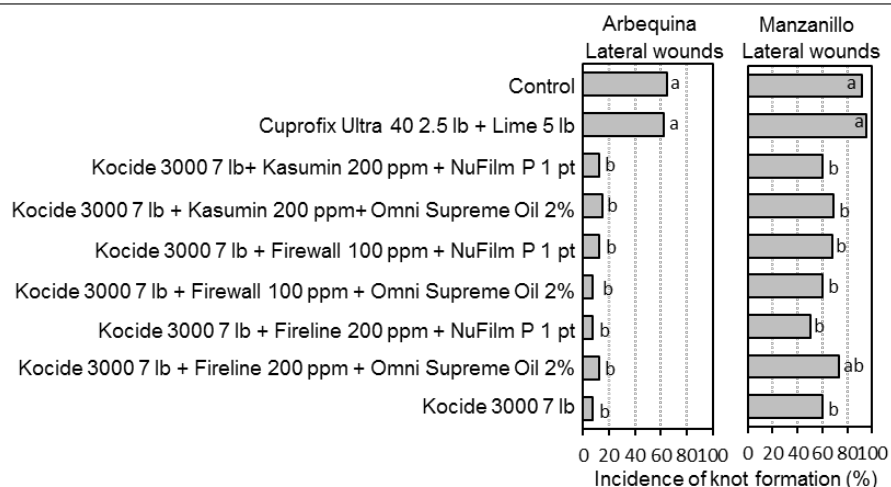
Potential enhancers of copper activity. Copper with and without potential enhancers of copper activity were evaluated in another trial. Kocide by itself at 7 lb/A was significantly more effective on 'Arbequina' leaf scars than when used at 3.5 lb/A but it was similar in performance at both rates on lateral wounds of both cultivars (Fig. 6).

The effect of potential copper-enhancing compounds was evaluated. Terrazole and Manzate significantly increased copper activity on lateral wounds of the highly susceptible 'Manzanillo'. For lateral wounds and leaf scars of 'Arbequina', there was only a slight numerical decrease in disease with the addition of these compounds to copper. The Tanos-copper treatment significantly improved copper performance on 'Arbequina' leaf scars and numerically on lateral wounds. ATD and Syllit had no significant effect on copper activity on both types of wounds and on both cultivars. As mentioned above, we used an extremely high concentration of the inoculum, a copper-resistant strain, and a high rate of

copper (i.e., 7 lb) to evaluate the worst-case scenario. Thus, showing improved performance with selected mixtures is a good indication that copper-enhancers are a valid strategy for future studies. As indicated in our 2017 proposal, SBH and ZTD are excellent candidates for this type of research.

Persistence of copper and antibiotics under simulated rain conditions. Studies on the persistence and efficacy of copper and copper-antibiotic mixtures on wounds that were inoculated after a 30-min simulated rain event were done in the fall of 2015 and evaluated in the spring of 2016. A high efficacy of treatments was only obtained on lateral wounds of ‘Arbequina’ olive (Fig. 7), although significant reductions were also observed on ‘Manzanillo’. On ‘Arbequina’, treatments with Kocide 3000 mixed with any of the three antibiotics and with 1 qt/A NuFilm-P or 2% Omni Supreme Oil were all similarly highly effective and there was no improvement in efficacy as compared to Kocide 3000 used by itself when a high rate of copper (7 lb/A) was used for all treatments. This was done because a copper-resistant strain and an extremely high inoculum level were used (Fig. 7). Although the persistence of Kocide 3000 following a 30-min simulated rain event was not improved in this trial, in our 2015 studies a 3.5-lb/A rate of Kocide 3000 mixed with Nu-Film was equivalent in efficacy to a 7-lb rate of Kocide 3000 used by itself. Moreover, the Kocide 3000 treatments in the simulated rain (Fig. 7) and no simulated rain studies (Fig. 6) were similarly effective. This demonstrated that high rates of Kocide 3000 persisted well on lateral ‘Arbequina’ wounds after a 30-min rain event. On ‘Manzanillo’, most treatments resulted in a significant reduction (although small) in disease as compared to the control. A treatment with basic copper (Cuprofix Ultra) mixed with additional hydrated lime showed no efficacy in these studies. This was likely the result of using lower metallic copper rates in this treatment, using a copper-resistant Psv strain, or perhaps there was a negative interaction of adding additional to the Cuprofix formulation.

Fig. 7. Efficacy and persistence of copper and antibiotic treatments for managing olive knot of ‘Arbequina’ and ‘Manzanillo’ olives inoculated with a copper-resistant Psv strain - Simulated rain field studies at UC Davis - Fall 2015 -



Olive twigs were wounded laterally or as leaf scars and spray-treated. Overhead irrigation was applied for 30 min, and after air-drying, wounds were inoculated with a copper-resistant Psv strain (1×10^8 CFU/ml). Disease was evaluated in the spring of 2016. Treatments with the same letters are not significantly different based on Fisher's LSD test ($P \leq 0.05$).

3) Epidemiology and management of olive knot under different environmental conditions

Growth chamber studies on low temperature injury and systemic infection of Psv. Additional low temperature growth chamber greenhouse studies were completed in 2016. In 2015, systemic movement was only observed on trees that were wounded and inoculated before exposure to low temperatures. No movement was noted on wounds inoculated after cold exposure and knots did not develop on unwounded plants inoculated before or after cold exposure. In 2016 studies, we adjusted the cold exposure time from 4 h to 2 h due to the extensive cold injury occurring after 4-h exposures (see 2015 report). In this year's experiments, a high incidence of knots ($>70\%$) developed on wounded, inoculated twigs, but no systemic movement was observed in any of the treatment combinations (i.e., wound, cold

exposure, and inoculate vs. wound, inoculate, and cold exposure). Without wounding, knots did not develop on plants that were inoculated before or after cold exposure. Low-temperature studies of olives are a challenge as many twigs/branches often die due to frost injury before disease can be evaluated but it appears that Psv-infected tissue that survives after a freezing event without killing the host plant often exhibit symptoms of systemic movement.

Fig. 8. Efficacy of various bactericides against olive knot applied on wounded olive twigs before or after a cold event.

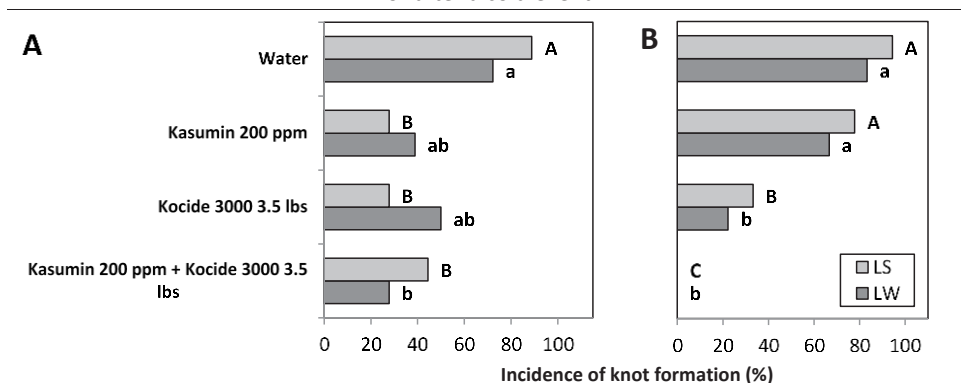


Fig. 8. **A**, Twigs of potted 'Manzanillo' olives were wounded with lateral wounds (LW) and leaves were removed to create leaf scars (LS). Treatments were sprayed onto wounded twigs, air-dried, spray-inoculated with a copper-sensitive Psv strain (2×10^7 CFU/ml), and plants were exposed to -5°C for 2 h before being returned to the greenhouse. **B**, Twigs of potted 'Manzanillo' olives were wounded as described above and plants were exposed to -5°C for 2 h. Immediately following cold exposure, plants were treated, allowed to air-dry, spray-inoculated as above, and returned to the greenhouse. Plants were evaluated after 7 weeks. Bars followed by the same letters indicate no significant difference for LS (uppercase) or LW (lowercase letters) treatments based on analysis of variance and Fisher's LSD mean separation ($P \leq 0.05$).

Treatments with bactericides applied before or after cold exposure significantly reduced the incidence of knots in most cases. Interestingly, efficacy of treatments varied depending on whether they were applied before or after the freezing event. Kasumin performed better when applied before cold exposure, while Kocide 3000 was slightly better (on lateral wounds) if applied afterwards. Kasumin - copper mixtures performed well in both situations but no disease developed when applied immediately after the cold exposure (Fig. 8).

Kasugamycin tree injections and soil applications. Application of Kasumin as a drench treatment using 1 or 2 applications 3 or 6 days before wounding and inoculation was not successful in reducing the incidence of knots on wounds. No phytotoxicity was observed with an application of 50 ml of 100 mg kasugamycin/L to trees grown in one-gallon pots. Reduction in olive knot incidence was not achieved and could be a factor of the concentration of the antibiotic used, low uptake through the root system, or rapid degradation of the material in the soil. Additionally, kasugamycin injection treatments were performed on mature 'Arbequina' olive trees with a tree injection system. When knots from injected branches or trees were sampled for Psv recovery several months after inoculation, viable bacteria were still recovered at levels similar to untreated controls. Therefore, injections did not eradicate or reduce populations of Psv inside knot tissues. Moreover, phytotoxicity was observed as branch dieback and leaf drop using the 100-ppm active ingredient injection rate of Kasumin.

Future Directions

The addition of copper-enhancing materials to copper improved treatment efficacy in managing olive knot. ATD, mancozeb, and etridiazole are not likely to be registered on olive for managing the disease but Tanos has potential for registration. We are currently testing other copper-enhancing materials for the control of other phytopathogenic bacteria with one very promising compound called SBH and a compound related to ATD called zinc thiadiazole (ZTD). Preliminary in vitro studies indicated that SBH significantly increased the performance of copper against a copper-resistant Psv strain although SBH alone has no or little antimicrobial activity. We hope to continue evaluating SBH performance in field trials.

Both SBH and ZTD have registrant support and are likely registerable on olives pending efficacy data for the control of olive knot.

Research should also continue with the antibiotics kasugamycin and oxytetracycline. Continued support will demonstrate to EPA that there is a need for additional compounds with different modes of action for managing olive knot. The performance of the antibiotic oxytetracycline for managing olive knot was improved with the addition of a sunburn protectant (Raynox). Additional studies are warranted to determine other possible factors that may be affecting the performance of oxytetracycline when applied to injured olive branches. In laboratory studies, oxytetracycline was highly effective in inhibiting growth of the pathogen.

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Department of Botany and Plant Sciences
Relevant AES/CE Project No.: 4556

University of California
Division of Agricultural Sciences

PROJECT PLAN/RESEARCH GRANT PROPOSAL PROGRESS REPORT

Project Year: 2016

Anticipated Duration of Project: New 2-year proposal to determine the efficacy of PGR and pruning treatments to manage alternate bearing; this requires yield data for 2 consecutive years.

Project Leaders:

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Project Title: Managing Alternate Bearing in Olive with PGRs and Pruning

Cooperators:

Lindcove REC

‘Manzanillo’ table olive orchard, Lindcove

Proposal Goal, Objective and Research Plan: This project is based on our discovery of the four mechanisms by which the ON-crop of fruit reduces return bloom the following year to perpetuate alternate bearing in ‘Manzanillo’ olive trees. The ON-crop causes: (1) inhibition of summer vegetative shoot growth; (2) inhibition of spring bud break; (3) abscission of floral buds; and (4) inhibition of floral development. Whereas, these mechanisms are typically discussed based on the effects of the ON crop, keep in mind the OFF crop has the opposite effect for each mechanism. This project also utilizes what we have learned about the timing and efficacy of PGR treatments that we have tested as branch injections and whole tree sprays. The PGRs included in the current experiment were selected based on prior results: (i) 6-BA to increase summer vegetative shoot growth and spring bud break of ON-crop olive trees to increase yield the following crop year; (ii) S-ABA to reduce fruit set and yield and to increase fruit size during the ON-crop year and increase yield the following year; (iii) AVG to increase fruit set and yield in the current OFF-crop year. The goal of our research is to develop a flexible management practice that can be adapted to ON- and OFF-bloom trees to even out alternate bearing in ‘Manzanillo’ olive orchards, so that growers do not experience the dismally low yields of an OFF-crop year. Using ‘Manzanillo’ olive trees in a commercial orchard at the Lindcove REC in Exeter, CA, which were subjected to light hand-pruning to maintain space and sunlight within rows

and between rows (no light, no flowers), our objective is to test the following treatments: (1) untreated ON-crop (ON bloom) control trees; (2) ON-crop (ON-bloom) trees sprayed with S-abscisic acid (S-ABA) (1 g/L), a growth inhibitor, at 30% full bloom to 1/3 of each of the 4 quadrants of the tree (1/3 of the entire tree) to reduce fruit set and yield 30% in the ON-crop year and increase yield 30% the following year (putative OFF-crop year) (Fig. 1); (3) ON-crop (ON-bloom) trees sprayed with 6-benzyladenine (6-BA) (50 mg/L) (i) in mid-July to increase summer vegetative shoot growth to increase the number of nodes that can produce inflorescences and (ii) again the following February to increase spring bud break to increase bloom, fruit set and yield the following year (putative OFF-crop year); (4) OFF-crop (OFF-bloom) control trees; (5) OFF-crop (OFF-bloom) trees sprayed (i) with 6-BA (50 mg/L) in February to increase spring bud break to increase bloom, fruit set and yield and (ii) with the ethylene biosynthesis inhibitor aminoethoxyvinylglycine (AVG) at 30% full bloom to further increase fruit set and yield in the current year (putative OFF-crop year); and (6) OFF-crop (OFF-bloom) trees sprayed *only* with AVG at 30% full bloom to increase fruit set and yield in the current crop year (putative OFF-crop year).

2016 Progress to Date: ON- and OFF-crop ‘Manzanillo’ olive trees in the orchard at the Lindcove REC were selected based on the yield history for the past 2 years and the experiment was blocked in relation to the yield history of the trees for the past 2 years. All treatments were applied to a single tree in each block of uniform yielding trees. There were 14 blocks and 6 treatments (i.e., 14 individual trees per treatment in a randomized complete block design). Trees that did not alternate bear or produced poorly for 2 years were eliminated from the experiment. Trees were selected just prior to the February application of 6-BA for treatment 5. The trees were pruned during early bloom. Trees for the remaining treatments were selected after pruning and just prior to 30% full bloom to confirm their block assignment based on prior yield history and the effect of pruning. At 30% full bloom, AVG was applied to the trees in treatments 5 and 6 and S-ABA was applied to the trees in treatment 2 (See Fig 1). Trees in treatment 4 received their first application of 6-BA in early July and will receive the second 6-BA application in February 2017. Harvest will be in October 2016, at which time we will determine the total kg of fruit per tree and take a subset of 100 fruit per tree, for which we will weigh and measure the length and diameter of each individual fruit to determine the pack out (fruit size distribution) and to estimate the total number of fruit per tree for each treatment.

In 2017, the 2016 ON-crop trees, which should produce a putative but improved OFF-crop the following year, will be treated starting in spring 2017 with the best treatment identified from this year’s research for increasing the yield during an OFF-crop year. Similarly, the 2016 OFF-crop trees, which should still produce a substantial (ON) crop the following year will be treated starting in spring 2017 with the best treatment identified from the 2016 harvest for increasing yield following the ON-crop year. With the harvest of 2017, if our research is successful, 2-year cumulative yield should be increased in our treated trees over the 2-year cumulative yield of the untreated ON- and OFF-crop control trees. Based on the yield results, the amount of vegetative growth, and tree structure at the end of year 1, we will decide whether or not to prune again in the spring of 2017.

Supplemental Information: The PGRs included in this research are all commercial products of Valent BioSciences. Valent is committed to helping us find strategy for mitigating alternate bearing in olive and provided \$5,000 to support the research.

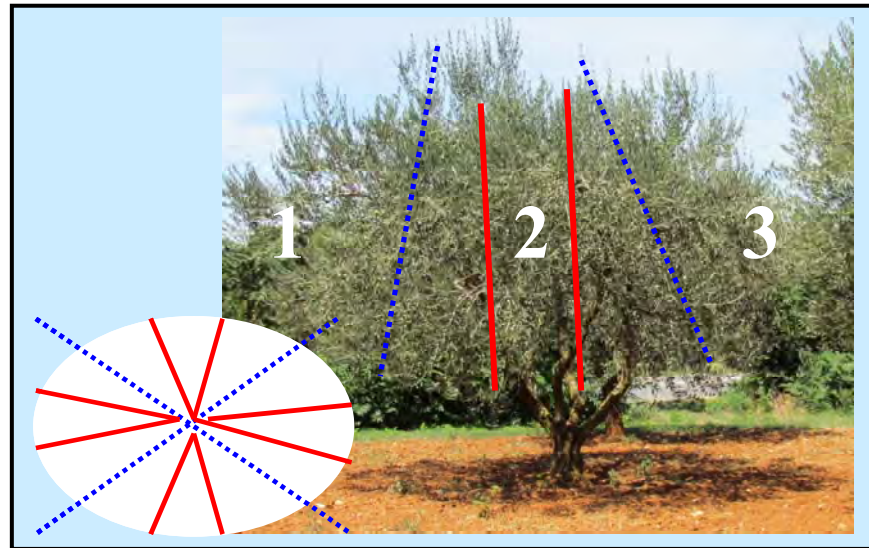


Fig. 1. S-abscisic acid (S-ABA) (1 g/L) was applied to 1/3 (red solid lines) of each of the four quadrants (blue dotted lines) of an ON-crop 'Manzanillo' olive tree to reduce fruit set and yield 30% during the ON-crop year to increase flowering, fruit set and yield 30% the following putative OFF-crop year. (Quadrant 4 is on the side of the tree opposite to quadrant 2; quadrants 1 and 3 are split equally on the front and rear sides of the tree.)

Biocontrol of Olive Psyllid:
2016 Progress Report for the California Olive Commission

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Introduction

The Olive psyllid, *Euphyllura olivina*, is an invasive pest to California, most likely from Spain, and its presence was first noted in San Diego and Orange counties in 2007. The olive psyllid can cause substantial harm to olive production by stressing trees through direct feeding, waxy excretions and sooty mold (Tzanakakis, 2006). The mission of this project is suppression of the psyllid through classical biological control by releasing a parasitic wasp found associated with olive psyllid in Spain.

Before a new biocontrol agent can be released in California, however, one must obtain a field release permit. Information required for this permit includes survey studies to determine what resident natural enemies, if any can feed on olive psyllid, the spread of the pest, and lab studies that determine the host range of the olive psyllid. Currently the USDA APHIS is restricting importation of biocontrol agents to those natural enemies demonstrating a high degree of host specificity.

Survey studies were first conducted by Johnson et al in 2009 and 2010 (unpubl. data); they determined that the psyllid had spread into Riverside County. Additional surveying conducted by Pickett in 2011 (unpubl. data) determined that the olive psyllid had spread into Los Angeles County. Surveying was also conducted for olive psyllid in Southern California in 2014 and 2015 (Jones, unpubl. data), which found the psyllid had spread to additional locations in Los Angeles and Riverside counties.

Host specificity testing began in 2012 with initial funding coming from COC, followed by support from the Specialty Crops Program at CDFA. After 3 years of work, a petition was submitted. We just learned that the request for a field release permit was denied. Three of 10 reviewers of our petition expressed concerns about non-target 'host feeding' and wanted more non-target psyllids tested. Our results suggests that adults of the parasitoids we want to release, *Psyllaephagus euphyllurae* can damage non-target psyllids by probing, although these parasitoids did not reproduce on any of their nymphs.

The current project funded by COC over the last 6 months conducted a survey to determine if olive psyllid has spread into central and northern California. We have also begun to address the concerns of the permit review committee. Additional native psyllids are being collected in California and cooperators in southern France agreed to collect the candidate parasitoid.

Methods

Survey. Sites (detailed in Table 1) were initially selected from previously surveyed locations in 2009-2011 by M. Johnson) and by C. Pickett (unpublished data). Additional sites were added as they were found during the survey. The survey was conducted April 4-11, 2016. All trees at each site were examined for waxy excretions (Fig. 1) for up to 5 minutes. Number of trees examined at any given site varied from 1 to at least 50.

Fig. 1. Olive psyllid nymphs with waxy excretions on young olive growth. San Diego, CA 2011.



Lab cultures. We are currently gathering additional non-target (native) psyllids in California to conduct additional tests to support a revision to our current field release petition. Collections of native psyllids were made in May from the foothills of the Sierra Nevada where there are species known to attack native species of *Ceanothus* spp. and *Fremontodendron californicum*, evergreen shrubs common to that area. Staff at the USDA ARS European Biological Control Laboratory (EBCL) in southern France collected parasitoids from northern Spain in late May and shipped several hundred to the UC Berkeley quarantine facility.

Results and Discussion

Survey in California. Olive psyllids were found in 9 new locations: 2 in Carmel-by-the-sea (Carmel), 2 in Solvang, 3 in Santa Barbara, and 2 in Montecito (Table 1). Populations were low and trees were flowering at all locations. Psyllids collected in Solvang and Carmel were reared to adults to confirm their identification. This survey indicates that the olive psyllid continues to spread northward towards areas of higher olive production. Based on observations from Spain, olive psyllid has the ability to survive in both cooler coastal areas and warmer inland regions. However, its populations appear to be higher nearer coastal regions of higher humidity.

Santa Barbara has an unusually high number of olive street trees, and many homeowners plant them as ornamentals. Most likely homeowners will not treat their trees for this pest. Santa Barbara, therefore, will become a major source population for dispersal of this pest. The Carmel population may not be connected to the Southern California populations, because there were no other psyllids found north of Solvang. The psyllid infestation at Valley Hills Nursery in Carmel may be problematic, but the population is very low: 3 clusters out

of 50+ trees in pots ranging from 5-50 gal. The nursery represents a supplier of trees to outlying areas and could spread the psyllid. It rained in Santa Barbara, Ventura, Oxnard, and Thousand Oaks for a couple days prior to survey. Lack of detection in the latter three areas may have resulted from low populations and removal of wax by rain.

Additional investigation may need to be done to determine the spread inland, particularly along I-5 through the “Grapevine” and the city of Hemet (Riverside County). Surveying was conducted in Hemet in 2015 and nothing was found, but this was a particularly dry year in Southern California and olive psyllid populations were lower at almost every site compared to 2013. Hemet has a lot of olive trees throughout the city and along streets in rural/agricultural areas. Furthermore, the area has a significant amount of commercial olive production. Given one of the highest densities of olive psyllid in California is in Murrieta (Riverside County), a climate similar to Hemet, and previously noted spreading into Meniffee (2014).

Table 1: Survey for Olive psyllid presence in April 2016, includes the number of trees examined and notes on the infestation level.

#	Location	Coordinates	Psyllids	#Trees sampled
1	Mission San Francisco Solano	38.29396, -122.45588	No	6
2	State Park, Sonoma	38.29384, -122.45708	No	2
3	Sonoma Marketplace	38.2909, -122.46249	No	12
4	Boyd Park, San Rafael	37.97545, -122.52925	No	5
5	Presidio Social Club, San Francisco	37.79737, -122.44839	No	7
6	Presidio, San Francisco	37.79885, -122.44873	No	3
7	Presidio, San Francisco	37.79705, -122.44769	No	1
8	Calaveras Plaza Shopping Center, Milpitas	37.42862, -121.91139	No	31
9	Mission San Jose ¹	37.5343, -121.91985	No	>50
10	Mission Blvd., San Jose ¹	37.52191, -121.91803	No	130
11	near U. Santa Clara ¹	37.34466, -121.93203	No	2
12	Mission Santa Cruz	36.97806, -122.02945	No	4
13	Casa del Fruta	36.98999, -121.38138	No	132
14	The Grove, Hollister	36.95911, -121.38314	No	51
15	Cemetery, San Juan Bautista ^{1,2}	36.84598, -121.545	No	>34
16	nr. Mission San Juan Bautista ¹	36.84498, -121.54098	No	3
17	Abbe Park: nr. Mission San Juan Bautista ¹	36.84441, -121.53866	No	2
18	Mission San Juan Bautista ¹	36.84575, -121.53696	No	6
19	San Juan Bautista 1 ²	36.84138, -121.53444	No	8
20	School, San Juan Bautista	36.84218, -121.53417	No	5
21	3 rd x Mariposa, San Juan Bautista	36.84453, -121.53694	No	4
22	Salinas 2 ²	36.67138, -121.65416	No	12
23	Salinas 1 ²	36.65638, -121.66138	No	15
24	Monterey, Museum of Monterey ²	36.60277, -121.89277	No	2

25	Mission San Carlos Borromeo de Carmelo ¹	36.54318, -121.91923	No	8
26	nr. Mission San Carlos Borromeo de Carmelo ¹	36.5422, -121.91771	No	6
27	Carmel Valley 4 ²	36.54222, -121.90527	No	12
28	The Barnyard Shopping Village, Carmel	36.5405, -121.90569	Yes	18
29	Carmel Shopping Ct. , Carmel ¹	36.53958, -121.90475	No	8
30	Carmel Middle School, Carmel ^{1,2}	36.54316, -121.89745	No	19
31	Valley Hills Nursery, Carmel ¹	36.53308, -121.84568	Yes	>50
32	Carmel Valley 3 ²	36.53166, -121.84111	No	7
33	Carmel Valley 2 ²	36.53083, -121.83499	No	10
34	Carmel Valley Rd., Carmel ¹	36.5297, -121.83029	No	1
35	Shulte Rd., Carmel ¹	36.52551, -121.83526	No	4
35	Carmel Valley Ctr. ¹	36.47893, -121.73221	No	19
36	Mission Soledad, Soledad	36.4048, -121.35577	No	~150
37	Mission San Antonio de Padua, Jolon	36.0155, -121.24988	No	9
38	N x 11 th , San Miguel	35.74884, -120.69544	No	4
39	Mission San Miguel ¹	35.74454, -120.6972	No	13
40	Traffic Way Plaza, Atascadero	35.50595, -120.66702	No	7
41	Holiday Inn Express San Luis Obispo	35.28946, -120.65109	No	1
42	Walnut x Chorro, San Luis Obispo	35.28369, -120.66635	No	2
43	Walnut st 1, San Luis Obispo	35.28409, -120.66611	No	1
44	Walnut st 2, San Luis Obispo	35.2848, -120.66499	No	1
45	San Lui Obispo ²	35.28555, -120.66361	No	7
46	Mission San Luis Obispo de Tolosa ¹ (Broad x Monterey)	35.28073, -120.66457	No	9
47	Higuera x Nipomo, San Luis Obispo	35.27836, -120.66571	No	1
48	Santa Maria ²	34.93388, -120.41888	No	14
49	Old Mission Santa Ines, Solvang	34.59436, -120.13661	Yes	6
50	Nr. Old Mission Santa Ines, Solvang	34.59572, -120.13779	Yes	10
51	top of Mission Canyon Rd. ¹	34.46404, -119.70853	Yes	10
52	Mission Canyon, nr. Top of road ¹	34.46256, -119.70871	No	>50
53	Mission Santa Barbara ¹	34.43748, -119.71306	No	~50
54	Presidio State Historic Park, Santa Barbara	34.42242, -119.69882	No	5
55	Nr. Presidio State Historic Park, Santa Barbara	34.42193, -119.69938	No	7
56	Santa Barbara	34.42319, -119.69546	Yes	15
57	Santa Barbara 1 ²	34.42222, -119.69666	Yes	16
58	Montecito 2 ²	34.44222, -119.64305	Yes	>20
59	Montecito 1 ²	34.42805, -119.64416	Yes	8
60	Mission Buenaventura ¹	34.281, -119.29906	No	5
61	Ventura, nr. 101 ¹	34.27856, -119.30248	No	1
62	Oxnard ²	34.21944, -119.17555	No	15
63	Thousand Oaks 2 ²	34.18027, -118.87666	No	20
64	Thousand Oaks 1 ²	34.17583, -118.84583	No	10
65	San Gabriel Mission Playhouse	34.09824, -118.10858	No	3

66	San Gabriel Mission High School	34.0988, -118.10702	No	3
67	Private residence, Jurupa Valley	34.01713, -117.4324	No	1
68	Private residence, Jurupa Valley	33.99686, -117.43243	No	2

¹Surveyed by C.H. Pickett, 2011

²Surveyed by M.W. Johnson 2009-2010

Lab cultures.

A major effort was made to collect and culture additional native psyllids from California and the candidate parasitoid from northern Spain. However, no additional testing for specificity was completed this year due to low numbers of the candidate *Psyllaephagus euphyllurae* emerging from European collections.

Olive psyllids were successfully transferred from CDFA in Sacramento to the UC Berkeley Quarantine and are doing well. Two species of psyllid common to *Ceanothus*, *Ceanothia ceanothii* and *Euglyptoneura robusta* (Hemiptera, Amaryllidaceae), were collected but neither psyllid reproduced in quarantine on the potted *Ceanothus integerimus* or *C. thyrsiflorus*. A colony of the fremontia psyllid *Dichlidophlebia fremontiae* was successfully established. We received and processed the Spain collection made by EBCL (Table 2). There was a very low recovery of *P. euphyllurae*, overall 9% of the collection. Most of the collection originated from a single collection site which had very high numbers of olive psyllid, and olive psyllid mummies (parasitized). However, there was an exceptionally high degree of hyperparasitism by *Apocharips trapezoidea* 91.9% - much higher than previous years. Surprisingly, a second primary parasitoid, *P. pulchellus*, was found in higher numbers than ever before, and higher than the candidate parasitoid, *P. euphyllurae* (all testing will be limited to the latter parasitoid since all previous work has focused on it and 4 years of collecting have found that *P. euphyllurae* is the most common parasitoid in Spain and France attacking olive psyllid). The number of live *P. euphyllurae* recovered were not enough to conduct experiments and the timing was a little off, so female parasitoids were used for rearing and use this coming year. Our cooperators with EBCL are willing to collect again for us (gratis). We now have one additional non-target psyllid culture available for host specificity testing this coming year. The native psyllids associated with *Ceanothus* can be field collected for use in testing.

Table 2. Summary of parasitoid emergence from 2016 Spain Collection. *Psyllaephagus euphyllurae* and *Psyllaephagus pulchellus* are primary parasitoids; *Apocharips trapezoidea* and *Pachyneuron* sp. are hyperparasitoids.

Location	<i>Psyllaephagus euphyllurae</i>	<i>Psyllaephagus pulchellus</i>	<i>Apocharips trapezoidea</i>	<i>Pachyneuron</i> sp.
1 (Waypoint B281)	19	69	216	20
2 (Manure)	0	0	0	0
3 (Waypoint B46)	0	1	0	0
4 (Lost Hwy)	1	2	0	0
5 (Caroibia ?)	11	0	4	0
Total	31	72	220	20

References

Tzanakakis M.E., 2006. Insects and mites feeding on olive: distribution, importance, habits, seasonal development and dormancy. Koninklijke Brill NV, Leiden, The Netherlands.

CALIFORNIA OLIVE COMMITTEE
PROJECT FINAL 2015 -2016 YEAR REPORT

Workgroup/Department: Olive / Plant Sciences, UC Davis

Project Year 2015- 2016 (NCE)

Anticipated Duration of Project: 10 years

Project Title:

Propagating Dwarfing Olive Rootstocks and Establishing a Long Term Orchard

Project Leaders:

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Commodity: Olive Relevant AES/CE Project No.

Year Initiated: 2013 Current Funding Request: **15,096.00**

Problems and Significance:

To facilitate mechanical harvesting the newest table olive orchards are planted in hedgerows and require regular mechanical pruning to keep the trees small. Our 12 X 18' foot research planting established at Nickels Soils Laboratory in 2002 has demonstrated to us this will be difficult with the 'Manzanillo' olive cultivar. Such hedgerow 'Manzanillo' orchards designed for mechanical harvesting would be easier to maintain if they could be grafted on dwarfing rootstocks. Among those olives with promise for use as a dwarfing rootstocks are:

Nikitskaya,

Olea cuspidate

Verticillium Resistant Oblonga

Dwarf D

Little Ollie (2015 addition)

In 2013 we proposed propagating these rootstocks and testing with grafted and non-grafted own rooted 'Manzanillo' controls for their dwarfing potential with 'Manzanillo' to produce a tree that is more amenable to mechanical harvesting. The own rooted 'Manzanillos' and 'Manzanillo' grafted to 'Manzanillo' in this orchard could also serve as the next generation hedgerow trained mechanically pruned orchard for mechanical harvesting with trunk and canopy contact shakers.

In 2013 year we were awarded funding to propagate the desired rootstocks and locate a suitable orchard site for establishment of the propagated trees. Both objectives have been achieved but due to difficulty of propagation with some cultivars and difficulty in locating a site with proper infrastructure planting was in spring 2014.

Overall Progress through 7/31/2016:

This application for initial funding was for two purposes:

- I. Propagation and grafting of the rootstocks with ‘Manzanillo’ scions.**
 - a. Dr. John Preece supervised the development of specific propagation techniques for 112 each of the following olive cultivars to be used as dwarfing rootstocks; Nikitskaya, *Olea cuspidate*, Verticillium Resistant Oblonga and Dwarf D. Dwarf D proved very difficult to root as cuttings and this means that there were sufficient trees only for the closer spacing. At the wider spacing, Little Ollie, which roots easily is being tested, which adds another potential rootstock and expands the scope of the study in a logical way.
- II. Establishing the next generation olive hedgerow orchard for evaluation of mechanical harvesters.**
 - a. Field 3556, a four-acre block located in Plant Sciences Field Facility located on the UC Davis Campus and maintained by UC Davis Plant Sciences field personnel was chosen as the planting site. This site has the added advantage of being located adjacent to oil orchards being developed by the UC Olive Center. The trees were planted in 2014. Attachment I: Field Map: 3556.
- III. Experimental Field Design:**
 - a. Split plot design with the north half of the field at spaced at 10 X 16’ and the south at 10 X 8’.
 - b. There are 4 Randomized Complete Blocks
 - c. Four different dwarfing rootstocks grafted with ‘Manzanillo’
 - d. Own rooted ‘Manzanillo’ and ‘Manzanillo’ grafted to a ‘Manzanillo’ grafting controls.
 - e. Sevillano pollinizers were planted as border rows around the perimeter of the orchard and in the middle, as a row between the wide and narrow spacing.

2015-16 Objectives:

- I. Finish grafting all rootstocks, once the 2015 plants are established: Attachment I: Field 3556 Plot Map**
- II. Collect data to study the any growth differences among the scions on the different rootstocks compared to the controls; will be done end of September**

Experimental Procedures: 2015-2016:

Complete grafting of smallest rootstocks. Based on experience gained in grafting, the final trees planted in 2015 will be sufficiently large for grafting late summer, 2016. This will be completed and will add Little Ollie as an experimental rootstock at the wider spacing.

Two scions were bark or whip grafted onto each rootstock. During 2016, the weaker of the two grafts will be pruned off to a single scion per rootstock.

The goal is to be able to dwarf the olive trees by using one or more of these rootstocks. Therefore, data will focus on measurements of vegetative vigor, including branch numbers and lengths, tree height, tree caliper of both the rootstock and scion. During 2015, there were fruit on the Manzanillo, and although it is early in the study yield data will be collected. In 2016.

Data will be analyzed using ANOVA with an LSD means separation.

Progress Summary: 2015-2016

The trees planted in 2014 were maintained and staked and grown through the summer of 2015 to allow the trees to reach sufficient size for grafting. The ‘Oblonga’ trees were falling over more and in more need of staking (which was done) than the others. In spring of 2015, the border rows of ‘Sevillano’ pollinizers were completed by planting the last 41 trees. There were insufficient trees available in 2014 to complete the border rows.

Some of the rows of dwarf olives were incomplete, therefore additional cuttings were rooted and trees produced at the National Clonal Germplasm Repository nursery. The exception is that ‘Dwarf D’ has proven to be extremely difficult to root to produce plants for the wider spacing portion of the study. Therefore, in addition, cuttings of ‘Little Ollie’ were rooted and this cultivar proved to be easy to propagate. On September 29 2015 the nursery produced plants were planted into the orchard and ‘Little Ollie’ replaced the originally planned ‘Dwarf D’ at the wider spacing. This completes the planting and also gives a fifth genetically different rootstock to test for dwarfing of olive. One of the ‘Sevillano’ trees died during the summer of 2015, but there were a few extra trees from the spring 2015 planting, and that tree was replaced.

Sierra Gold Nursery and staff of the National Clonal Germplasm Repository grafted the trees from September 28 – Oct. 1, 2015. This cooler time of the year was better for the grafts to heal and take. Following grafting, the orchard was sprayed with Kocide to control olive knot.

The block was pruned May 15-18, 2016. The block was rated July 20th 2016 with the following results: of the grafts done in September 28th 23 (3%) failed, and 87 rootstocks (11%) remain too small to graft, and 48 (6%) of the trees are dead or missing: Attachment I. The 3% graft failures and 11% too small in FALL 2015 will be grafted fall 2016. The 11% dead is due to squirrel damage to the irrigation lines flooding individual trees. The lines have been repaired and moved further away from the trees as they are now larger; in winter 2016 the drippers will be replaced with microsprinklers.

A few trees have produced minimal crop in 2016 so yield will be collected in September 2016.

By spring 2017 most of the trees should be large enough to demonstrate if the rootstocks have dwarfing potential and all the scions will be pruned back to an equal size to allow the Manzanillo scions to grow.

Desired Result:

At maturity the rootstocks will maintain tree size at 10 feet or less, and the trees can be harvested with trunk shakers or canopy contact harvesters. The experimental design will also allow a determination of 'Manzanillo' tree yields at a 10 X 16' and a 8 X 16' feet spacing.

Canopy management, tree hedging and topping to optimize yield

Introduction and scope

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.

Materials, methods and results

Nickels Trial

We initiated the trial in late April 2016 (Figure 1) as a randomized block design with 3 treatments and 4 replicates. The treatments were: a) 10 foot topping, b) 13 foot topping and c) control – no topping. All trees were hedged on April 25 followed by hand pruning on May 26. We measured the time it took for 7 pruners to prune 30 trees in all treatments to estimate pruning costs. The 10 foot topping treatment removed significant amounts of wood and produced shorter statured trees (Figure 2). Trees were harvested on October 7, 2016 and samples were taken to Musco Olive to evaluate fruit size and value of the crop.

Pruning costs, crop yields, price (based on the grading sheet) and partial economic return (calculated as the product of yield and price with pruning costs subtracted) are presented in Table 1. Trees that were topped at 10 feet resulted in pruning costs that were about half the non-topped control. No significant differences ($p < 0.05$) were found between olive yields; however there was a trend that topping reduced yields. Trees topped at 10 and 13 feet produced larger fruit than the control, resulting in a great price per ton (Table 1). This greater value, however, could not compensate for the lower olive yields. The partial economic returns were greatest in the control treatment.

Nielsen Trials

The goal of this experiment is to determine the most effective timing of canopy hedging to ensure return bloom and minimize excessive vegetative growth. Another important goal is to evaluate hedging effects on alternate bearing. In oil olive, hedging reduces the severe yield swings in alternate bearing trees. The experiment was established as a randomized block design with 4 replicates in a 14 year-old orchard at Erik Nielsen's farm. Because of the late start of the grant, we were not able to hedge early in the spring; next year we will initiate hedging treatments in March. In 2016, Hedging began on April 27 and continued approximately monthly until mid-July (Table 2). A video of the severe hedging can be found at https://photos.google.com/search/_tv_Videos/photo/AF1QipNCE1VGj7inFN8TkIWPMs_1BOKg_5QN2Mgg2y9Z. Light interception levels were determined using a Decagon quantum sensor following hedging (Figure 4). Trees were harvested on October 3, 2016 and samples were taken to Musco Olive to evaluate fruit size and value of the crop.

The greatest yields were found in earliest and moderately hedged plots (Table 2). Severe hedging and topping significantly reduced the percent light interception and olive yields (Table 2). Severe hedging and hedging conducted earlier in the season also resulted in larger fruit and greater price per ton. However, similar to the Nickels trial, the greater price per ton could not compensate for the lower yields caused by the severe hedging. We suspect that the highest or lowest yielding treatments will trade places the following year due to the alternate bearing nature of the olive. Hedging, however, should reduce the severity of the alternate bearing. We will be evaluating the effects of the timing and severity of hedging on returns bloom and yield in 2017.

Additional Activities

'Manzanillo' olives have been collected from various olive orchards and are currently being dried. Following drying they will be ground and set for nutrient analyses at UC Davis. These data will be used to develop a nutrient removal calculator for 'Manzanillo' olives.

We will be collecting light levels in both orchards using the UC Davis mule at the end of the season. These data and shoot growth measurements will be used to assess the regrowth of the orchard following hedging treatments.

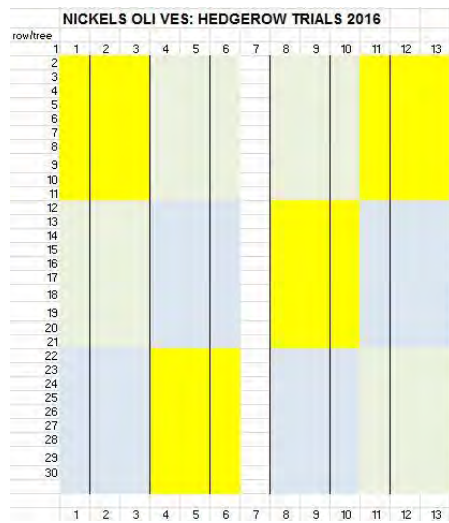


Figure 1. Set up of Nickels trial. Yellow = 10 foot topping followed by hand pruning to remove stubs with thinning cuts; Green = 13 foot topping followed by hand pruning to thin canopy and remove stubs; Blue = Hand pruned. Solid line represents where double boom hedger traveled in May 25, 2016 (5 feet from trunk).



Figure 2. Trees following 10 foot topping and hedging 5 feet from the trunk.



Figure 3. Set up of Nielsen trial in Orland, California. Colors correspond to the following hedging dates:
 Black = 27-Apr Blue = 15-Jul Severe Blue Pokadot= 24-May Severe
 Green = 24-May Pink = 27-Apr Severe White = Control
 Orange = 15-Jul



Figure 4. Measuring light levels following hedging using a quantum sensor

Table 1. Relationship between topping height and pruning costs, 'Manzanillo' olive yields, fruit value, and return at Nickels farm.

Treatment	Pruning Costs* (\$/a)	Yields (t/a)	Price (\$/ton)	Return*** (\$/a)
Topped at 10'	500 a**	2.01	1336 a	2066
Topped at 13'	885 b	3.57	1326 a	3161
Control	930 b	4.65	1217 b	4715
P value	0.045	0.091	0.0004	0.1

* pruning costs based on time needed to prune the trees multiplied by \$11/hr.

** different letters in the same column indicate significance $p < 0.05$.

** partial economic return was calculated as the product of yield and price with pruning costs subtracted, no other costs were included

Table 2. Effects of hedging date and severity of hedging on 'Manzanillo' olive yields at Nielsen's farm.

Hedging Date	Severity of Hedge*	% Light Interception	Yield (lbs/a)	Price (\$/t)
24-May	Moderate	74 b	14533 a	1171
27-Apr	Moderate	76 b	14313 a	1238
No Hedge	NA	85 c	13246 a	1184
24-May	Severe	61 a	12203 ab	1194
15-Jul	Severe	68 ab	12070 ab	1227
15-Jul	Moderate	73 b	10528 ab	1235
27-Apr	Severe	71 b	6183 b	1270
P value		0.037	0.041	NS

* Moderate = approximately 8.5 feet from trunk; Severe = approximately 6.5 feet from trunk

**UCCE Glenn County - Olive Fruit Fly Populations
for Glenn and Tehama County**

	4-Oct		10-Oct		18-Oct		24-Oct		31-Oct		8-Nov		14-Nov		21-Nov														TOT/YR		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Orland 1																															
Glenn County Fairgrounds	4	1	10	15	9	4	12	8	0	0	1	0	2	2	0	0													560	232	
Orland 2																															
Road 200 & Road E	2	1	5	1	4	7	17	8	0	1	0	3	2	1	0	0													572	249	
Orland 3																															
SE Orland N & 16	6	3	31	21	14	7	44	32	1	2	16	7	37	11	8	4													507	267	
Orland 4																															
NE Orland Rd 12 & N	0	1	3	1	0	0	6	5	0	0	0	1	3	0	0	0													91	47	
Orland 5																															
Rd 21 & M	0	0	16	12	15	8	32	23	1	1	0	0	1	0	0	0													325	156	
Orland 6																															
Hwy 99W & Rd 18	0	0	19	16	8	7	16	16	0	0	1	4	2	2	0	0													249	149	
Corning 1																															
Northbound I-5 Reststop	3	6	18	4	3	3	3	8	1	0	1	2	6	0	2	1													426	235	
Corning 2																															
Fig Lane & Houghton	12	5	37	22	19	12	23	20	4	6	0	--	14	13	2	0													396	287	
Corning 3																															
Barham & Sampson	3	3	2	5	5	5	0	0	0	0	1	0	0	0	0	0													203	111	
Corning 4																															
Sac River - Kopta Rd	0	2	2	3	7	4	10	13	11	14	2	4	0	0	0	1													89	79	
Corning 5																															
Viola Ave & Orchard Ave	0	0	1	0	0	0	1	0	1	0	0	0	0	0	0	0													13	1	
Corning 6																															
Dora Ave & Marguerite Ave	0	0	4	3	3	1	4	3	0	0	0	0	0	0	0	0													214	95	
Total	30	22	148	103	87	58	168	136	19	24	22	21	67	29	12	6	0	0	0	0	0	0	0	0	0	0	0	0	0	3645	1908

	4-Jul		11-Jul		19-Jul		25-Jul		1-Aug		8-Aug		15-Aug		22-Aug		29-Aug		6-Sep		12-Sep		19-Sep		26-Sep		TOT/YR	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Orland 1																												
Glenn County Fairgrounds	6	5	0	0	0	1	1	0	0	0	0	0	0	1	0	0	0	0	1	0	0	2	1	7	4	2	522	202
Orland 2																												
Road 200 & Road E	1	0	0	1	1	1	2	0	0	0	0	2	0	0	0	0	0	1	1	2	1	1	3	0	3	1	542	227
Orland 3																												
SE Orland N & 16	1	2	13	3	8	3	2	3	1	0	1	0	2	0	0	0	2	2	7	3	4	4	5	3	4	1	350	180
Orland 4																												
NE Orland Rd 12 & N	11	5	11	11	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	9	5	79	39
Orland 5																												
Rd 21 & M	0	0	1	3	0	0	3	1	0	1	2	1	7	3	0	0	1	0	2	3	9	4	4	2	9	4	260	112
Orland 6																												
Hwy 99W & Rd 18	0	3	2	1	8	4	0	0	2	1	0	1	1	0	1	0	0	0	1	1	2	5	5	3	18	7	203	104
Corning 1																												
Northbound I-5 Reststop	1	1	20	16	13	11	12	6	0	1	7	4	6	4	0	1	0	1	7	3	6	2	0	5	13	14	389	211
Corning 2																												
Fig Lane & Houghton	2	8	38	35	32	43	8	7	0	0	0	0	0	0	0	0	0	3	0	3	4	1	0	13	21	285	209	
Corning 3																												
Barham & Sampson	4	0	25	23	35	14	22	13	1	0	3	2	6	5	0	0	0	4	3	1	2	2	0	0	1	192	98	
Corning 4																												
Sac River - Kopta Rd	0	0	6	2	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	6	2	3	3	4	5	10	57	38
Corning 5																												
Viola Ave & Orchard Ave	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1
Corning 6																												
Dora Ave & Marguerite Ave	5	2	12	5	10	5	5	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1	3	2	203	88	
Total	31	27	129	100	109	83	55	30	4	3	14	11	23	13	1	1	4	4	28	22	28	27	25	25	81	68	3092	1509

	4-Apr		11-Apr		18-Apr		25-Apr		2-May		9-May		16-May		23-May		31-May		6-Jun		13-Jun		20-Jun		27-Jun		TOT/YR		
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	
Orland 1																													
Glenn County Fairgrounds	20	17	218	58	101	31	20	10	19	4	3	0	22	15	9	11	43	19	10	4	44	15	9	7	9	5	509	184	
Orland 2																													
Road 200 & Road E	1	1	52	15	131	34	68	20	169	54	12	4	10	6	28	46	50	36	2	1	7	1	3	0	1	0	530	218	
Orland 3																													
SE Orland N & 16	15	16	56	28	32	10	14	7	18	17	2	3	5	8	19	26	28	14	13	2	98	25	26	16	23	15	300	156	
Orland 4																													
NE Orland Rd 12 & N	0	0	2	0	3	0	0	0	0	0	0	1	0	0	1	0	5	3	5	0	29	12	24	13	39	30	45	16	
Orland 5																													
Rd 21 & M	3	4	6	7	26	8	3	2	4	1	0	0	0	0	2	3	7	5	5	4	166	56	29	29	9	5	222	90	
Orland 6																													
Hwy 99W & Rd 18	5	10	78	30	21	3	4	4	6	2	1	0	0	1	11	14	16	9	5	2	16	3	4	3	4	7	163	78	
Corning 1																													
Northbound I-5 Reststop	1	0	13	4	30	12	16	6	86	25	6	3	28	21	28	17	31	25	6	6	59	23	35	23	24	25	304	142	
Corning 2																													
Fig Lane & Houghton	0	0	13	4	3	2	6	0	8	3	0	0	5	3	12	7	51	31	37	23	50	18	43	15	42	24	185	91	
Corning 3																													
Barham & Sampson	1	0	5	2	3	1	3	0	1	2	1	0	1	1	0	0	7	3	0	1	67	25	40	27	28	11	89	35	
Corning 4																													
Sac River - Kopta Rd	3	0	10	2	2	0	1	0	12	7	6	0	1	1	0	0	1	0	0	0	3	2	0	1	0	0	39	12	
Corning 5																													
Viola Ave & Orchard Ave	0	0	2	0	1	0	1	0	2	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	3	4	8	0
Corning 6																													
Dora Ave & Marguerite Ave	1	1	9	4	17	9	8	3	17	8	7	4	5	4	13	2	4	4	0	3	85	31	78	35	73	33	166	73	
Total	50	49	464	154	370	110	144	52	342	123	38	15	77	60	123	126	244	149	83	46	625	211	291	169	255	159	2560	1059	

Southern Region Olive Fruit Fly Project

Sponsored by: California Olive Committee, Leffingwell Ag Sales & Ag IPM Consultants

2016 Total OLFF for the Week Ending

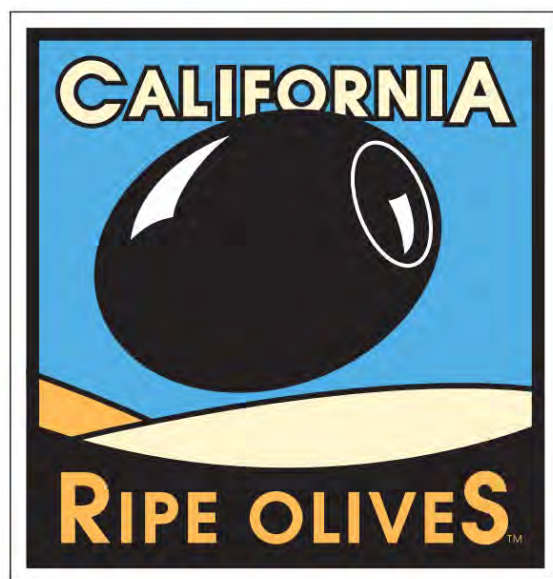
Block	Apr.01		Apr.08		Apr.15		Apr.22		Apr.29		May.06		May.13		May.20		May.27		Jun.03		Jun.10		Jun.17		Jun.24		Jul.01		TOT/YR	
	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F	M	F
Woodlake	set	set	62	22	32	9	6	3	8	3	0	1	4	1	2	2	11	8	5	2	1	0	13	9	27	13	3	1	174	74
Ivanhoe	set	set	15	5	13	2	3	2	4	1	0	1	2	0	0	0	4	2	2	2	12	7	14	9	7	1	1	3	77	35
Exeter	set	set	19	7	26	11	10	3	6	1	5	1	3	0	6	4	0	1	3	0	3	1	16	6	4	3	0	0	101	38
South Exeter	set	set	35	15	37	5	28	4	6	3	3	1	0	0	1	3	0	8	1	4	3	36	6	36	5	0	0	196	44	
Tonyville	set	set	71	13	52	7	17	3	6	3	4	2	25	9	25	3	17	7	10	1	7	1	9	5	24	5	5	1	272	60
W. Lindsay	set	set	13	5	25	3	8	2	6	2	2	1	2	2	2	1	3	2	3	5	2	1	14	3	14	2	4	1	98	30
Strathmore	set	set	7	1	17	4	9	3	5	1	5	0	1	0	3	3	5	0	2	0	3	1	22	4	23	6	5	3	107	26
Porterville	set	set	6	0	14	2	4	1	2	2	0	2	1	0	3	0	0	0	0	0	0	0	1	0	16	5	5	1	52	13
Terra Bella	set	set	6	0	16	3	9	1	2	1	1	3	8	5	7	2	3	1	3	0	3	1	10	2	16	4	0	0	84	23
Total			234	68	232	46	94	22	45	17	20	12	46	17	48	16	46	21	36	11	35	15	135	44	167	44	23	10	1161	343
City of Visalia	set	set	13	7	19	1	20	10	10	4	4	2	8	2	54	25	26	7	14	6	1	0	23	5	28	8	1	2	235	79

Southern Region Olive Fruit Fly Project 2016

Date Check	Block	1		2		SUBTOT	
		M	F	M	F	M	F
Nov.23	Woodlake	1	2	6	0	7	2
Nov.23	Ivanhoe	5	2	0	1	5	3
Nov.23	Exeter	1	0	2	0	3	0
Nov.23	South Exeter	0	0	0	0	0	0
Nov.23	Tonyville	4	2	5	1	9	3
Nov.23	W. Lindsay	0	0	5	0	5	0
Nov.23	Strathmore	1	0	16	4	17	4
Nov.23	Porterville	3	1	0	0	3	1
Nov.23	Terra Bella	0	0	3	0	3	0
	TOTAL					52	13
Nov.23	City of Visalia	0	0	11	1	11	1

TABLE OLIVE PRODUCTION COST STUDY

for the California Olive Committee



Prepared by



D.W. BLOCK ASSOCIATES, LLC

December 9, 2016



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Introduction

The California Olive Committee (COC) is a grower-funded entity that administers marketing, research, inspection, and compliance programs for ripe (also referred to as table) olives produced in the state of California. The organization is comprised of two family-owned canning facilities and roughly one thousand growers located from Kern County to Shasta County, with operations ranging from less than 5 acres to over 1,000 acres in size.

In 2015, COC retained the services of D.W. Block Associates, LLC (DWB) to conduct a study of table olive production costs in California. The study was initiated in mid -2015 but was put on hold for several months until June 2016. The bulk of the primary research in the field, including grower interviews, was done in the summer and fall of 2016.

DWB is grateful to all the growers and COC staff who provided their valuable input and time for this study. Growers took time out of their busy schedules to share specific cost data and insights into the various factors affecting the cost of ripe olive production in California.

Methodology

Research for this study consisted of secondary (literature review) and primary (field) methods. In late 2015, DWB obtained and analyzed official statistics pertaining to ripe table olives in the United States and abroad, and also reviewed some of the critical issues in California agriculture as they related to table olive production, including labor, water, land use change, international trade, food safety, and consumer preferences. These sources helped provide context for specific developments in the California industry.

Primary research consisted of in-person interviews and an online survey with 31 growers believed to be representative of the overall population of California table olive growers. Of the 14 growers initially contacted, 13 were interviewed. For the online survey, a total of 206 growers were contacted via email, which yielded 18 responses.

Each grower was interviewed with the same set of questions (included in the Appendix), and also reviewed a sheet of production cost assumptions based on figures from Cost-Return studies for olives produced by UC Davis in 2016. Interviews were conducted in June 2016, followed by the online survey, which ran from August to October 2016.

The results of this research have been compiled in the following report.

Executive Summary

Tables ES-1 and ES-2 report the major categories of variable and fixed production costs obtained by the survey detailed in this report.

Table ES-1. Average¹ cash operating costs, by region/size of respondent.

		North			South	
		Baseline	Large	Small	Large	Small
Average Yield/Acre		5.00	4.89	4.92	6.09	4.54
Average Price/Ton		\$1,020	\$940	\$940	\$1,100	\$1,100
Avg. Gross Returns		\$5,100	\$4,595	\$4,621	\$6,694	\$4,996
Average Operating Costs	By item	500	500	500	493	607
Custom	Harvest Olives	\$2,500	\$2,444	\$2,458	\$2,999	\$2,758
	PCA Fees	35	35	35	35	35
Water-Irrigation		270	334	273	207	411
Herbicide		47	47	64	68	69
Insecticide		197	197	181	139	144
Fertilizer		59	89	113	58	120
Fungicide		62	65	63	76	66
Thinning Agent		41	101	72	129	25
Labor	Equipment Operator	108	177	151	139	148
	Non-Machine Labor	453	582	490	478	410
Machinery	Fuel-Gasoline	6	6	6	5	6
	Fuel-Diesel	24	24	24	86	26
	Lube	5	5	5	5	5
	Machinery Repair	13	13	13	13	13
Interest on Operating Capital (4.25%)		33	40	37	35	40
Total Operating Costs / Acre		3,854	4,159	3,985	4,473	4,276
Total Operating Costs / Ton		771	851	811	735	941
Net Returns/Acre Above Operating Costs		1,246	437	636	2,221	720

Numbers may not add due to rounding

¹ Weighted by grower acreage

Table ES-2. Average¹ cash and non-cash overhead costs, by region/size of respondent.

Annual Costs per Acre	UC Davis Baseline	North Large	North Small	South Large	South Small
Cash Overhead Costs					
Liability Insurance	16	13	17	28	25
Office Expense	75	74	76	69	56
Sanitation Fees	18	17	18	15	18
Property Taxes	135	135	133	92	132
Property Insurance	11	13	19	12	37
Investment Repairs	108	108	113	133	109
Total Cash Overhead Costs/Acre	363	360	376	349	377
Non-Cash Overhead Costs					
Buildings	158	158	123	158	150
Orchard Establishment	205	264	223	246	234
Irrigation System-Double Drip	71	81	78	61	81
Land - Olives SV	260	349	288	342	411
Shop Tools	16	16	14	16	16
Pruning Equipment	5	5	8	5	5
Fuel Tank 2X 1000-Gallon	18	18	16	18	18
Equipment	190	190	190	190	190
Total Non-Cash Overhead Costs/Acre	923	1081	940	1036	1105
Total Costs/Acre	5138	5535	5274	6432	5837
Net Returns Above Total Costs	-40	-1,004	-680	836	-762

Numbers may not add due to rounding

Background

1. While U.S. ripe olive consumption continues to grow, imports are taking up an increasing share of U.S. market
2. California table olive acreage is in a long term decline due to multiple factors:
 - a. High production costs (labor)
 - b. Competition from imported product
 - c. Urban development
 - d. Higher returns from other crops
3. For a variety of reasons, the labor situation is not likely to improve
 - a. Increased enforcement of immigration laws
 - b. Costs of guest worker program
 - c. Supply of farm labor from Mexico is shrinking:
 - d. Immigration reform that normalizes undocumented workers also increases their mobility and ability to find work outside agriculture
 - e. Mechanical harvesting challenges

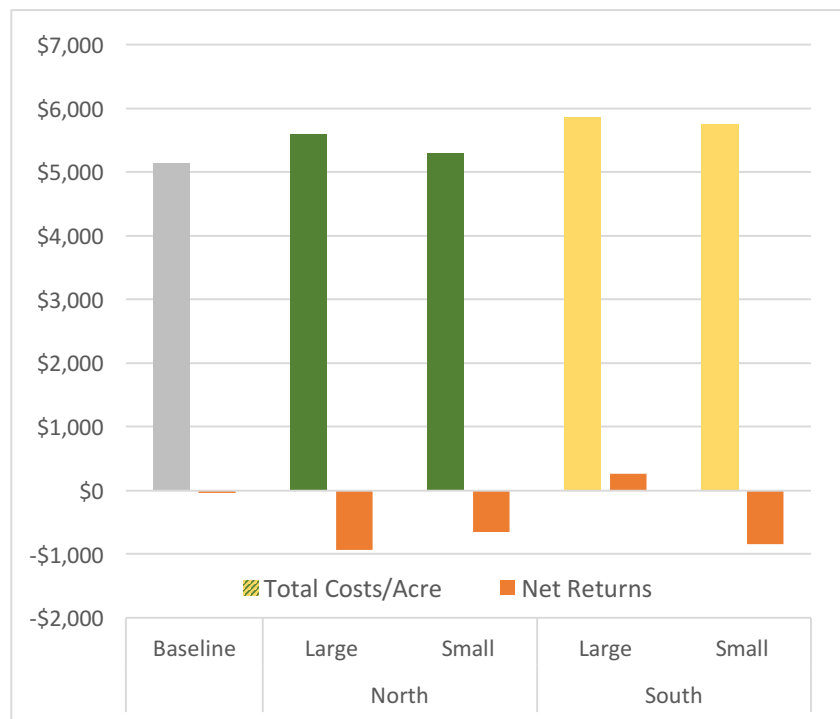
Production cost survey results

4. Survey of 31 table olive growers. Respondents were broken down by geographic location (North/South) and size (Less than/greater than 100 acres)
5. Production costs reported by survey respondents were \$150 to \$700 per acre higher among all respondents compared to the baseline 2016 Olive Production Cost study produced by the UC Davis Agricultural Issues Center (AIC Study)
6. Net returns in three of the four respondent categories were negative. Only large southern growers *as a group* reported positive net returns.
 - a. Key reasons for this are the higher yields of larger growers and higher pricing obtained in the south due to a higher proportion of higher-priced sized fruit.
 - b. Insecticide and nutrient costs were generally lower among southern growers, while northern growers saw lower herbicide costs.
7. While production costs per acre were higher among large, southern growers, higher reported yields resulted in the lowest costs per ton of all the categories.
8. Cash overhead costs were similar across regions and sizes
9. Non-cash overhead costs were smallest among smaller, northern growers.

Total Costs and Net Returns

Total costs and returns are summarized in **Table ES-1**, below. Each region/size category is compared with the baseline figures from the 2016 UC Davis/AIC cost-return study.

Figure ES-1. Average total costs and net returns per acre.



Source: 2016 COC Grower Survey

Industry Background

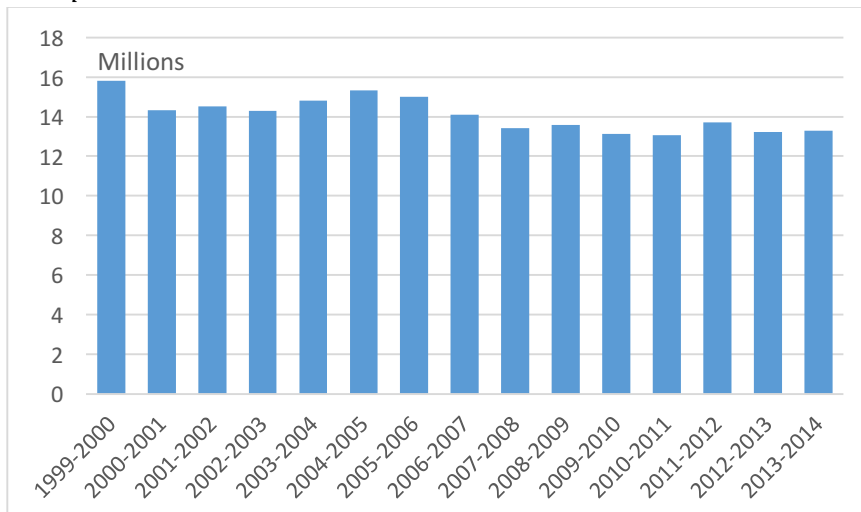
While this study focuses on production costs in California's diverse table olive growing industry, some background information is provided to add context to the following analysis.

California olive supply

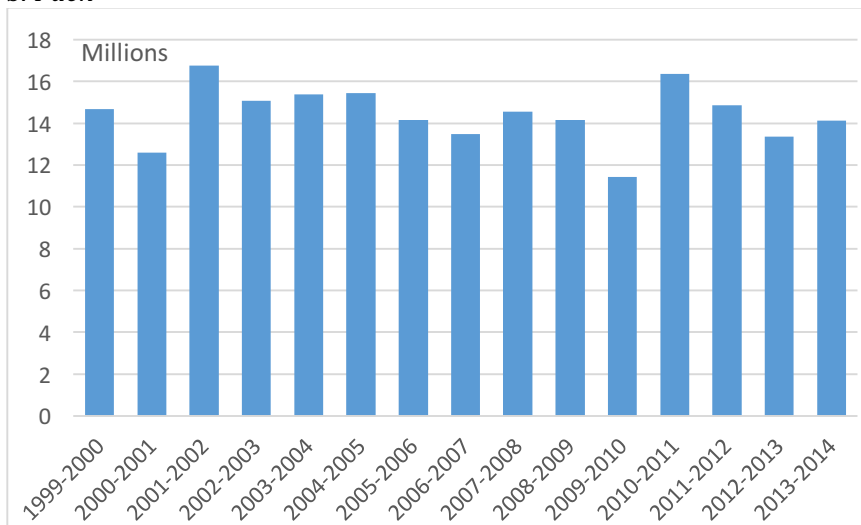
Even in the face of tremendous industry changes, the supply of California ripe olives has been stable over the past fifteen years, as shown in **Figure 1** and **Figure 2** below. While shipments are lower than levels seen in the early 2000s, they have been more or less flat since 2008. Pack, which varies according to the size of the crop each year, still remains close to the long-term average, as also shown in the charts below.

Figure 1. California ripe olive shipments and pack (converted cases 24/300 basis).

a. Shipments



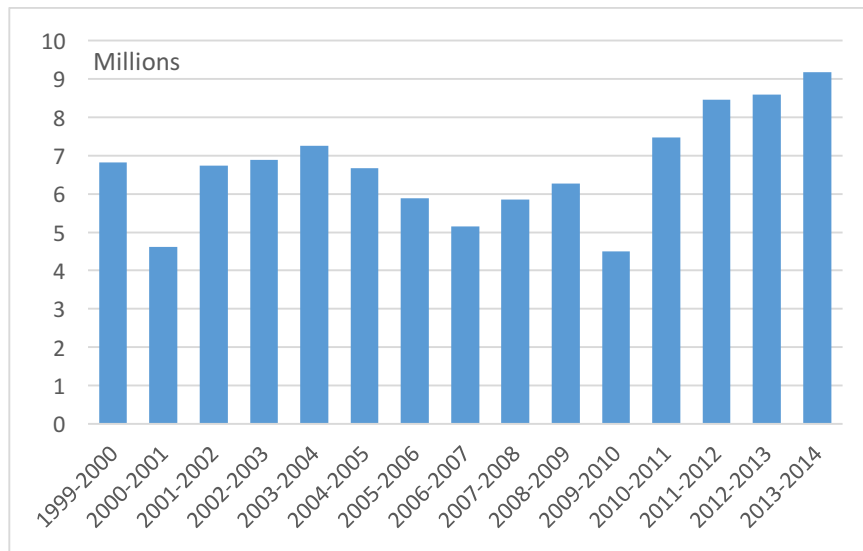
b. Pack



Source: California Olive Committee

Ripe olive inventories have been increasing in recent years, beginning with the record 2010 harvest.

Figure 2. California ripe olive inventories (converted cases 24/300 basis).



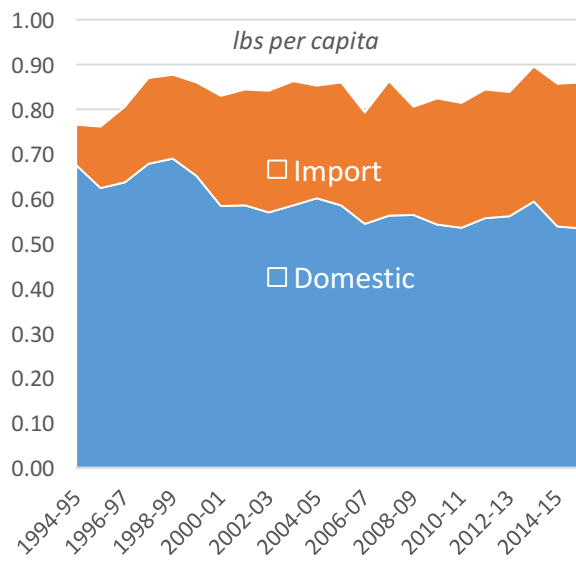
Source: California Olive Committee

U.S. olive demand/disappearance

U.S. consumption of ripe olives totaled approximately 270 million pounds in 2015. Total per capita consumption of canned ripe olives has been steady over the past 20 years, but the supply has increasingly come from imports, primarily from Spain, as ongoing support from the European Union's Common Agricultural Program (CAP) has encouraged high levels of olive production in Europe.² During the 1994-95 season, the California industry supplied nearly 70 percent of the table olives consumed in the U.S. By 2014-15, California represented roughly 55 percent of U.S. supply, as shown in **Figure 3**, below.

² <http://www.teatronaturale.it/strettamente-tecnico/l-arca-olearia/22809-il-90-dell-olivicoltura-spagnola-e-in-perdita-senza-gli-aiuti-della-pac.htm>

Figure 3. U.S. per capita consumption of canned olives

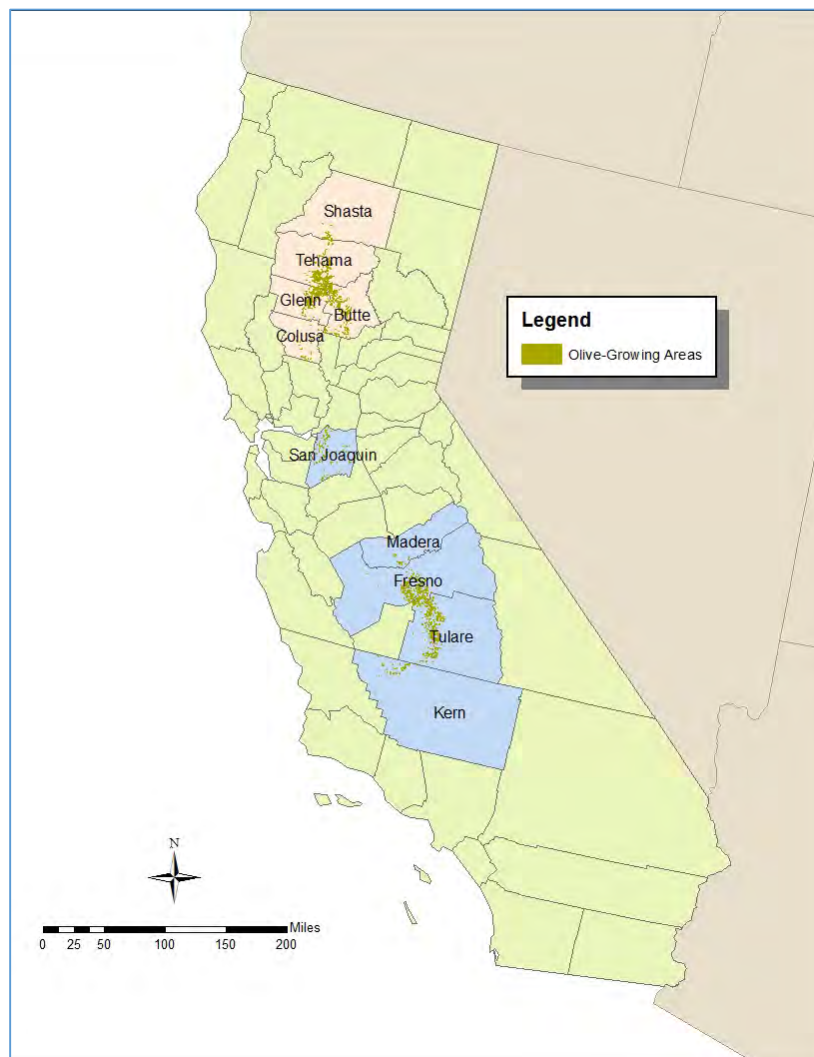


Sources: COC, USDA, U.S. Customs, Census Bureau

California olive acreage

Table olives are grown in two distinct regions in California. The southern growing region running from Kern County north to Tulare, Fresno, Madera, and parts of San Joaquin County represents approximately 15,000 acres; roughly two-thirds of the state total. The remaining third includes over 8,000 acres in the Sacramento River Valley counties of Colusa, Glenn, Butte, Tehama, and Shasta. Crop area devoted to table olive production has declined steadily over the past decade, due to a combination of increasing foreign imports and unfavorable domestic conditions, including rising production costs, urban development, and competition for land from more profitable crops.

Figure 4. Table olive-growing regions in California.



Sources: COC, USDA

In the ten-year period between 2006 and 2014, California olive acreage declined from nearly 32,000 acres to less than 23,000 acres, an average decrease of 3.5 percent per year, as shown in **Table 1** and **Figure 5**, below.

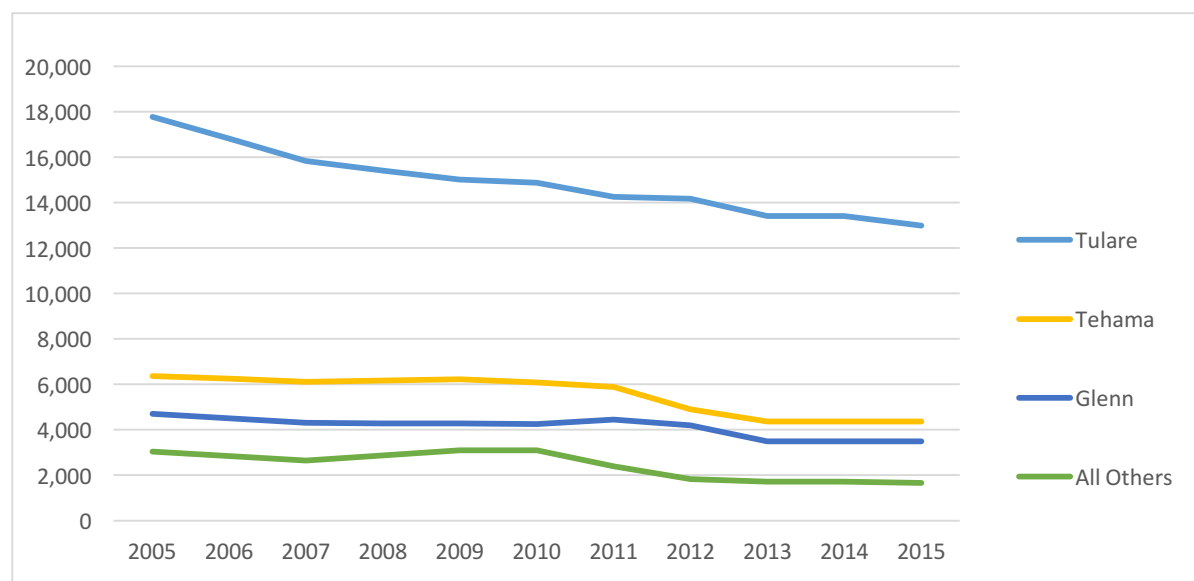
Table 1. California olive acreage, 2005-2014

County	2006	2007	2008	2009	2010	2011	2012	2013	2014
Tehama	6,365	6,242	6,118	6,174	6,229	6,094	5,874	4,903	4,364
Glenn	4,697	4,506	4,315	4,295	4,274	4,252	4,459	4,200	3,486
Butte	-	-	-	226	451	495	511	371	351
Colusa	22	22	22	23	23	25	25	20	25
Shasta	252	239	226	251	276	258	241	111	12
Subtotal	11,336	11,009	10,681	10,967	11,253	11,124	11,110	9,605	8,238
Tulare	17,789	16,817	15,845	15,427	15,009	14,890	14,264	14,167	13,401
Fresno	962	879	795	720	644	650	649	604	625
Madera	1,407	1,332	1,256	1,281	1,305	1,256	575	462	361
Kern	393	372	350	368	386	386	386	240	240
San Joaquin	-	-	-	10	20	16	16	12	91
Subtotal	20,551	19,399	18,246	17,805	17,364	17,198	15,890	15,485	14,718
Grand Total	31,887	30,407	28,927	28,772	28,617	28,322	27,000	25,090	22,956

Source: California Olive Committee. Numbers may not add due to rounding.

Note: In June 2016, several growers interviewed stated they intended to reduce acreage significantly in 2017.

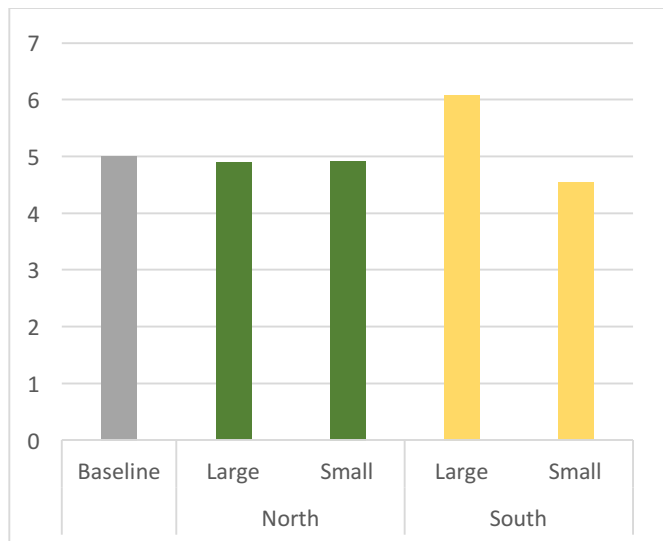
Figure 5. California table olive acreage: 2004-2015



Source: California Olive Committee

Table olive yields are reported in **Figure 6**, below. The comparatively high yields among large southern growers appear to be due largely to higher density production systems compared to the other categories.

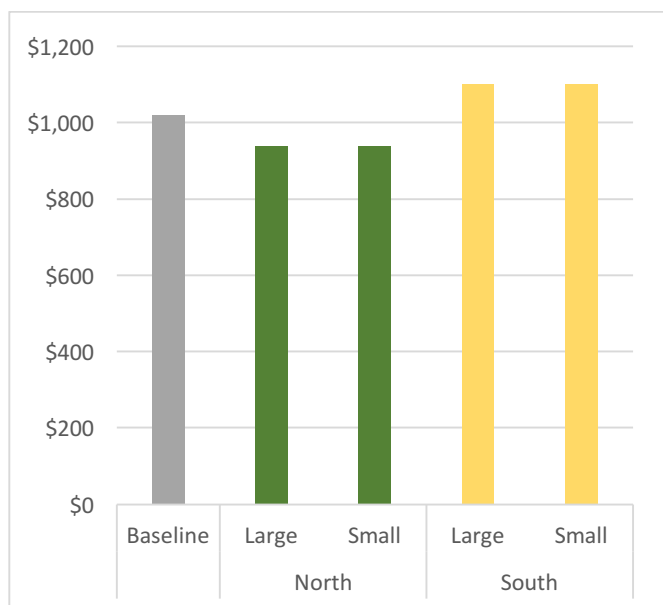
Figure 6. Olive yields by region and size of operation (tons/acre).



Source: 2016 COC Grower Survey

Average prices are reported by region for the 2016 harvest. The price differences are attributable to the predominant sizes in each region – the southern region produces a larger proportion of higher-priced sizes.

Figure 6. Average price/ton received by region and size.



Source: 2016 COC Grower Survey

California Trends: Industry trends, operating conditions, competing crops

The following discussion covers major components of olive production costs in California. For the purposes of this report, all production costs are expressed in terms of how they relate to a baseline established by the cost-return studies published by the UC Davis Agricultural Issues Center (AIC).

Recognizing that each individual olive grower in California has its own unique costs, the present study aims to capture facts about the industry at a greater level of detail than the AIC cost-return studies, while preserving the anonymity of those who responded to the COC-sponsored survey conducted in June-October 2016. Substantial effort was made to interview as many growers in each category as possible. The growers sampled for this study represent over 25% of the total California acreage.

All production costs described as “Average” on the following pages are reported per acre, and are based on a weighted average of the survey respondents – in other words, the costs per acre of a larger producer in a category carries more weight than that of a smaller producer in the same category. This is simply done to reflect the actual practices on the ground: a 2,000-acre grower represents a larger share of production, and their costs are weighted accordingly. Detailed methods are explained in the Appendix.

Labor costs

Hand-harvested olives are one of the most, if not the most labor-intensive crops in the California specialty crop sector.

Baseline labor rates as reported in the AIC’s 2016 Olive Cost-Return study are based on the wages paid plus the employer’s share of payroll taxes, insurance, and benefits. According to the U.S. Bureau of Labor Statistics, labor rates in the key growing regions (Tulare-Fresno and Tehama-Glenn counties), farm labor rates are roughly the same, though differences may exist due to the availability of other employment opportunities and in the timing of different harvests that may affect going wage rates.

Recent developments, such as the increase in the state minimum wage (SB 3) and the phase-out of the overtime exemptions for agricultural workers (AB 1066), are expected to hit labor-intensive industry segments the hardest

Table 2, below compares the labor costs associated with selected specialty crops grown in the Sacramento and San Joaquin valleys.

Table 2. Labor as a percentage of total operating costs, selected California crops.

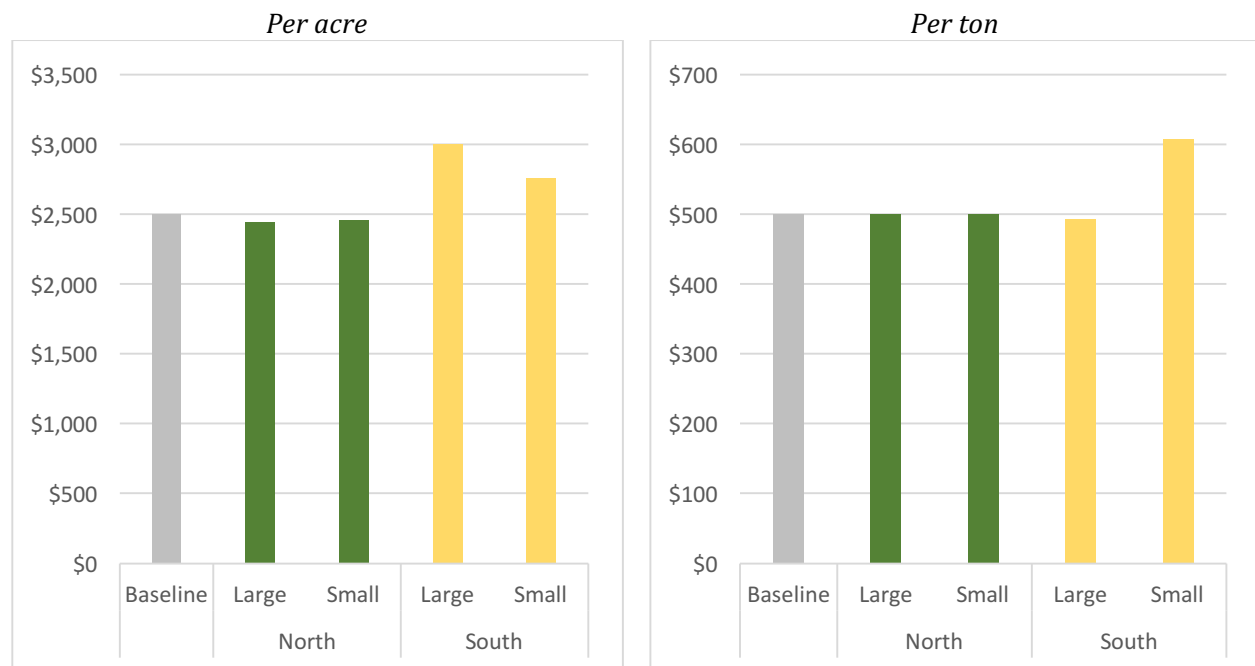
Crop	Harvest Method	Labor Cost
Olives – Standard	Hand	81%
Tomatoes – Fresh	Hand	77%
Grapes – Wine	Mech	43% - 54%
Grapes – Table	Hand	51% - 53%
Almonds	Mech	28% - 35%
Tomatoes – Processing	Mech	20%
Olives – High Density	Mech	19%
Walnuts	Mech	12% - 14%

Includes cultural, harvest, and post-harvest labor.

Sources: UC Davis, DWB estimates

Harvest costs, as measured by acre, are highest among large growers in the southern region. This is due to the higher yields, as mentioned above. On a per-ton basis, the situation is reversed, with those growers seeing the lowest costs, as shown in **Figure 7**, below.

Figure 7. Average harvest costs per acre.



Source: 2016 COC Grower Survey

As would be expected, the industry has focused a great deal of attention on developing mechanical harvesting methods for olives, both in the U.S. and in Spain, the world's leading table olive producer. While high density approaches have been tested in the field, adoption

rates have been slow, due to the large upfront capital costs and the attractiveness of other crops currently bringing in higher returns than olives.

Labor supply

The labor situation for California specialty crops looks increasingly adverse, with factors inside and outside the U.S. leading to a continued decline in farm labor supply and higher costs for the workers who do remain in agriculture. Key developments include:

- Increased enforcement/auditing of I-9 forms: workers simply quit/move on
- Costs of H-2A guest worker program: housing requirements and minimum wage
- Supply of farm labor from Mexico is shrinking:
 - Increased agricultural employment within Mexico
 - Decreasing supply of farmworkers in rural Mexico – less pressure to emigrate to U.S.
 - During housing boom that peaked in 2007-08, many workers went into construction; after recession they did not return to farm work
- Immigration reform that normalizes undocumented workers also increases their mobility and ability to find work outside agriculture
- Mexico is a destination of its own for farmworkers from Central America, leaving fewer willing to come to the U.S.
- Minimum wage increase and new overtime rules for agricultural workers
- Growing role of farm labor contractors: higher out-of-pocket costs (up to 30% commission on top of wages)

Water

Water is a large component of non-labor operating costs in the standard, hand-harvested production system, representing approximately 35 percent of these costs. This is largely due to the low density of the orchards. In newer, high-density plantings, irrigation costs are roughly half of these costs. **Table 3** compares irrigation costs for selected crops.

Table 3. Irrigation water costs as percent of non-labor operating costs, selected crops.

Crop	Water Cost
Olives (Std)	35%
Olives (Hi-density)	16%
Grapes (Wine)	4% - 12%
Walnuts	8% - 11%
Tomatoes – Fresh	10%
Tomatoes – Processing	9%
Almonds	2% - 7%

Sources: UC Davis, DWB estimates

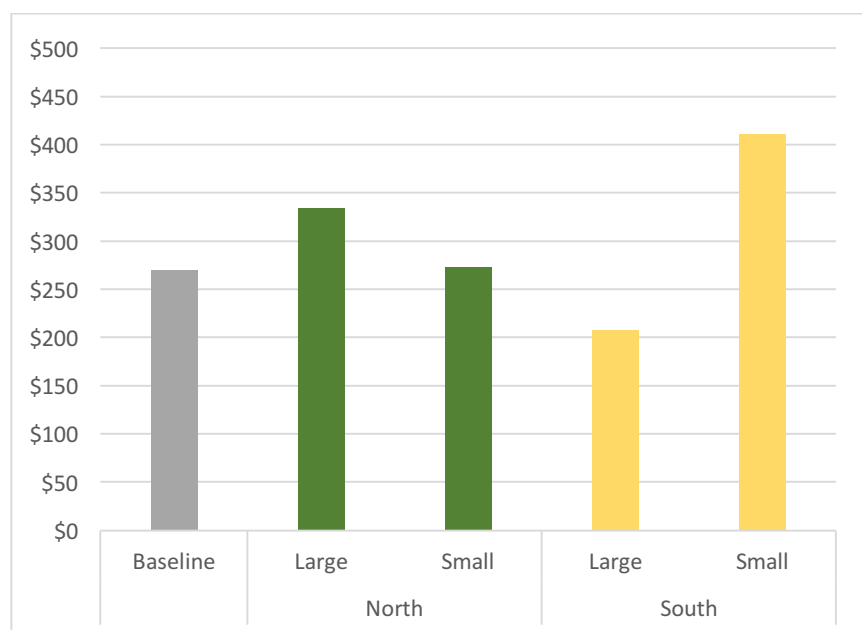
Irrigation water costs vary widely by region, and water availability continues to be limited by the ongoing drought. As has been in the case in other drought periods over the past 15

years, the most water-stressed areas are in the eastern Tulare Lake Basin (Kern and Tulare counties) and in the Westside Water District (Fresno County). These areas represent over 60 percent of California’s olive acreage.

Water supplies are less constrained in the Sacramento River Valley, which in most years receives most of its allotment of the state and federal water.

Irrigation costs by region and grower size are reported in **Figure 8**. These figures from the grower survey include purchased water and groundwater pumping.

Figure 8. Average irrigation water costs per acre.



Source: 2016 COC Grower Survey

The move to manage the state’s groundwater resources moved forward rapidly in the 2014/2015 water year. In addition to the Sustainable Groundwater Management Act (SGMA), which took effect in early 2015, bipartisan bills (AB 1390 and SB 226) to accelerate the groundwater basin adjudication process became law in October 2015. Together, the legislation will eventually result in setting firm allocations for groundwater users in order to prevent unsustainable pumping in the future. In practical terms, this means that agricultural groundwater use will effectively be capped, which will ultimately put a firm limit on irrigated acreage. In the long run, this implies that the state’s agriculture will shift even further toward high value specialty crops, combined with continued fallowing of marginally productive land.

Crop protection (fungicides, herbicides, insecticides, rodenticides)

Crop protection costs also loom large with standard olive production systems, with these costs making up around 30 percent of non-labor operating costs. In high-density systems, crop protection represents closer to 20 percent.

As high density production systems become more established, more data will be available regarding these costs; however, some reports have suggested that conditions in high-density orchards may favor development of certain pests and fungal diseases if orchards are not carefully pruned.

Table 4. Crop protection costs as percent of non-labor operating costs, selected crops.

Crop	Crop Protection Costs
Olives (Std)	30%
Tomatoes-Fresh	29%
Almonds	17% - 28%
Grapes (Wine)	22% - 28%
Walnuts	21% - 25%
Olives (Hi-density)	19%
Tomatoes-Processing	7%

Sources: UC Davis, DWB estimates

Soil fertility management

Fertilizer costs represent a relatively small amount of non-labor production costs, ranging from 5 percent (high density) to 13 percent (standard density) of these costs. **Table 5** compares olives with selected other crops.

Table 5. Fertilizer costs as percent of non-labor operating costs, selected crops.

Crop	Crop Protection Costs
Almonds	22% - 26%
Tomatoes-Fresh	18%
Grapes (Wine)	6% - 14%
Olives (Std)	13%
Tomatoes-Processing	11%
Olives (Hi-density)	5%
Walnuts	4% - 9%

Sources: UC Davis, DWB estimates

Food safety

While food safety is a major item of concern in many California-grown crops, olives appear to have little exposure to new costs or risks associated with the implementation of the 2011 Food Safety Modernization Act (FSMA). There have been no reported recalls of domestic (i.e., California) product since the FDA began capturing such data in 1994. On the other hand, imported olives were implicated in two separate incidents in 2007, where olives of Italian origin were recalled due to concerns over botulism. In the case of U.S.-produced table olives, the nature of the industry (there being only two processors) provides strong imperatives for product traceability and quality control, and in fact, most

domestic canned food processors are already exempt from FSMA requirements because the industry is considered to have already adopted best practices for food safety.

Environmental concerns

As air and water quality regulations are implemented at the regional level, olive growers face the same set of environmental regulations as other crops in the Central Valley. Consequently, economic effects will be roughly the same regardless of the crop grown, so olive growers are expected to neither benefit nor be exceptionally burdened by environmental regulations in the state compared to other crops.

As of April 2016, there does not appear to be any new or proposed environmental regulations being formally proposed at the state level³. Additional legislation could take place by the end of 2016, but their likelihood of being enacted is not known at this time.

Mechanization

While mechanization in the olive industry has been proceeding at a slow pace, another California crop has experienced a fairly rapid mechanization, which could provide an example of what might occur with olives if the industry chooses that path. California raisin producers have dealt with rising labor costs by planting new grape varieties that allow dried-on-the-vine (DOV) methods that allow for machine harvesting, which has reduced labor requirements by as much as 50 percent. In all, approximately 50,000 acres of grape vines for raisins have been replanted since 2000, representing over 26 percent of the state's acreage. This transition has taken place mostly with larger operations.

Table 6 compares the operating costs of standard and high-density olive production systems.

Table 6. Comparison of traditional and high-density olive production costs

Cost Per Acre	Standard Manual Harvest	% of Total	High Density Machine Harvest	% of Total
Total Operating Costs	\$3,049		\$1,664	
Labor - Pre/Post Harvest	\$554	18%	\$308	19%
Labor - Harvesting	\$1,750	57%	\$600	36%
Total Labor	\$2,304	76%	\$908	55%

Source: 2011 Olive Cost-Return studies for medium and super high density olive orchards

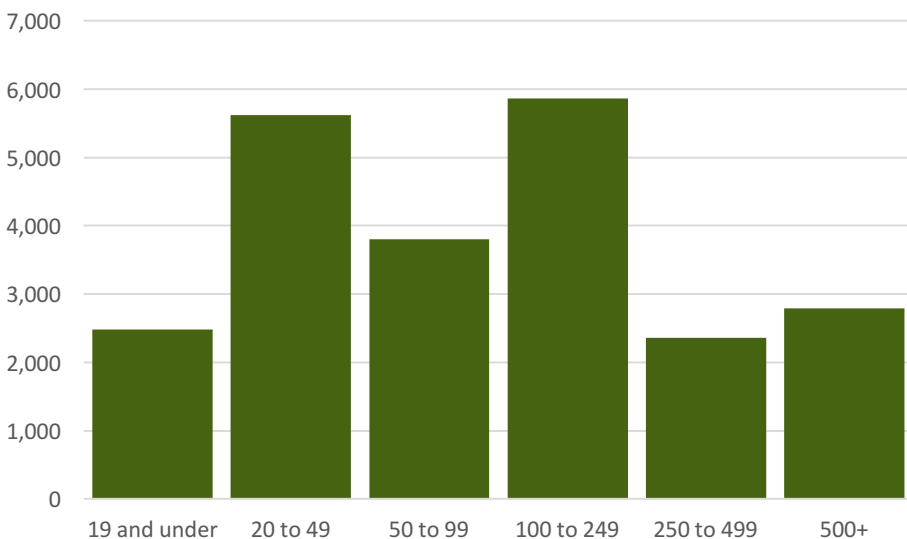
³ <http://www.oal.ca.gov/proposed-regulations/>

Distribution of olive growers by size

Based on figures reported by the COC, the median size of olive-growing operations is slightly less than 100 acres. This midpoint is used to distinguish between small (up to 100 acres), and large (over 100 acres) operations in the production cost survey results found in the following section.

The distribution of olive acreage by size of operation is estimated in **Figure 9**, below, based on COC data about the number of growers in each size class. For example, the total area in California taken up by small operations (less than 20 acres each) is roughly 2,500 acres. The total crop area taken up by operations of 20-49 acres each is 5,600 acres, and so on.

Figure 9. Olive acreage, by size class of operation, 2006.



Source: COC, with estimated distribution by DWB

Production Cost Model

Approach

The UC Davis Agricultural Issues Center (AIC), along with the UC Cooperative Extension (UCCE), produces cost and return studies for a wide variety of crop and livestock commodities grown in California. The UC system has issued four dozen table olive studies since 1938, reflecting the long history and stature of table olive production in California.

The most recent table olive cost-return study was issued in 2016, and focuses on a prototypical Manzanillo orchard on 40-acres in the Sacramento Valley.

These cost and return studies contain detailed figures relating to production practices for each crop and region, including cultural practices from pre-plant to post-harvest, as well as cash and capital overhead costs.

Recognizing that these studies are a useful resource for planning and evaluating production costs of valuable crops in California, this study attempts to describe production costs at a finer resolution, reflecting the diversity of operations throughout the state's major growing areas.

Accordingly, the approach to the present study is to analyze differences between the two major growing regions (the Sacramento Valley and Tulare-Fresno counties), as well as operation size: small (up to 100 acres) and large (over 100 acres).

In order to obtain additional information, the research team obtained production cost data and background on production practices from 31 individual growers in the state. An initial group of 13 growers were identified by the research team and interviewed in June 2016. This was supplemented by an online survey of growers in September 2016, which yielded an additional 18 responses out of 206 growers contacted via e-mail.

Respondents were categorized by location (North and South) and size (Large and Small), and the average values for each category were used to summarize the variation in production costs by line item (e.g., irrigation water, nutrients, herbicides, etc.), as reported in the following section.

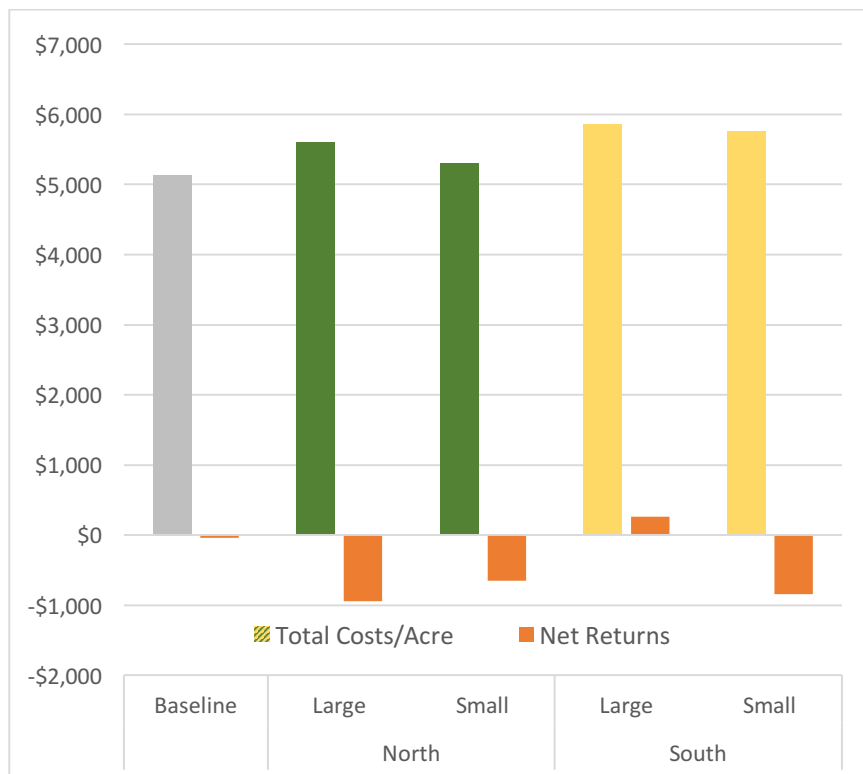
A detailed discussion of the survey approach and methods can be found in the Appendix.

Survey Results

The survey results are summarized in **Table 7** and **Figure 10**, below. These findings illustrate two broad conclusions: costs are generally slightly higher and revenues are generally lower than the baseline figures, with some variation by size and region.

As will become clear on the following pages, large growers in the southern region have seen considerably higher costs, due largely to higher yields per acre. This is offset by higher overall pricing based on a larger proportion of higher-valued olive size.

Figure 10. Average total costs and net returns per acre.



Source: 2016 COC Grower Survey

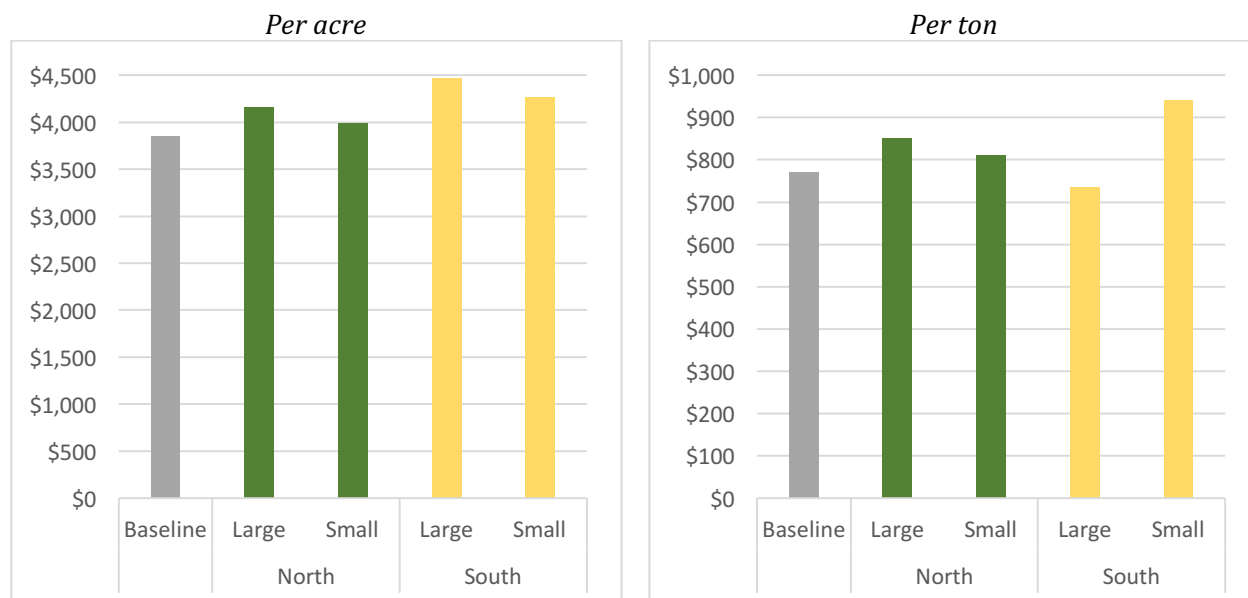
Table 7. Costs and returns per acre.

Category	Operating Costs	Overhead	Total Costs	Revenues	Net Returns
Baseline	\$3,854	\$1,286	\$5,140	\$5,100	-\$40
North-Large	\$4,159	\$1,441	\$5,600	\$4,595	-\$1,004
North-Small	\$3,985	\$1,316	\$5,301	\$4,621	-\$680
South-Large	\$4,473	\$1,385	\$5,858	\$6,694	\$836
South-Small	\$4,276	\$1,482	\$5,758	\$4,996	-\$762

Source: 2016 COC Grower Survey

Operating Costs depend greatly on harvest costs, a topic discussed in more detail in the regional breakdowns in the next section. Depending on the region and grower size, harvesting costs represented between 60 percent and 72 percent of operating costs.

Figure 11. Average total operating costs.

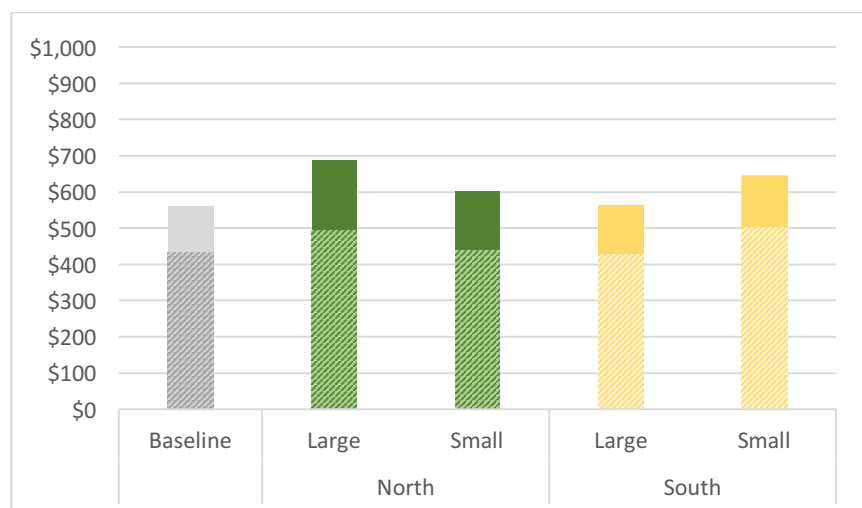


Source: 2016 COC Grower Survey

Labor costs

Even when excluding the harvest, labor costs represent a substantial portion of operating costs, as shown in **Figure 12** below. Pruning and shredding costs represent the largest proportion of these costs, as shown in the crosshatched area below.

Figure 12. Average labor costs per acre (excluding harvest).



Source: 2016 COC Grower Survey

Combined, harvest and pruning costs represent over 90 percent of labor costs among the growers surveyed.

Table 8. Average labor costs per acre, by type.

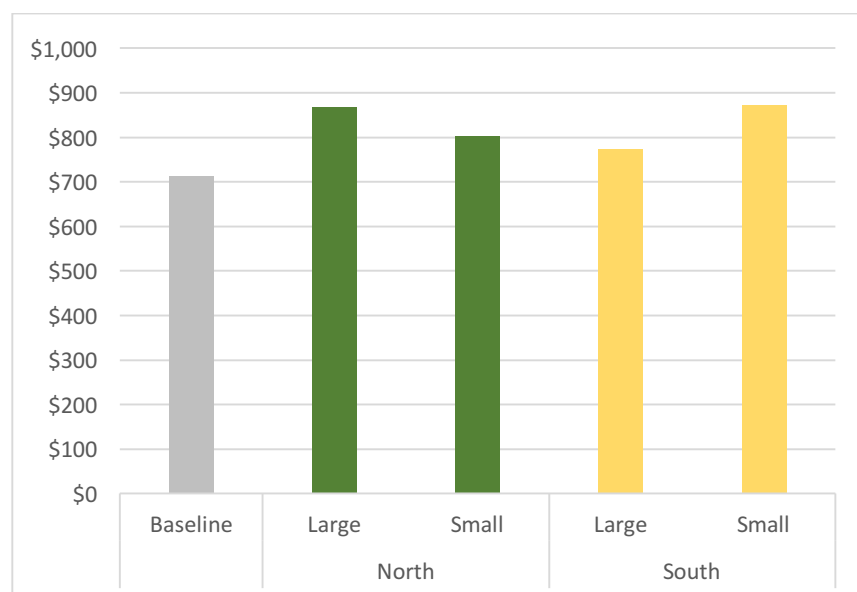
Category	Harvest	Irrigation	Machine (Skilled)	Non- machine (Unskilled)	Other	Pest/ disease mgmt	Pruning	Weed mgmt	Total
Baseline	\$2,500	\$15	\$108	\$28	\$8	\$20	\$425	\$22	\$3,125
North-Large	\$2,444	\$34	\$106	\$26	\$36	\$35	\$486	\$36	\$3,204
North-Small	\$2,458	\$21	\$108	\$32	\$7	\$21	\$431	\$21	\$3,099
South-Large	\$2,999	\$23	\$98	\$27	\$7	\$20	\$421	\$21	\$3,616
South-Small	\$2,758	\$12	\$117	\$21	\$6	\$15	\$495	\$16	\$3,316

Source: 2016 COC Grower Survey

Crop inputs

Reported input costs exceeded the baseline in all of the respondent categories, though these costs varied by location and size in different ways. For example, fungicide and herbicide costs were uniformly higher than the baseline among all respondents. All other costs were generally higher in the north, while thinning agent (Liqui-Stik) costs were higher among large growers compared to small growers.

Figure 13. Average total input costs per acre.



Source: 2016 COC Grower Survey

Table 9. Average input costs per acre, by location and size.

Category	Fungicide	Herbicide	Insect		Nutrients	Thinning		Total
			Control	Insecticide		Agent	Water	
Baseline	\$62	\$47	\$14	\$197	\$59	\$41	\$270	\$720
North-Large	\$65	\$47	\$15	\$197	\$89	\$101	\$334	\$879
North-Small	\$63	\$64	\$16	\$181	\$113	\$72	\$273	\$810
South-Large	\$76	\$68	\$7	\$139	\$58	\$129	\$207	\$782
South-Small	\$66	\$69	\$8	\$136	\$120	\$25	\$411	\$867

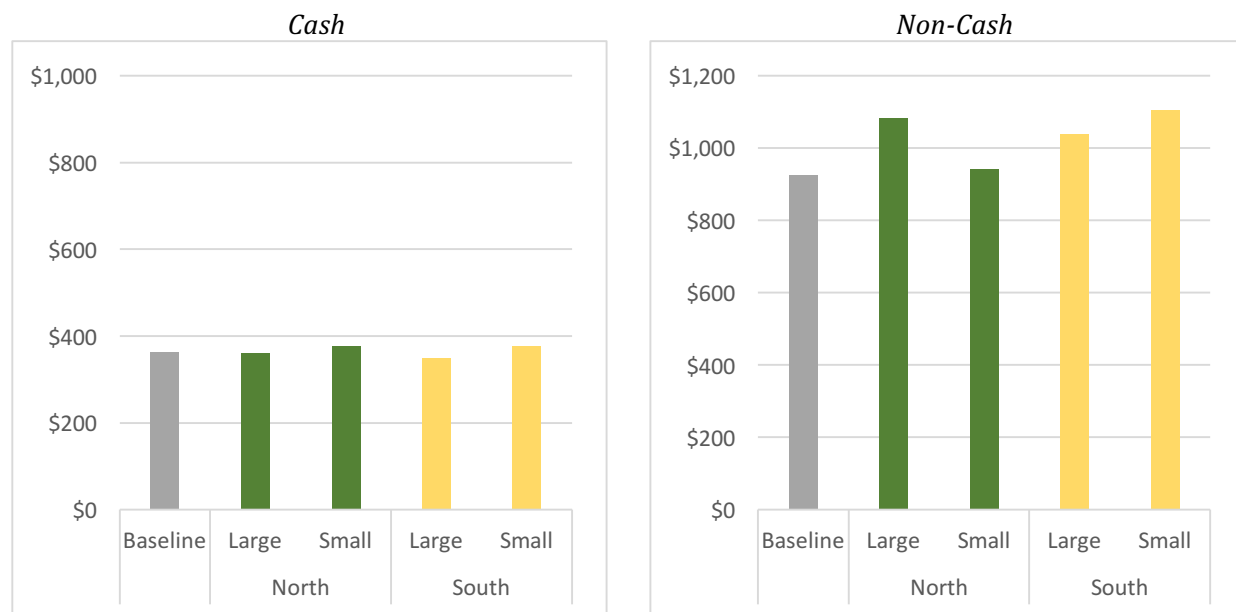
Source: 2016 COC Grower Survey

Overhead costs

Cash overhead costs per acre did not deviate much from the baseline. The most notable finding is that some costs, such as office, insurance, fees, and taxes, were lower among larger producers, which would seem to match expectations, as larger operations can spread their costs over a larger acreage base.

Non-cash overhead costs were likewise similar to, though slightly higher than, the baseline across all regions and size categories. Land costs were slightly higher among respondents in the southern region.

Figure 14. Average overhead costs.



Source: 2016 COC Grower Survey

Cash and non-cash overhead costs are shown in more detail in **Tables 10** and **11**, below.

Table 10. Average cash overhead per acre cost detail.

Category	Equipment Repair	Liability Insurance	Office	Property Insurance	Property Tax	Sanitation	Total
Baseline	\$108	\$16	\$75	\$11	\$135	\$18	\$363
North-Large	\$108	\$17	\$74	\$13	\$135	\$17	\$365
North-Small	\$113	\$17	\$76	\$19	\$133	\$18	\$374
South-Large	\$133	\$28	\$69	\$12	\$92	\$15	\$349
South-Small	\$115	\$25	\$56	\$37	\$132	\$14	\$454

Source: 2016 COC Grower Survey

Table 11. Average non-cash overhead per acre cost detail.

Category	Buildings	Equipment	Orchard Establishment	Fuel Tanks	Irrigation System	Land Cost	Tools	Total
Baseline	\$158	\$190	\$205	\$18	\$71	\$260	\$21	\$923
North-Large	\$158	\$190	\$264	\$18	\$81	\$349	\$21	\$1,082
North-Small	\$123	\$179	\$223	\$16	\$78	\$288	\$22	\$930
South-Large	\$158	\$190	\$246	\$18	\$61	\$342	\$21	\$1,036
South-Small	\$112	\$143	\$176	\$14	\$134	\$411	\$16	\$1,005

Source: 2016 COC Grower Survey

Ranging Analysis (Net returns at varying prices and yields)

The following tables provide a dynamic picture of the potential profitability of each region/size category. This sensitivity, or ranging, analysis compares the net returns per acre and per ton for a range of crop yields (from 2tons/acre to 8 tons/acre) and price (from \$720 to \$1320 per ton).

Table 12. Costs and returns: Baseline (2016 UC Davis Cost-Return Study)

Baseline		Yield (Tons/Acre)						
		2.00	3.00	4.00	5.00	6.00	7.00	8.00
OPERATING COST/ACRE								
Cultural		1,319	1,319	1,319	1,319	1,319	1,319	1,319
Harvest		1,000	1,500	2,000	2,500	3,000	3,500	4,000
Interest on Operating Capital @ 4.25%		26	28	30	32	34	35	37
TOTAL OPERATING COSTS/ACRE		2,345	2,847	3,349	3,851	4,353	4,854	5,356
TOTAL OPERATING COSTS/TON		1,173	949	837	770	726	693	670
CASH OVERHEAD COSTS/ACRE		363	363	363	363	363	363	363
TOTAL CASH COSTS/ACRE		2,708	3,210	3,712	4,214	4,716	5,217	5,719
TOTAL CASH COSTS/TON		1,354	1,070	928	843	786	745	715
NON-CASH OVERHEAD COSTS/ACRE		923	923	923	923	923	923	923
TOTAL COSTS/ACRE		3,631	4,133	4,635	5,137	5,639	6,140	6,642
TOTAL COSTS/TON		1,816	1,378	1,159	1,027	940	877	830

Net Return per Acre		Yield (Tons/Acre)						
		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Above Operating Costs	\$720	-905	-687	-469	-251	-33	186	404
	\$820	-705	-387	-69	249	567	886	1,204
	\$920	-505	-87	331	749	1,167	1,586	2,004
	\$1020	-305	213	731	1,249	1,767	2,286	2,804
	\$1120	-105	513	1,131	1,749	2,367	2,986	3,604
	\$1220	95	813	1,531	2,249	2,967	3,686	4,404
	\$1320	295	1,113	1,931	2,749	3,567	4,386	5,204

Net Return per Acre		Yield (Tons/Acre)						
		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Above Cash Costs	\$720	-1,268	-1,050	-832	-614	-396	-177	41
	\$820	-1,068	-750	-432	-114	204	523	841
	\$920	-868	-450	-32	386	804	1,223	1,641
	\$1020	-668	-150	368	886	1,404	1,923	2,441
	\$1120	-468	150	768	1,386	2,004	2,623	3,241
	\$1220	-268	450	1,168	1,886	2,604	3,323	4,041
	\$1320	-68	750	1,568	2,386	3,204	4,023	4,841

Net Return per Acre		Yield (Tons/Acre)						
		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Above Total Costs	\$720	-2,191	-1,973	-1,755	-1,537	-1,319	-1,100	-882
	\$820	-1,991	-1,673	-1,355	-1,037	-719	-400	-82
	\$920	-1,791	-1,373	-955	-537	-119	300	718
	\$1020	-1,591	-1,073	-555	-37	481	1,000	1,518
	\$1120	-1,391	-773	-155	463	1,081	1,700	2,318
	\$1220	-1,191	-473	245	963	1,681	2,400	3,118
	\$1320	-991	-173	645	1,463	2,281	3,100	3,918

Table 13. Costs and returns: North/Large

		Yield (Tons/Acre)						
Baseline		2.00	3.00	4.00	5.00	6.00	7.00	8.00
OPERATING COST/ACRE								
Cultural		1,618	1,618	1,618	1,618	1,618	1,618	1,618
Harvest		1,000	1,500	2,000	2,500	3,000	3,500	3,999
Interest on Operating Capital @ 4.25%		40	40	40	40	40	40	40
TOTAL OPERATING COSTS/ACRE		2,657	3,157	3,657	4,157	4,657	5,157	5,657
TOTAL OPERATING COSTS/TON		1,329	1,052	914	831	776	737	707
CASH OVERHEAD COSTS/ACRE								
		360	360	360	360	360	360	360
TOTAL CASH COSTS/ACRE		3,017	3,517	4,017	4,517	5,017	5,517	6,017
TOTAL CASH COSTS/TON		1,509	1,172	1,004	903	836	788	752
NON-CASH OVERHEAD COSTS/ACRE								
		1,081	1,081	1,081	1,081	1,081	1,081	1,081
TOTAL COSTS/ACRE		4,098	4,598	5,098	5,598	6,098	6,598	7,098
TOTAL COSTS/TON		2,049	1,533	1,275	1,120	1,016	943	887
		Yield (Tons/Acre)						
Net Return per Acre Above Op Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-1,217	-997	-777	-557	-337	-117	103
	\$820	-1,017	-697	-377	-57	263	583	903
	\$920	-817	-397	23	443	863	1,283	1,703
	\$1020	-617	-97	423	943	1,463	1,983	2,503
	\$1120	-417	203	823	1,443	2,063	2,683	3,303
	\$1220	-217	503	1,223	1,943	2,663	3,383	4,103
	\$1320	-17	803	1,623	2,443	3,263	4,083	4,903
		Yield (Tons/Acre)						
Net Return per Acre Above Cash Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-1,577	-1,357	-1,137	-917	-697	-477	-257
	\$820	-1,377	-1,057	-737	-417	-97	223	543
	\$920	-1,177	-757	-337	83	503	923	1,343
	\$1020	-977	-457	63	583	1,103	1,623	2,143
	\$1120	-777	-157	463	1,083	1,703	2,323	2,943
	\$1220	-577	143	863	1,583	2,303	3,023	3,743
	\$1320	-377	443	1,263	2,083	2,903	3,723	4,543
		Yield (Tons/Acre)						
Net Return per Acre Above Total Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-2,658	-2,438	-2,218	-1,998	-1,778	-1,558	-1,338
	\$820	-2,458	-2,138	-1,818	-1,498	-1,178	-858	-538
	\$920	-2,258	-1,838	-1,418	-998	-578	-158	262
	\$1020	-2,058	-1,538	-1,018	-498	22	542	1,062
	\$1120	-1,858	-1,238	-618	2	622	1,242	1,862
	\$1220	-1,658	-938	-218	502	1,222	1,942	2,662
	\$1320	-1,458	-638	182	1,002	1,822	2,642	3,462

Table 14. Costs and returns: North/Small

		Yield (Tons/Acre)						
Baseline		2.00	3.00	4.00	5.00	6.00	7.00	8.00
OPERATING COST/ACRE								
Cultural		1,468	1,468	1,468	1,468	1,468	1,468	1,468
Harvest		1,000	1,500	2,000	2,500	3,000	3,500	4,000
Interest on Operating Capital @ 4.25%		37	37	37	37	37	37	37
TOTAL OPERATING COSTS/ACRE		2,505	3,005	3,505	4,005	4,505	5,005	5,505
TOTAL OPERATING COSTS/TON		1,252	1,002	876	801	751	715	688
CASH OVERHEAD COSTS/ACRE								
		376	376	376	376	376	376	376
TOTAL CASH COSTS/ACRE		2,881	3,381	3,881	4,381	4,881	5,381	5,881
TOTAL CASH COSTS/TON		1,440	1,127	970	876	813	769	735
NON-CASH OVERHEAD COSTS/ACRE								
		940	940	940	940	940	940	940
TOTAL COSTS/ACRE		3,821	4,321	4,821	5,321	5,821	6,321	6,821
TOTAL COSTS/TON		1,910	1,440	1,205	1,064	970	903	853

		Yield (Tons/Acre)						
Net Return per Acre Above Op Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-1,065	-845	-625	-405	-185	35	255
	\$820	-865	-545	-225	95	415	735	1,055
	\$920	-665	-245	175	595	1,015	1,435	1,855
	\$1020	-465	55	575	1,095	1,615	2,135	2,655
	\$1120	-265	355	975	1,595	2,215	2,835	3,455
	\$1220	-65	655	1,375	2,095	2,815	3,535	4,255
	\$1320	135	955	1,775	2,595	3,415	4,235	5,055

		Yield (Tons/Acre)						
Net Return per Acre Above Cash Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-1,441	-1,221	-1,001	-781	-561	-341	-121
	\$820	-1,241	-921	-601	-281	39	359	679
	\$920	-1,041	-621	-201	219	639	1,059	1,479
	\$1020	-841	-321	199	719	1,239	1,759	2,279
	\$1120	-641	-21	599	1,219	1,839	2,459	3,079
	\$1220	-441	279	999	1,719	2,439	3,159	3,879
	\$1320	-241	579	1,399	2,219	3,039	3,859	4,679

		Yield (Tons/Acre)						
Net Return per Acre Above Total Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-2,381	-2,161	-1,941	-1,721	-1,501	-1,281	-1,061
	\$820	-2,181	-1,861	-1,541	-1,221	-901	-581	-261
	\$920	-1,981	-1,561	-1,141	-721	-301	119	539
	\$1020	-1,781	-1,261	-741	-221	299	819	1,339
	\$1120	-1,581	-961	-341	279	899	1,519	2,139
	\$1220	-1,381	-661	59	779	1,499	2,219	2,939
	\$1320	-1,181	-361	459	1,279	2,099	2,919	3,739

Table 15: Costs and returns: South/Large

		Yield (Tons/Acre)						
Baseline		2.00	3.00	4.00	5.00	6.00	7.00	8.00
OPERATING COST/ACRE								
Cultural		1,331	1,331	1,331	1,331	1,331	1,331	1,331
Harvest		986	1,478	1,971	2,464	2,957	3,450	3,943
Interest on Operating Capital @ 4.25%		35	35	35	35	35	35	35
TOTAL OPERATING COSTS/ACRE		2,352	2,845	3,338	3,831	4,324	4,817	5,309
TOTAL OPERATING COSTS/TON		1,176	948	835	766	721	688	664
CASH OVERHEAD COSTS/ACRE								
TOTAL CASH COSTS/ACRE		2,701	3,194	3,687	4,180	4,673	5,166	5,658
TOTAL CASH COSTS/TON		1,351	1,065	922	836	779	738	707
NON-CASH OVERHEAD COSTS/ACRE								
TOTAL COSTS/ACRE		3,737	4,230	4,723	5,216	5,709	6,202	6,694
TOTAL COSTS/TON		1,869	1,410	1,181	1,043	951	886	837

		Yield (Tons/Acre)						
Net Return per Acre Above Op Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-912	-685	-458	-231	-4	223	451
	\$820	-712	-385	-58	269	596	923	1,251
	\$920	-512	-85	342	769	1,196	1,623	2,051
	\$1020	-312	215	742	1,269	1,796	2,323	2,851
	\$1120	-112	515	1,142	1,769	2,396	3,023	3,651
	\$1220	88	815	1,542	2,269	2,996	3,723	4,451
	\$1320	288	1,115	1,942	2,769	3,596	4,423	5,251

		Yield (Tons/Acre)						
Net Return per Acre Above Cash Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-1,261	-1,034	-807	-580	-353	-126	102
	\$820	-1,061	-734	-407	-80	247	574	902
	\$920	-861	-434	-7	420	847	1,274	1,702
	\$1020	-661	-134	393	920	1,447	1,974	2,502
	\$1120	-461	166	793	1,420	2,047	2,674	3,302
	\$1220	-261	466	1,193	1,920	2,647	3,374	4,102
	\$1320	-61	766	1,593	2,420	3,247	4,074	4,902

		Yield (Tons/Acre)						
Net Return per Acre Above Total Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-2,297	-2,070	-1,843	-1,616	-1,389	-1,162	-934
	\$820	-2,097	-1,770	-1,443	-1,116	-789	-462	-134
	\$920	-1,897	-1,470	-1,043	-616	-189	238	666
	\$1020	-1,697	-1,170	-643	-116	411	938	1,466
	\$1120	-1,497	-870	-243	384	1,011	1,638	2,266
	\$1220	-1,297	-570	157	884	1,611	2,338	3,066
	\$1320	-1,097	-270	557	1,384	2,211	3,038	3,866

Table 16: Costs and returns: South/Small

		Yield (Tons/Acre)						
Baseline		2.00	3.00	4.00	5.00	6.00	7.00	8.00
OPERATING COST/ACRE								
Cultural		1,562	1,562	1,562	1,562	1,562	1,562	1,562
Harvest		1,215	1,822	2,429	3,036	3,644	4,251	4,858
Interest on Operating Capital @ 4.25%		40	40	40	40	40	40	40
TOTAL OPERATING COSTS/ACRE		2,816	3,424	4,031	4,638	5,246	5,853	6,460
TOTAL OPERATING COSTS/TON		1,408	1,141	1,008	928	874	836	808
CASH OVERHEAD COSTS/ACRE								
		377	377	377	377	377	377	377
TOTAL CASH COSTS/ACRE		3,193	3,801	4,408	5,015	5,623	6,230	6,837
TOTAL CASH COSTS/TON		1,597	1,267	1,102	1,003	937	890	855
NON-CASH OVERHEAD COSTS/ACRE								
		1,105	1,105	1,105	1,105	1,105	1,105	1,105
TOTAL COSTS/ACRE		4,298	4,906	5,513	6,120	6,728	7,335	7,942
TOTAL COSTS/TON		2,149	1,635	1,378	1,224	1,121	1,048	993

		Yield (Tons/Acre)						
Net Return per Acre Above Op Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-1,376	-1,264	-1,151	-1,038	-926	-813	-700
	\$820	-1,176	-964	-751	-538	-326	-113	100
	\$920	-976	-664	-351	-38	274	587	900
	\$1020	-776	-364	49	462	874	1,287	1,700
	\$1120	-576	-64	449	962	1,474	1,987	2,500
	\$1220	-376	236	849	1,462	2,074	2,687	3,300
	\$1320	-176	536	1,249	1,962	2,674	3,387	4,100

		Yield (Tons/Acre)						
Net Return per Acre Above Cash Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-1,753	-1,641	-1,528	-1,415	-1,303	-1,190	-1,077
	\$820	-1,553	-1,341	-1,128	-915	-703	-490	-277
	\$920	-1,353	-1,041	-728	-415	-103	210	523
	\$1020	-1,153	-741	-328	85	497	910	1,323
	\$1120	-953	-441	72	585	1,097	1,610	2,123
	\$1220	-753	-141	472	1,085	1,697	2,310	2,923
	\$1320	-553	159	872	1,585	2,297	3,010	3,723

		Yield (Tons/Acre)						
Net Return per Acre Above Total Costs		2.00	3.00	4.00	5.00	6.00	7.00	8.00
Price (\$/ton)	\$720	-2,658	-2,438	-2,218	-1,998	-1,778	-1,558	-1,338
	\$820	-2,458	-2,138	-1,818	-1,498	-1,178	-858	-538
	\$920	-2,258	-1,838	-1,418	-998	-578	-158	262
	\$1020	-2,058	-1,538	-1,018	-498	22	542	1,062
	\$1120	-1,858	-1,238	-618	2	622	1,242	1,862
	\$1220	-1,658	-938	-218	502	1,222	1,942	2,662
	\$1320	-1,458	-638	182	1,002	1,822	2,642	3,462

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Appendix – Grower Survey Methods

Survey Background

With approximately 1,000 growing operations in California, the table olive industry is especially diverse, in terms of size, location, ownership structure, and production practices. For this reason, the aim of the present study was to build upon the benchmark production cost studies prepared by the University of California Cooperative Extension (UCCE) and the Agricultural Issues Center at UC Davis (AIC). The table olive study was updated in mid-2016, providing a current look at the generalized production practices and costs faced by table olive growers in California. Some of the assumptions made in the cost-return study include:

- Manzanillo variety
- 40-acre operation (35 acres in actual production)
- Sacramento River Valley (i.e., northern California) location
- Owner-farmed
- Pruning conducted every year
- 36 acre-inches of applied irrigation water
- Only nitrogen fertilizer (UAN-32) is considered
- Costs of adjuvants, black scale treatment, and micronutrients not included
- Thinning conducted in alternate years
- Hand harvesting
- 5-tons per acre average yield

As shown in Table 8 earlier in this report, operations with around 40 acres represent about 25 percent of total table olive acreage in California. In addition to this sizeable group, the COC is also interested in the cost structure of different-sized growers. To better understand larger operations as well as those in southern growing areas, COC authorized a survey of production costs faced by growers throughout the state.

Data sampling strategy

Obtaining detailed cost data from a representative sample of growers proved to be one of the major challenges to conducting this study. To reduce the effort required of growers, DWB prepared a two-page summary of production costs based on the most recent UC cost-return study. Growers were asked to compare their costs with the UC figures (referred to throughout this report as the *baseline* costs). This has benefits as well as drawbacks. The benefits of this approach were a consistent cost reporting framework, a reduction in the time required by growers to look up cost details, and the use of the baseline costs as a prompt for talking about how production practices and costs differed by size of operation and location. One drawback of this approach is the potential for the baseline costs to bias the responses, but was judged to be a sufficient tradeoff in order to maximize the response rate.

Survey Questions

The survey instruments were based on selected tables from the 2016 *Sample Costs to Produce Table Olives* produced by the University of California Cooperative Extension. The in-person survey is reported in **Figure 14**; the online survey is depicted in **Figure 15**.

Figure 14. In-person survey instrument.

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Table Olive Cost Survey

County:
 Year of Data:
 Variety and est. Acreage:
 Water Source (own well/water district):

Yield/Acre: 5.0 tons
 Planting Density: Low (less than 50 trees/acre)
 Med (50-150 trees/acre)
 High (150-250 trees/acre)
 Higher than 250 trees/acre

Labor Rate/Hour - High \$ 21.90
 Labor Rate/Hour - Low \$ 17.52

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Interviewee
 Date

Notes:

		LIC Davis Figures (2016 Update)					Your Costs				
		Unit Price/					Unit Price/				
Operating Costs	Description	Qty/Acre	Unit	Cost	Cost/Ac	Total Cost	Qty/Acre	Cost	Cost/Ac	Total Cost	
Labor	Machine	4.92	Hr	21.90	108	4,510					
	Non-machine, misc.	1.59	Hr	17.52	28	1,116					
	Harvest Olives	5.00	Ton	500.00	2,500	100,000					
	Pruning	24.26	Hr	17.52	425	17,000					
Fungicide	Kocide 3000	8.00	Lb	7.80	62	2,496					
Fertilizer	LN-32	100.00	Lb	0.59	59	2,360					
Irrigation	Water	36.00	Adn	7.50	270	10,800					
Custom	Pest Control Advisor	1.00	Acre	35.00	35	1,400					
Thinning Agent	Liqua-stik	36.00	Oz	1.15	41	1,656					
Herbicide	Roundup Ultra Max	2.76	Pint	4.31	12	476					
Herbicide	Simazine 4L	7.00	Pint	3.40	24	952					
Herbicide	Diluron 4L	3.20	Pint	3.53	11	452					
Olive Fly Trap	McPhail Trap	0.10	Ea	5.00	1	20					
Bait	Tonifa Yeast	0.95	Lb	13.80	13	524					
Insecticide	GF 120	140.00	Oz	1.41	197	7,896					
Labor costs associated with above items		28.00	Hr								
	Irrigation/Fertigation	36.00	Hr								
	Pest/disease mgmt	40.00	Hr								
	Weed mgmt	18.00	Hr								
	Other										

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Figure 15. Online survey instrument.

2016 California Table Olive Production Cost Survey

Greetings California ripe olive grower,

Our firm has been retained by the California Olive Committee to undertake a study of the costs of producing ripe olives in the state. We have interviewed several growers personally and are now asking for your input via this online survey.

We understand how busy you are and we are most grateful for your time and attention in completing this questionnaire. Your responses will provide valuable input to the California Olive Committee's work to better understand the production cost concerns of your industry.

Please be assured that your responses are anonymous, and we do not ask any questions that can be used to identify you or your operation.

Thank you for your input; please contact Daniel Block, Principal Consultant of D.W. Block Associates, LLC at 206-801-3500 if you have any questions or comments.

Background

1. In which county/counties are you currently growing table olives? (Please check all that apply)

- ☐ Kern
- ☐ Tulare
- ☐ Fresno
- ☐ Madera
- ☐ San Joaquin
- ☐ Colusa
- ☐ Glenn
- ☐ Butte
- ☐ Tehama
- ☐ Shasta

2. How many total acres of table olives do you grow?

- ☐ Less than 25 acres
- ☐ 25-49 acres
- ☐ 50-99 acres
- ☐ 100-249 acres
- ☐ 250-499 acres
- ☐ 500 acres or more

3. Which would you consider to be your primary variety/varieties?

- ☐ Manzanillo
- ☐ Sevilliano
- ☐ Other:

4. Do you grow table olives only?

- ☐ Yes, I grow table olives only
- ☐ No, I grow other crops as well

Figure 15. Online survey instrument, cont.

5. What proportion of your total acreage is devoted to table olives?

- ☐ 25% or less
☐ 25% to 50%
☐ 50% to 75%
☐ More than 75%

6. Are you mechanically harvesting any of your current acreage?

- ☐ Yes
☐ No

Input Costs

The following values come from the 2016 UC Davis Cost-Return study for table olives in the Sacramento Valley. If your costs are the same as these default values, you can proceed to the next section. If your costs differ in any way, please check the corresponding checkbox and enter your own values.

Category	Product	Quantity/ Acre	Unit Cost	Cost/ acre
Fungicide	Kocide 3000	8 lbs	\$7.80	\$62
Fertilizer	UN-32	100 lbs	\$0.59	\$59
Irrigation	Water	36 acre/inches	\$7.50	\$270
Custom	Pest control advisor	Rate per acre	\$35.00	\$35
Thinning Agent	Liqua-stik	36 Ounces	\$1.15	\$41
Herbicide	Roundup Ultra/Power Max	2.76 pints	\$4.31	\$12
Herbicide	Simazine 4L	7 pints	\$3.40	\$24
Herbicide	Diuron 4L	3.2 pints	\$3.53	\$11
Olive fly trap	McPhail trap	1 per 10 acres	\$5.00	\$0.50
Olive fly bait	Torula yeast	0.95 lbs	\$13.80	\$13
Insecticide	GF 120	140 ounces	\$1.41	\$197
Fuel	Gasoline			\$6
Fuel	Diesel			\$24

If you would like to enter different values in any category, please check the appropriate boxes and enter the new values in the spaces below

- ☐ Fungicides
☐ Nutrients
☐ Water
☐ Pest ctrl advisor
☐ Thinning Agent
☐ Herbicides
☐ Insect ctrl
☐ Insecticide
☐ Gasoline
☐ Diesel
☐ Other:

Figure 15. Online survey instrument, cont.

Labor Costs

The following values come from the 2016 UC Davis Cost-Return study for table olives in the Sacramento Valley. If your costs are the same as these default values, you can proceed to the next section. If your costs differ in any way, please check the corresponding checkbox and enter your own values.

Category	Quantity/Acre	Wage/hr	Cost/acre
Machine	4.94 hrs	\$21.90	\$108
Non-machine, misc.	1.59 hrs	\$17.52	\$28
Harvest	Tons/acre	\$500/ton	\$2,500
Pruning & shredding - Annualized costs	24.26 hrs	\$17.52	\$425
Irrigation	0.7 hr	\$21.90	\$15
Pest/disease mgmt	0.9 hr	\$21.90	\$20
Weed mgmt	1 hr	\$21.90	\$22
Other	0.45 hr	\$17.52	\$8

If you would like to enter different values in any category, please check the appropriate boxes and enter the new values in the spaces below

- ☐ Machine
- ☐ Non-machine, misc.
- ☐ Harvest
- ☐ Pruning & Shredding
- ☐ Irrigation
- ☐ Pest/disease mgmt
- ☐ Weed mgmt
- ☐ Other:

Overhead Costs

The following values come from the 2016 UC Davis Cost-Return study for table olives in the Sacramento Valley. If your costs are the same as these default values, you can proceed to the next section. If your costs differ in any way, please check the corresponding checkbox and enter your own values.

Cash Overhead	Cost/Acre
Office expense	\$75
Sanitation fees	\$18
Liability insurance	\$16
Property insurance	\$11
Property taxes	\$135
Investment repairs (equip)	\$108

If you would like to enter different values in any category, please check the appropriate boxes and enter the new values in the spaces below

- ☐ Office expense
- ☐ Sanitation fees
- ☐ Liability insurance
- ☐ Property insurance
- ☐ Property taxes
- ☐ Investment repairs (equipment)
- ☐ Other:

Figure 15. Online survey instrument, cont.

UC Davis Cost-Return Default Values

Non-Cash Overhead	Cost/Acre
Drip irrigation system	\$1,800
Land	\$8,000
Orchard establishment costs	\$5,000
Fuel tanks (2X 1000 gallon)	\$274
Buildings	\$3,000
Shop tools	\$250
Pruning tools	\$80
Equipment	\$291
Other	

If you would like to enter different values in any category, please check the appropriate boxes and enter the new values in the spaces below

☐ Drip irrigation system
☐ Land
☐ Orchard establishment
☐ Fuel tanks
☐ Buildings
☐ Shop tools
☐ Pruning tools
☐ Equipment
☐ Other:

If you have any specific practices, products, or costs not included in this survey, please describe briefly here

Example: Micronutrients/brand name, 4 lbs per acre, \$10 per lb.

Submit Form

Descriptive Statistics

Between June 20 and October 14, 2016, DWB surveyed a total of 30 California table olive growers. Responses were gathered through a combination of in-person, structured interviews (n=12) at growers' offices and an online survey conducted in late September (n=18). A final phone interview was conducted with one additional grower in early October (n=1). **Table 17** reports responses by location and size of the olive operation.

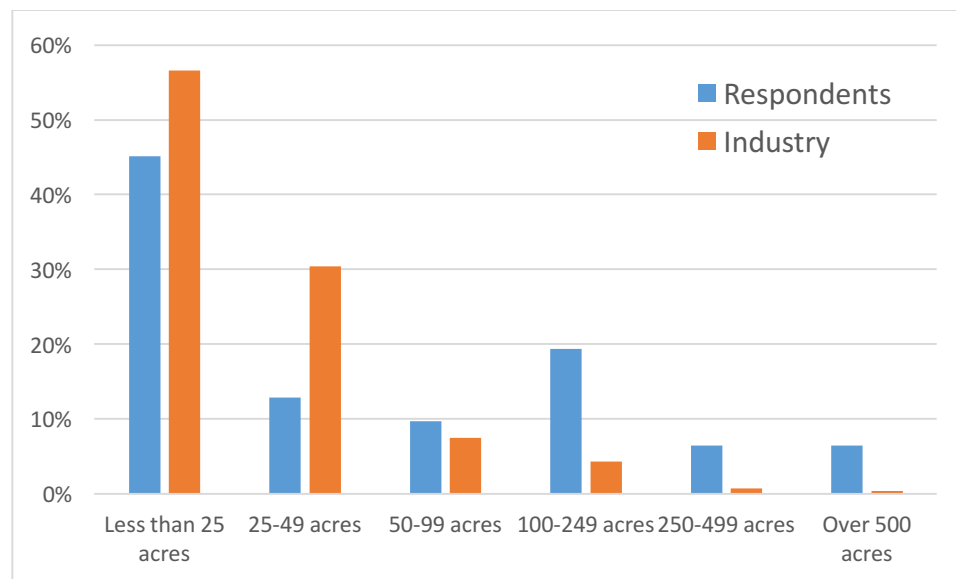
Table 17. Survey responses by location and size

Acreage Category	North	South	Total	% of total
Less than 25 acres	8	6	14	45.2%
25-49 acres	4	0	4	12.9%
50-99 acres	0	3	3	9.7%
100-249 acres	4	2	6	19.4%
250-499 acres	1	1	2	6.5%
500-999 acres	0	0	0	0.0%
Over 1000 acres	1	1	2	6.5%

South: Tulare and Fresno counties. North: Tehama and Glenn counties

The size distribution of respondents is compared with the statewide distribution of growers in **Figure 15**, below.

Figure 15. Distribution of survey respondents and entire industry, by operation size.



Source: 2016 COC Grower Survey

MARKETING



CA GROWN PARTNERSHIP



California Grown (also known as the Buy California Marketing Agreement, BCMA) is a joint effort of agricultural industry groups representing the products of California's farms, ranches, forests, and fisheries. Working as an advisory board to the California Department of Food and Agriculture, BCMA brings together industry and government resources to increase the awareness, consumption, and value of California agricultural products, helping the state's consumers enjoy the best of the California lifestyle.

California Grown is funded through public and private contributions by the U.S. Department of Agriculture, the California Department of Food and Agriculture, and California agricultural organizations.

The COC participates as an active member of the California Grown partnership by attending regular board meetings and joining internal committees. Through this partnership, the COC is able to promote California olives at various events including, California Agriculture Day at the Capitol, the Produce Marketing Association's Fresh Summit Exposition, and many more.

At PMA 2016, the COC was able to host a "California Mary" bar within the California Grown booth space. This, along with our grower highlight videos, which were displayed on the booth's flat screen televisions, served as a great tool to share the story of California Ripe Olives to industry members from across the globe.





2016 Program Review

The following pages present a highlight summary of the FleishmanHillard facilitated marketing plan that was enacted in 2016 on behalf of the COC.

2016 PROGRAM REVIEW

In 2016, the California Olive Committee launched the “Ripe Olives Grown in California – Enjoyed by Families Everywhere” integrated marketing campaign featuring California ripe olive growers as the heart and soul of the effort. The program included a mix of marketing tactics and activities and generated more than 300 million total impressions. The program activities included: asset development, Modern Mom partnership, digital and social media, blogger and media entertainment, full page recipe features (ROP), infographic, retail trade advertising, campaign press release and trade advertising, and industry communication. All in all, the 2016 marketing campaign received positive feedback from the industry and was successful in spreading the message of a multi-generational family industry.

Asset Development

The asset development portion of the COC’s 2016 campaign included a new logo which featured a warm and vintage look to further highlight the theme of the campaign.

Additionally, six grower families were selected to participate in a multi-media shoot showcasing their rich family history and continuous involvement in the California ripe olive industry.



Since recipes are a utilized in many of our promotional activities, the COC developed many new recipes, several of which were provided by our growers as their personal family recipes, to be featured on social media, the COC website, print ads, and much more. The recipes featured every food medium from appetizers to dinners, and even several desserts.



Recipe & Lifestyle Asset Development



National Media Partner



Through the COC's partnership with Modern Mom, we were able to develop a custom California olive recipe video and ten sponsored posts on the blog website. These efforts proved to be successful, and generated nearly 20.3 million impressions. Modern Mom is a blog co-run by distinguished model, actress, entrepreneur, winner of Dancing with the Stars Season 7, and mom of four, Brooke Burke, and successful entrepreneur and mother of three, Lisa Rosenblatt. Together, Lisa and Brooke operate the Modern Mom blog which is filled with original content from celebrated experts, authors, bloggers, and real moms all over the world. The Modern Mom partnership was a natural fit for the COC to showcase and develop recipe content to our target audience. Below is an example of a portion of a COC post on the Modern Mom webpage.

Three California Ripe Olive Recipes Straight From the Growers Themselves

BY MODERNMOM STAFF



This post is in partnership with the California Olive Committee.

Did you know that California produces over 95% of the olives grown in the United States? And the best part is that they are not grown in big industrial farms. Nope, multi-generation farming families

Included in the Modern Mom Partnership:

- 10 Sponsored Posts
- 1 Recipe Video

Stuffed Portabella Mushrooms with California Ripe Olives and Feta Cheese

BY GUEST WRITER



3 0 Tweet 33 101 0 0

The following is a guest post by Dana Vento and is in partnership with the California Olive Committee.

March is Women's History Month, a time to reflect and highlight the many contributions of women in our society. Today, I'd like to shed some light on a few women who have made one of my favorite snacks and ingredients, California Ripe Olives, possible.

For starters, let's throw it back to the 1800s with Freda Ehmann. Freda began experimenting with 280 gallons of olives in barrels on her back porch. Thanks to her creative dreaming and stick-to-it-ness, California Ripe Olives were created right then and there. Pretty cool, right? Fast forward to today and many women are out in the fields growing and harvesting these tasty morsels for all of us to enjoy. Check out this fun [video](#) of Sally Campbell, a mom, entrepreneur and olive grower. I'm not sure what's cuter, Sally's baby, dogs or her mini horse, Roper?

Women's History Month also makes me think of strong women like my grandmother—traveling through Ellis Island, coming to America on her own and having no one and no resources, yet creating a life for herself. My grandmother always had ripe olives in her pantry for a quick creative accent or base ingredient for a meal from frittatas to stuffed mushrooms.



Baked Potato Salad

BY GUEST WRITER



3 0 Tweet 25 4 0 0

This article was written by Jennifer Worden in partnership with the California Olive Committee.

Let summer begin with warm weekends, no school, and this excellent Baked Potato Salad recipe with all the right finishing touches, like California Ripe Olives. YUMMY! It's the perfect complement to whatever is cooking on the grill and it always reminds me that it's summer.

I think it was my aunt who introduced this baked potato salad to our family cookouts, but it's been awhile so I could be wrong and it could have been my mom. Either way, it's delicious and has been a definite family favorite for years. Some may think of this as a casserole, but for me, this is everything a Potato Salad should be...a yummy side dish with veggies and other mouth-watering mix-ins, such as California Ripe Olives.



Overnight Breakfast Casserole

BY GUEST WRITER



3 1 Tweet 12 28 0 0

The following is a guest post by Jamie of Love Bakes Good Cakes and is in partnership with the California Olive Committee.

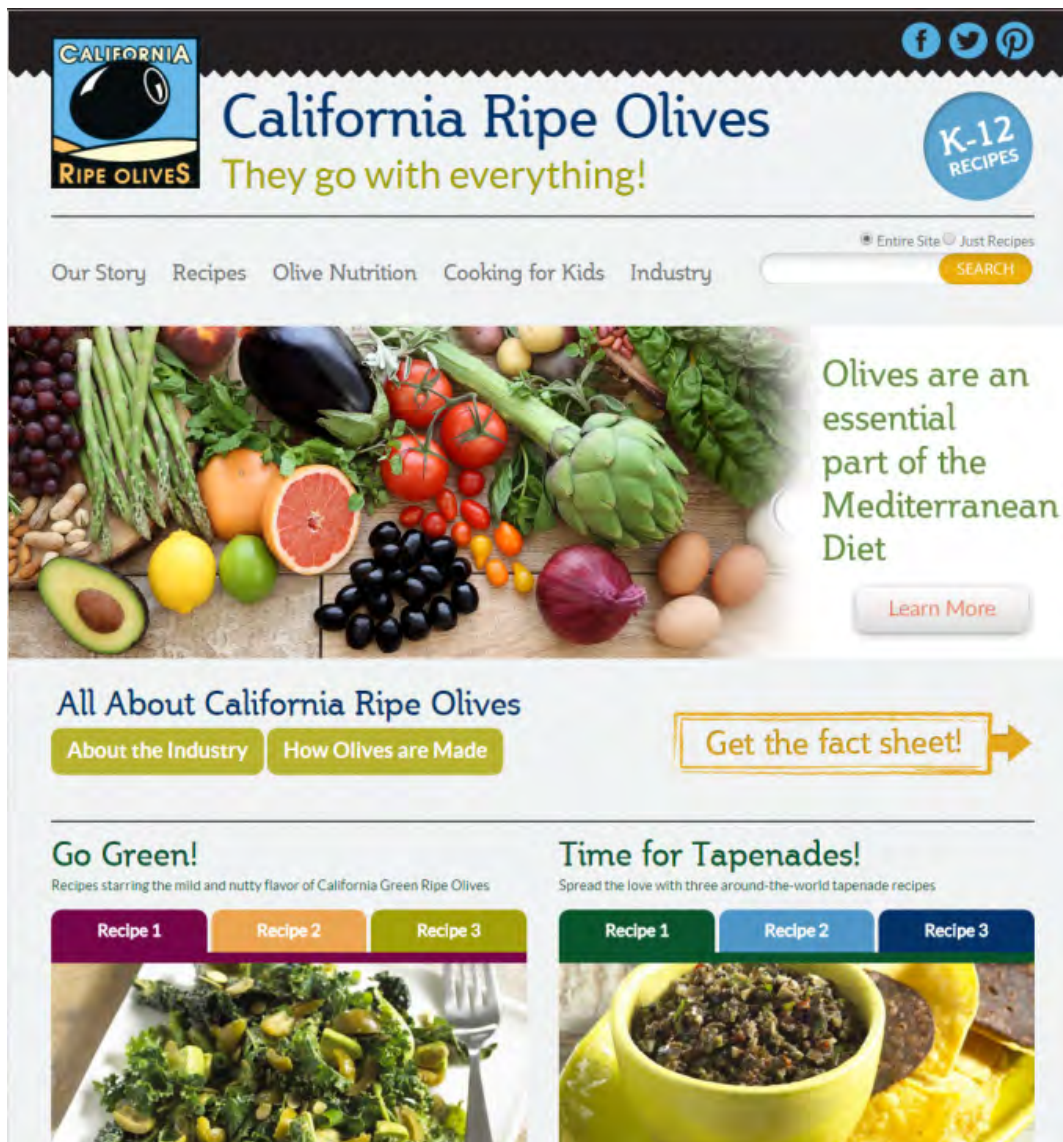
For fuss-free mornings, this Overnight Breakfast Casserole comes together quickly the night before and is baked in the morning! This recipe is also a great base to easily customize to your family's preferences.

Although we're not necessarily traditional when it comes to holiday meals (we've been known to eat soup and sandwiches for Christmas!), we do enjoy a special breakfast for special days like birthdays, Christmas, Thanksgiving, and Easter. One of my favorite holiday (or weekend) breakfast dishes is this Overnight Breakfast Casserole. It's so easy to put together the night before, then all you have to do is just bake it in the morning! I'm fond of this particular recipe because it is soooooo easy to customize to what your family likes—or whatever ingredients you have on hand! I like to load ours up with lots of veggies and California Ripe Olives for ample flavor. It's such a hit in our house that we've even made it for nights when we've craved breakfast for dinner. For a Mexican twist, we like to top our casserole with salsa, sour cream, and extra black olives. Mmmmm!

Digital and Social Media

For the digital media aspect of our 2016 program, the COC completed a design refresh and formatting overhaul of CalOlive.org. The website refresh was conducted in order to align the site with the COC's new campaign theme, highlighting California ripe olive growers. In addition, the newly developed recipes were featured on the website along with old recipes which were updated and photographed. The CalOlive.org webpage is a great tool to share the COC's message with the public, and also serves as a valuable tool in providing information to industry members.

Website Refresh



New website features:

- Updated campaign logo
- New page highlighting CA olive growers
- Updated and new recipes and photos
- Industry section with access to research reports, agendas, meeting packets, and monthly and import reports.



Social media efforts proved to be successful yet again, as over 1 million consumers were reached through prompted content and flash giveaways. By utilizing promoted posts, costing just over one hundred dollars apiece, the COC Facebook page was able to reach a substantially higher amount of viewers, an investment with a truly worthwhile return.



Non-Promoted Post:

9 likes

0 comments

0 shares

Promoted Post:

447 likes

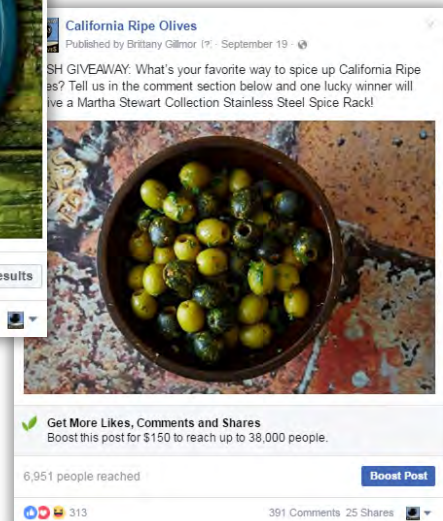
21 comments

14 shares





- Over 25k fans to date on Facebook with Q4 “like-ad” campaign bringin in 9k new fans
- Flash giveaways continue to drive engagement for a low cost
- Promoted posts support engagement and fan acquisition



Blogger and Media Engagement

Throughout the duration of the 2016 marketing plan, the COC worked in conjunction with many bloggers and other media personalities. In order to bring this group of individuals together in a setting where California ripe olives have the highest potential to gain recognition, the COC hosted two influencer dinners. These influencer dinners, in Los Angeles and Chicago, brought media and California ripe olive growers together for conversation and a meal which was specifically prepared to feature California ripe olives. The meal included everything from appetizers to desserts, and was prepared by lo-cal, family owned restaurants to further accen-tuate our continuous message of family.

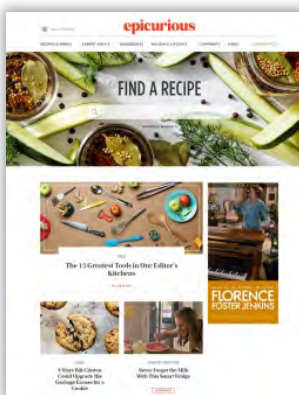


In addition to these two influencer dinners, the COC also made a big splash in New York City with an influencer dinner, deskside deliveries at top national outlets/publications, and speed pitching/ sponsorship at a food and lifestyle blogger event. All in all, the blogger media is a cost efficient and effective way to increase our exposure to consumers everywhere.



Blogger and Media Engagement New York

Deskside Deliveries



Media/Blogger Dinner

Food & Lifestyle Blogger
Speed Pitching Event



Blogger and Media Engagement Los Angeles

Influencer Dinner Participants



KAREN GILLINGHAM
stylist • writer • recipes



Presley's Pantry
iViva food!



Chicago

Influencer Dinner Participants



CHEFDRUCK

IN GOOD **TASTE**

THE SENSIBLE MOM

Full Page Recipe Feature (ROP) and Infographic

Another aspect of the COC's promotional activities was a full page recipe feature, or ROP. This ROP was entitled "Eat Like a Farmer" and featured a recipe and grower-focused infographic. These materials were distributed to print and online media outlets, and generated a combined 282 million impressions.



CITIZEN TRIBUNE Food Sunday, August 14, 2016 E-3

Cowboy Caviar

Eat Like a Farmer

Red Potato and Olive Salad

Cowboy Caviar
Recipe courtesy of olive grower/producer, *California Olive Growers*.
Serves 6-8
1 cup chopped tomato
2 green onions, sliced
1 avocado, peeled, pitted and cut into small cubes
1 can (15 ounces) black beans, rinsed and drained
1 can (15 ounces) corn, drained and rinsed
1/2 cup prepared vinaigrette dressing
1/2 cup cheddar cheese, shredded

Red Potato and Olive Salad
Recipe courtesy of olive grower/producer, *California Olive Growers*.
Serves 6-8
1/2 cup olive oil
1/2 cup vinegar
1/2 cup chopped onion
1/2 cup chopped tomato
1/2 cup chopped red potato
1/2 cup chopped olive
1/2 cup chopped red onion
1/2 cup chopped red pepper
1/2 cup chopped red onion
1/2 cup chopped red pepper
1/2 cup chopped red onion
1/2 cup chopped red pepper

Retini with Shrimp and Olives
Recipe courtesy of olive grower/producer, *California Olive Growers*.
Serves 6-8
1 pound shrimp, peeled and deveined
1/2 cup olive oil
1/2 cup vinegar
1/2 cup chopped onion
1/2 cup chopped tomato
1/2 cup chopped red potato
1/2 cup chopped olive
1/2 cup chopped red onion
1/2 cup chopped red pepper

Retail Trade Advertising

Aside from consumer focused activities, the COC also participated in various retail promotion activities. Our retail advertisements came in the form of print insertions into major retail publications such as, Progressive Grocer, Grocery Headquarters and The Shelby Report. Combined, the COC placed 18 grower-focused campaign advertisement insertions utilizing the grower assets created earlier in the year. These print ads were successful in reaching nearly half a million supermarket decision makers. See an example below of a segment of ads run in Progressive Grocer during June, August, and October.

PROGRESSIVE
GROCER

THE SHELBY
REPORT

GROCERY
HEADQUARTERS



June

RIPE OLIVES
GROWN IN
California

Enjoyed by families everywhere

**MEET CALIFORNIA RIPE OLIVE GROWERS:
JULIA & JORGE INESTROZA**

Julia and Jorge Inestroza started their olive grove in 1980 in the heart of California's Central Valley. They have since grown their family's olive grove into a thriving business, producing high-quality California Ripe Olives for over 30 years. Today, they are proud to share their passion for olives with the world.

PENNE PUTTANESCA

Ingredients: 1 lb. penne pasta, 1/2 cup olive oil, 1/2 cup tomato sauce, 1/2 cup red wine, 1/2 cup anchovies, 1/2 cup capers, 1/2 cup olives, 1/2 cup garlic, 1/2 cup onion, 1/2 cup bell pepper, 1/2 cup mushrooms, 1/2 cup tomatoes, 1/2 cup basil, 1/2 cup parmesan cheese.

Directions: Cook pasta in salted water. Drain. Heat oil in a large skillet. Add onion, bell pepper, and mushrooms. Cook until softened. Add garlic and cook until fragrant. Add tomato sauce, red wine, anchovies, capers, and olives. Simmer for 10 minutes. Add pasta and parmesan cheese. Garnish with fresh basil.

What makes CALIFORNIA RIPE OLIVES SPECIAL ARE...

the multi-generational farming families that work hard to bring a high-quality olive from the grove to the pantry. With hard-working grower families across the Golden State, California Ripe Olives are a true farm-to-table choice for shoppers. Stock up your shelves today.

For more California Ripe Olive grower stories, please visit www.calolive.org

August

RIPE OLIVES
GROWN IN
California

Enjoyed by families everywhere

**MEET CALIFORNIA RIPE OLIVE GROWERS:
The Nerey Family**

The Nerey family started working as laborers in the olive groves of Northern California. With hard work and financial assistance from family, Pablo Nerey's grandfather was able to buy his first grove and harvest his own California olives. Today, Pablo manages the family's olive growing operation alongside his brothers, Juan Carlos and Oscar, and is teaching his son, Pablo Jr., about farming and sharing his love for California Ripe Olives.

COWBOY CAVIAR

Ingredients: 1 lb. cowboy caviar, 1/2 cup olive oil, 1/2 cup tomato sauce, 1/2 cup red wine, 1/2 cup anchovies, 1/2 cup capers, 1/2 cup olives, 1/2 cup garlic, 1/2 cup onion, 1/2 cup bell pepper, 1/2 cup mushrooms, 1/2 cup tomatoes, 1/2 cup basil, 1/2 cup parmesan cheese.

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For more California Ripe Olive grower stories, please visit www.calolive.org

RIPE OLIVES
GROWN IN
California

Enjoyed by families everywhere

**MEET CALIFORNIA RIPE OLIVE GROWERS:
THE DELEONARDIS FAMILY**

Tracy and Deleonardis started their olive grove in 1980 in the heart of California's Central Valley. They have since grown their family's olive grove into a thriving business, producing high-quality California Ripe Olives for over 30 years. Today, they are proud to share their passion for olives with the world.

COWBOY CAVIAR

Ingredients: 1 lb. cowboy caviar, 1/2 cup olive oil, 1/2 cup tomato sauce, 1/2 cup red wine, 1/2 cup anchovies, 1/2 cup capers, 1/2 cup olives, 1/2 cup garlic, 1/2 cup onion, 1/2 cup bell pepper, 1/2 cup mushrooms, 1/2 cup tomatoes, 1/2 cup basil, 1/2 cup parmesan cheese.

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For more California Ripe Olive grower stories, please visit www.calolive.org

October

Campaign Press Release

In order to gain even more traction, a press release was distributed to further highlight our grower focused campaign. This press release was shared with many well-known agricultural trade media outlets, and garnered highly positive feedback.

FOR IMMEDIATE RELEASE

Brittany Gillmor
FleishmanHillard on behalf of the California Olive Committee
916-492-5339
brittany.gillmor@fleishman.com



California Olive Industry Turns to Its Growers to Star in New Campaign

Fresno, Calif. (August 3, 2016) – In an age where farmers are a new form of celebrity, brands and commodity organizations are going straight to the source to inspire both consumer and trade communications. The California Olive Committee (COC), comprised of two canneries and hundreds of family farmers who raise olives on about 27,000 acres of orchards, is now taking this approach in an all new grower-focused trade campaign titled "Ripe Olives: Grown in California: Enjoyed By Families Everywhere."

The new campaign seeks to focus on the quality of California while highlighting aspects of family tradition inherent in California olive industry through the multi-generation farming families that work hard to bring them from the grove to pantries. The COC worked with table olive growers and their families to create all new videos, photography and recipes to help bring to life the multi-generation and California-centric story of the industry and its growers. These assets will be featured prominently in various communications including trade advertising, web and social media content, branded collateral, and parenting-focused news websites like ModernMom.com.



"This campaign has truly given us the opportunity to shine a light on the amazing farming families behind a product not often thought about beyond the can," said Alexander Ott, Executive Director of the California Olive Committee. "From their farming ingenuity to their culinary prowess, these family stories are begging to be told and we're excited to be able to do that through this campaign."

For images of California olive growers and their families, olive orchards, harvest and recipes, please contact Brittany Gillmor at 916-492-5339 or brittany.gillmor@fleishman.com.

###

About the California Olive Committee

The California Olive Committee (COC) is a grower-funded program established by a Federal Marketing Order in 1965 to administer marketing, research, inspection and compliance programs on behalf of the ripe olive industry. The COC is comprised of two olive canners and thousands of family farmers, who raise olives on about 27,000 acres of orchards that crisscross the warm inland valleys of California. "Like" California Ripe Olives on [Facebook](https://www.facebook.com/CaliforniaRipeOlives), follow @CalRipeOlives on [Twitter](https://twitter.com/CalRipeOlives), and join California Ripe Olives on [Pinterest](https://www.pinterest.com/CaliforniaRipeOlives/). For more information about California Ripe Olives including recipes, visit: <http://www.calolive.org>.

Grower Campaign to Help Market Olives

Published August 4, 2016

Some California olive growers are getting their 15 minutes of fame. A new campaign is focusing on their stories to help market olives.



In an age where farmers are a new form of celebrity, brands and commodity organizations are going straight to the source to inspire both consumer and trade communications. The California Olive Committee (COC) is now taking this approach in an all new grower-focused trade campaign titled "Ripe Olives: Grown in California: Enjoyed By Families Everywhere."

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The California Olive Commission is comprised of two canneries and hundreds of family farmers who raise olives on about 27,000 acres of orchards.

California Olive Industry Turns To Its Grower/Stars



Posted By: David Eddy | [Email](#)



In an age where farmers are a new form of celebrity, brands and commodity organizations are going straight to the source to inspire both consumer and trade communications.

The **California Olive Committee** (COC), a grower-funded program established by a Federal Marketing Order in 1965, is comprised of two canneries and hundreds of family farmers who raise olives on about 27,000 acres of orchards. The COC is launching an all new grower-focused trade campaign titled "Ripe Olives: Grown in California: Enjoyed By Families Everywhere."

The new campaign seeks to focus on the quality of California while highlighting aspects of family tradition inherent in the California olive industry through the multi-generation farming families that work hard to bring them from the grove to pantries. The COC produces more than 95% of the olives grown in the U.S. today. Typically farms are not mechanically run industrial farms, but multi-generational orchards powered by hardworking California farmers and their families.

The COC worked with table olive growers and their families to create all new videos, photography, and recipes to help bring to life the multi-generation and California-centric story of the industry and its growers. These assets will be featured prominently in various communications including trade advertising, web and social media content, branded collateral, and parenting-focused news websites like ModernMom.com.

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Industry Communications

To ensure that industry members are kept up to date on the COC's activities, a monthly Olive Branch newsletter with "As It Happens" news is distributed via e-mail. These updates include information and updates regarding the progress of our marketing plan. In addition, the COC distributes a summer newsletter with a more in-depth summary of activities. It is truly important to ensure the industry is kept up-to-date on all marketing activities, and the COC strives to provide a complete and comprehensive update through these materials.



The Olive Branch

Chairman's Corner

Dear California Table Olive Grower:

First, I want to thank all of the table olive growers in California for their support of the California Olive Committee which recently celebrated its 50th birthday. I would like to, as a reminder, present to you what the California Olive Committee (COC) represents.

The COC is your Federal Marketing Order that was established in 1965 under the Agricultural Marketing act of 1937 to effect the orderly marketing of olives grown in California.

The COC administers the market order programs. The Committee, serving for a period of two years, consists of eight producer members, plus eight alternates representing the growers from our olive growing districts as well as eight handler members and eight handler alternates.

Decisions made by the Committee are subject to approval by the Secretary of the United States Department of Agriculture. At this time provisions of the Marketing Order apply only to black and green ripe olives and not to tree ripen, Spanish style, olive oil, Sicilian, Greek or other style olives. The Marketing Order program is funded by an assessment, established every year in December, on each ton of olives received for use as black or green ripe canned olives. The Committee functions and expenditures fall into four main categories:

- Administrative
- Crop and Processing Research
- Incoming and Outgoing Inspection
- Marketing and Public Relations

I would like to also mention some functions the COC cannot be involved in because the Order is part of the United States Department of Agriculture. The Order cannot bargain prices on behalf of the olive growers, this function belongs to the Olive Growers Council's for expenses. Your Marketing Order to the California Olive Association.

In closing, I once again want to wish all of you a healthy and

Best Regards,

Michael W. Silveira
Michael W. Silveira
Chairman of the California Olive Committee

SUMMER 2015



The Olive Branch

Technology is Key to Industry

With increased rules, regulations, labor shortages, minimum wage increases, and drought, growers throughout the Golden State are looking to new, innovative ways to save dollars and maximize profits. One key is the use of technology.

It's an exciting time for the California olive industry with the introduction of mechanical harvesting. The result is less labor costs in an effort to maximize return. Additionally, the industry has implemented electronic reporting to the California Olive Committee, making reporting easier and brings real-time data to the grower. Lastly, the industry has developed, and is in the process of verifying, optical sizing which takes the subjectivity out of the grading process. Currently, this project is moving forward and after three years of research and development, USDA is working with the COC to verify the process of the machine. These three changes are just the beginning for how the olive industry is utilizing technology to its fullest potential.

Technology successes in olives and other industries are paving the way for California to compete both domestically and internationally. With such a quality product, the possibilities are limitless and exciting for the future of the California olive industry. The challenge is going to be staying the course and keep moving forward.

SUMMER 2016

VISIT US AT CALOLIVE.ORG



The Olive Branch

AS IT HAPPENS NEWS

August 11, 2016

Our Story | Recipes | Olive Nutrition | Cooking for Kids | SEARCH | TWITTER | FACEBOOK | LINKEDIN | INDUSTRY

RIPE OLIVES

GROWN IN California

Created by Families Everywhere

MEET OUR GROWERS

Inestroza Family
The Inestroza family whips up delicious meals using the olives they grow in California's Central Valley.

Curiel Family
The Curiel family is what the American Dream is all about.

Nerey Family
The Nereys have deep roots as a family in the California olive industry.

Watch Now

COC Website Gets A Makeover

CalOlive.org is back and looking better than ever! The COC website has been completely revamped to become more user-friendly and reflect the look and feel of our new campaign, "Ripe Olives: Grown in California, Enjoyed by Families Everywhere."

A brand new "Meet Our Growers" section of the website displays grower stories, highlighting recipes and videos from the Inestroza, Curiel, Nerey, Burrenson, DeLeonardis and Erickson families. To watch each family's video, just hover over their portrait and click play.



The Olive Branch

AS IT HAPPENS NEWS

August 5, 2016

Eat Like a California Olive Farmer

BY MODERNMOM STAFF

Finally, a new In members can e

California olive grower recipes are proudly on display in a brand new sponsored blog post on popular parenting website, ModernMom.com. The website, reaching 1,070,328 unique monthly visitors, is dedicated to providing tips and tools for busy moms. The new blog post, titled "Eat Like a California Olive Farmer," features a Bacon Olive Appetizer from the Burrenson family, a California Ripe Olives and Meyer Lemon Tapenade from the Inestroza family, and finally, Ed's Signature Sandwich from the Curiel family.

This isn't the first time grower recipes have been featured on ModernMom.com—three additional grower recipes can be found in a May blog post titled, "Three California Ripe Olive Recipes Straight From the Growers' Kitchens."

2566 Alvarado Ave., Suite #102 Clovis, CA 93611
CalOlive.org | Connect with us | FACEBOOK | TWITTER | LINKEDIN | PINTEREST

P: 559-456-9006 F: 559-456-9009

Actual Results

Activity	Impressions/Reach
Modern Mom Partnership	20.3 million
ROP (Full-Page Color Feature)	158.6 million
Social Media	1 million
Trade Advertising	498,315
Infographic	123.4 million
Total	303.9 million impressions



RIPE OLIVES

ENJOYED BY FAMILIES EVERYWHERE

2017 Program Outline

The following pages present an outline of the Fleishman-Hillard facilitated 2017 COC marketing plan. As the year progresses, some activities may be altered or replaced, but the following summary serves as a general overview of planned activities at this point in time.

2017 PROGRAM OUTLINE

Based on feedback from the COC, the 2017 marketing plan will build upon the message that was introduced in 2016. Our goal is to further establish the message of our industry's focus on family values and traditions. We believe there is strong potential for this campaign into the 2017 year. Another focus the COC has for 2017 is to increase involvement with CA Grown, and utilize this partnership as frequently as possible. This is a great way to not only gain recognition, but also to further associate ourselves with the strong message of being a high-quality California product. The 2017 program will include seven main aspects as listed below:

- National Media Partner
- Influencer Activation
- Media Engagement
- Asset Development
- Digital/Social Media Integration
- Retail Advertising
- Industry Communications

In addition, based on Committee feedback, we have developed a new campaign logo, complete with original typefaces, textures, colors, etc. This logo will make its debut in 2017 and will be utilized in website banners with our national media partner, the COC website, social media, previous and planned grower highlight videos, and retail trade ads. All in all, the 2017 marketing program will serve to build upon our already established foundation, and we are looking forward to yet another successful year.

Target Audience

Online recipe content is the premier place where women ages 25-35 discover new recipes and is the number one driver for women to try new food products. We seek to capitalize on the fact that women, and moms in particular, primarily do the grocery shopping for their families. We have found that they turn to search engines for help, and the top 100 food search terms tend to be extremely broad in nature, for example: "dinner ideas", "healthy recipes", and "slow cooker recipes." In fact, 71% of women were inspired to try new food items because of a recipe that they searched for or found on a cooking site or blog. It is because of this that we are confident in our ability to increase consumption of California ripe olives by making available recipes in which they are featured as a main ingredient.



National Media Partner

In 2017, the COC has selected Simply Recipes as our new national media partner. We chose this new platform for a plethora of reasons.

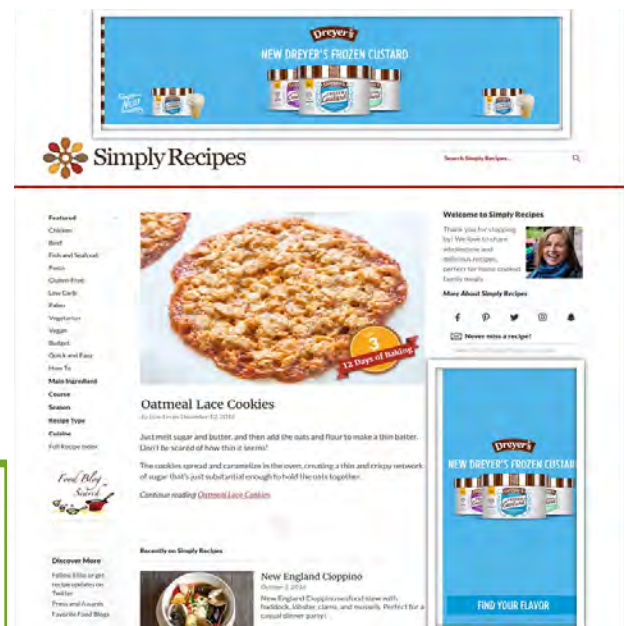


Simply Recipes®

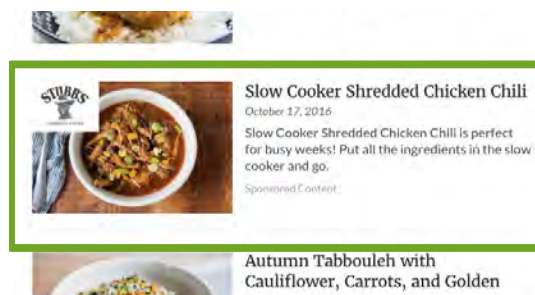
- #1 food site for women, ages 25-49
- Founded by food blog pioneer, Elise Bauer
- Influenced by her family's own kitchen and generations of family recipes. We feel her story is a direct reflection of the message we are portraying in our campaign.
- Based in Carmichael, CA. This location is convenient and will aid us in creating a more personal relationship with the organization.

As a part of our partnership with Simply Recipes, we wish to further integrate our message of "Ripe Olives Grown in California, Enjoyed by Families Everywhere." We feel confident in doing this by:

- Tapping into Elise's social media influence and the popularity of her sites. She will create new content, including five new recipes, and two new videos.
- These new recipes/videos will be featured on the Simply Recipes website along with a round-up of existing California Ripe Olive recipes.
- We will also have a social media promotion for new content that is expected to reach 7.5 million recipe seekers through the Simply Recipes platform.



The COC will be hosting a Thanksgiving Eve site take-over that is expected to reach a massive 2.5 million impressions. In this effort, the spaces on the website where the Dreyer's advertisement banners are located will instead feature California Ripe Olives.



Influencer Activation



In 2017, we have the ability to integrate our national media partner, Elise Bauer from Simply Recipes, with our influencer activation event. The event will be custom for California Ripe Olives, and will be hosted by Elise herself and California olive grower families. We plan to bring in approximately twenty online food influencers for a hands-on immersion experience with California Ripe Olives.

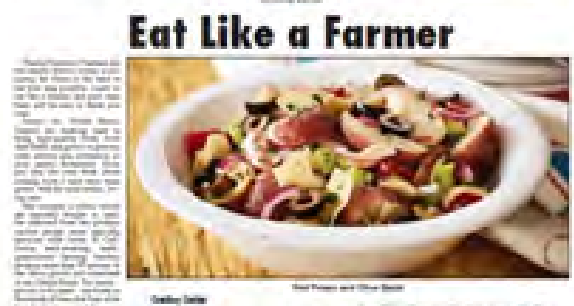
The menu will feature dishes specifically including olives, and will be developed by Simply Recipes. Elise will also be performing a rec-ipe demonstration of both our dishes and in-kitchen content created by the influencers.

This event is expected to translate into extensive new content and national visibility, and will result in new California ripe olives posts, photography, videography, and social media activation.



Media Engagement

Additionally, the COC will own all new Simply Recipes content and will amplify via traditional media outreach. We will be releasing a Simply Recipes themed ROP, a multi-media news release featuring an olive grower video loop to underscore origin story and new Simply Recipes videos, Video mat releases, and a Co-op SMT.



Asset Development

As mentioned, the COC has developed a new campaign logo which will be utilized in website banners with our national media partner, the COC website, social media, previous and planned grower highlight videos, and retail trade ads.



In addition to the new campaign logo, we also plan to continue building our grower video library. These videos received such positive feedback in 2016, and we wish to continue sharing these stories into the next year of the program. We plan to create two to three additional grower videos, which will be integrated into our custom influencer event, traditional media outreach, and California Ripe Olives website and social media properties.



Digital/Social Media Amplification

Our social media presence grew significantly during the 2016 marketing year, and we hope to continue this momentum into 2017 as well. We found that investing into promoted posts had a very positive effect on the size of the audience we are able to reach. Our grower videos, in particular, were highly popular which is why we would like to continue featuring them in 2017.



In 2017, we are going to ensure that each of our Facebook posts are promoted, due to our 2016 success. Through the use of promoted posts, we can also develop editorial calendars, perform community management, and amplify our messages. The following areas of content are where we will focus our attention in 2017.



- Grower-focused content
- Simply Recipes videos and recipes
- Use existing CA Ripe Olives assets



Industry Communications



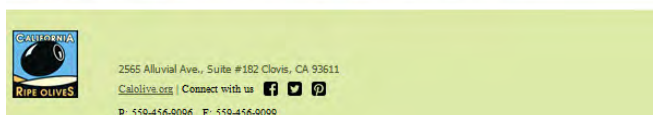
One of our main goals in the 2017 year is to ensure we keep the industry informed of California Ripe Olives marketing activities. We will do this through:

- Mid-year newsletter
- Grower e-newsletter
- CA ag trade media relations

Grower Recipes Featured on ModernMom.com

California olive grower recipes are proudly on display in a brand new sponsored blog post on popular parenting website, ModernMom.com. The website, reaching 1,970,328 unique monthly visitors, is dedicated to providing tips and tools for busy moms. The new blog post, titled "Eat Like a California Olive Farmer," features a Bacon Olive Appetizer from the Burreason family, a California Ripe Olives and Meyer Lemon Tapenade from the Inestroza family, and finally, Ed's Signature Sandwich from the Curriel family.

This isn't the first time grower recipes have been featured on ModernMom.com—three additional grower recipes can be found in a May blog post titled, "Three California Ripe Olive Recipes Straight From the Growers Themselves."



Retail Outreach

Based on feedback from Committee members after the 2016 marketing plan was complete, we have decided to increase our retail promotions program in 2017. We plan to include new retail outlet publications for advertisement, highlight our partnership with CA Grown, and ensure that our message of a California quality product is clear and concise when presented.

Our 2017 retail outreach plan will include:

- Ad insertions in key retail outlets with refreshed advertising content highlighting CA origin/Freda's story, CA Grown partnership and preference information, foodservice recipes, and grower content. We feel that the CA Grown partnership will be extremely valuable in these advertisements due to the fact that 77% of California and 75% of national consumers report they prefer products grown in the U.S. compared to products grown elsewhere.
- What's In Store retail dietician outreach. We plan to engage with 75+ retail dieticians who represent regional/national retailers in conjunction with the Academy of Nutrition and Dietetics annual conference.



SmartBrief

Anticipated Results

Activity	Estimated Impressions/Reach
Simply Recipes integration and social media amplification	20-22 million
Influencer activation	5 million plus 20+ new pieces of content
Media engagement	120-150 million
Digital/social integration	20,000 monthly
Retail	500,000-1 million
Total	145-170 million impressions

EXPORTS





TRANS-PACIFIC PARTNERSHIP

One of the first acts of President Trump's administration was to pull out of the Trans Pacific Partnership, also known as TPP. This trade agreement was set to be a partnership between 12 countries within the Pacific region. Although originally hailed as a trade agreement that would "level the playing field," the new administration felt that it heavily favored other countries and would hurt the United States economic interests. There are whispers in D.C. that the agreement is not completely dead and may emerge under a different name with some adjustments within it to appease the new administration.

In the meantime, the other TPP member countries will need to decide to move forward with the original TPP agreement without the United States or pause and retool the agreement to something that is more favorable to the current administration. Additionally, since China was not a member of the original TPP agreement, China is seeing the TPP collapse as a possible chance to gain a strong foothold in the Asian region. The TPP agreement had been seen as an economic guarantee of U.S. commitment to the region in the face of the growing influence of China. During the recent Regional Comprehensive Economic Partnership discussions in Japan, China has been insisting that Asian countries begin to shift to regional goods and services. The U.S. decision to leave the TPP agreement has the potential to open the door for China to assert even more economic and industrial influence within the Asian region.

TRANSATLANTIC TRADE AND INVESTMENT PARTNERSHIP

The Transatlantic Trade and Investment Partnership (TTIP) is a trade agreement that is being negotiated between the European Union (EU) and the United States (U.S.). The aim of this trade agreement is to promote trade and economic growth across varying sectors throughout both economies. TTIP was highly touted during the Obama administration but since the Trump administration has taken over, the negotiations are on hold. Much like the Trans Pacific Partnership (TPP), the Trump administration prefers bilateral agreements and believes multi-lateral agreements such as TTIP could hurt U.S. economic interest. Although the U.S. has not officially pulled out of the TTIP negotiations, all discussions are on hold for the near future.

FOREIGN AGRICULTURAL SERVICE



The Foreign Agricultural Service (FAS) helps expand and maintain foreign markets for U.S. agricultural products by helping remove trade barriers and enforcing U.S. rights under existing trade agreements. The FAS works with foreign governments, international organizations, and the Office of the U.S. Trade Representative to establish international standards and rules to improve accountability and predictability for agricultural trade. Additionally, FAS partners up with cooperators like the U.S. Apple Export Council to help US exporters develop and maintain agricultural export markets. FAS distributes funding to these cooperators via the Farm Bill under programs such as the Market Access Program (MAP), Technical Assistance for Specialty Crop (TASC), and Emerging Market Programs (EMP). Each of these programs keep US products more competitive and counter subsidized foreign competition in the international market.

MAP AND EMP FUNDING

The Market Access Program (MAP), provides an opportunity for various organizations to pursue overseas marketing and promotional activities in order to build commercial export markets for U.S. agricultural products and commodities. MAP funding is extremely helpful for groups, such as the COC, to perform these activities at a shared cost with FAS. MAP has the ability to reach many parts of the globe, and ultimately helps to build international markets for a wide variety of U.S. farm and food products. FAS provides cost-share assistance to eligible U.S. organization for various activities including: consumer advertising, public relations, point-of-sale demonstrations, participation in trade fairs and exhibits, market research, and technical assistance. The idea is that FAS wants to encourage U.S. organizations to pursue international markets by utilizing the funding they are willing to provide.

The Emerging Market Program (EMP) helps U.S. organizations promote exports of U.S. agricultural products to countries that have, or are developing, market-oriented economies and that have the potential to be viable commercial markets. Through EMP, FAS provides cost-share funding for technical assistance activities such as: feasibility studies, market research, orientation visits, specialized training, and business workshops. EMP supports a variety of U.S. agricultural commodities and products, meaning products that endorse or promote branded products or specific companies are not eligible.

EXPORT SUMMARIES

China

Over the next decade China's middle class is expected to increase dramatically. According to the CIA World Fact sheet, estimates suggest that the middle class could be over 628 million people by 2020 with an earned annual income between US \$50,000 and US \$500,000. With the largest middle class in the world, the California Olive Committee views China as a tremendous growth opportunity.



Wanting to build upon California's agricultural reputation and current trade relationship with China, the COC began exploring China as a potential export market. Although the Chinese market is relatively untapped for ripe olives, Spain and other European countries have demonstrated the ability to export ripe olives to China. Currently, ripe olives are not part of the standard diet of the Chinese consumer but with the rise of popularity in olive oil a natural transition to ripe olives is possible. Demonstrating the health benefits and versatility of ripe olives, could create a demand when focused on popular diet trends such as the Mediterranean Diet. Additionally, China has the largest foodservice sector in the world which will also be an area of focus.

Attempting to capitalize on the relative infancy of the ripe olive market in China and California's relative export relationship with China, the COC began applying for funding provided by the Foreign Agricultural Service (FAS). In 2017, the California Olive Committee was accepted as a sole cooperator within the Market Access Program which is the funding source through FAS. In 2017, utilizing the Emerging Market Program (EMP), the COC will hire a trade representative to provide the California olive industry with Chinese market intelligence, educational outreach, and research. Once this market intelligence, educational outreach, and research is obtained, the COC Board will determine if a full-fledged marketing program is warranted.

The initial EMP program will provide:

- Market viability and potential for California ripe olives in China
- Education of key Chinese retailers and officials on the benefits of California ripe olives
- Understanding of the Chinese retail and foodservice market including consumer trends, distribution, pricing, regulatory requirements, and destinations of importance
- Distribution of materials differentiating California olives from European varieties.

EXPORT SUMMARIES

India

In 2011, India began allowing Foreign Direct Investment into the retail industry. In the past, India has been closed to foreign investment which led to numerous unorganized retailing such as corner shops and hand carts. Seizing an opportunity to try and capture a share of one of the top five retail markets in the world, retail giants such as Walmart and Tesco began ramping up investment into the India retail industry.



Additionally, according to the BCG Inc. E-commerce is expected to be the next major area supporting retail growth in India. The industry is projected to touch US\$ 100 billion by 2020 growing from US\$ 30 billion in 2016. Amazon India is investing heavily in the online retailing sector in India with the expectation that e-commerce will allow Indian consumers to shift back to eating at home more often, which in turn is likely to lead urban consumers to purchase groceries and other household supplies on a more regular basis.

As typical western retail outlets and e-commerce began to spread, the Indian government began an increased focus on healthy eating. The healthy eating campaign has fueled imports of safe and reliable products a lot of which comes from the United States. According to the Indian government, India imported approximately 3,000 metric tons of olives in 2015-2016 worth roughly US\$4 million. Imports have increased annually and are expected to continually increase due to India's increasing domestic olive demand. India's domestic olive production is heavily focused on olive oil with very little attention given to the ripe olive sector. With the interest in healthy eating in India growing, a natural transition from olive oil to ripe olives is entirely possible.

With India's middle class steadily growing, and expected to surpass its population of 600 million within the next decade, the California Olive Committee (COC) began applying for Foreign Agricultural Service (FAS) funding in 2016. The initial purpose of the FAS funding will be to research if India is a viable market for California ripe olives. The COC will initially go after Emerging Market Program (EMP) dollars focusing on market intelligence, educational outreach, and market research. Once this market intelligence, educational outreach, and research is obtained, the COC Board will determine if a full-fledged marketing program is warranted. The COC believes that India provides a high market potential, low economic risk, and moderate political risk for the future exports of California ripe olives.

The initial EMP program will provide:

- Market viability and potential for California ripe olives in India
- Education of key Indian retailers and officials on the benefits of California ripe olives
- Understanding of the Indian retail and foodservice market including consumer trends, distribution, pricing, regulatory requirements, and destinations of importance
- Distribution of materials differentiating California olives from European varieties.

EXPORT SUMMARIES

Japan

Japan is a very well established and competitive retail market. Retail giants such as Aeon and Yamada Denki are constantly competing to get the Japanese consumers their preference of high-quality food at lower prices. This has been encouraging Japanese grocery retailers to expand their private labels with higher quality products, but at relatively competitive prices compared to premium products. While the consumption of fresh fruit is decreasing, the consumption of processed/cut fruit is increasing. The reoccurring theme throughout the retail food industry in Japan is convenience.



In the very near future, Japan's population is going to experience a major change. According to Euromonitor International, the number of Japanese citizens over the age of 65 years is expected to increase by 8%, to reach 36.6 million, or approximately 30.2% of the total population. With an aging population and a younger generation that is increasingly eating outside of the home, convenience whether eating out or in house is going to be a driving force in all food categories.

Although Japan remains one of the largest food importers, trust in the food supply is extremely important. The United States, California especially, has an outstanding reputation for providing safe, reliable, quality food products. In 2015, the California Olive Committee conducted a preliminary export market research program to discern what markets might be viable for exports from California. Upon receiving the market report, it was suggested that California has an opportunity to expand the ripe olive export market in Japan. The COC staff was instructed to pursue options to increase exposure and promotion capabilities in Japan.

In 2016, the COC applied for and received Market Access Program (MAP) funding for promotions and market development in Japan. The MAP funding will fund three areas:

- Trade Representation – The representative will be responsible for conducting meetings on behalf of the COC, engage in trade and media contacts with an emphasis on retailers, organize a reverse trade mission, and conduct other general tasks associated with COC in Japan
- Market Research – Research will be conducted to evaluate the Japanese market for olives and their growth potential. This research will focus on both consumer and trade perceptions of olives, as well as on how consumers and the foodservice sector utilize olives.
- Retail Promotions – Promotions will focus on the health benefits of olives as well as their versatility. Promotional materials, such as pamphlets and recipe cards, will be developed and distributed. The COC will initiate promotions with retailers in Japan based on trade representative's recommendations.

In 2017, the COC is anticipating receiving \$100,000 from MAP for promotion and market development in Japan.

STATISTICS



CALIFORNIA RIPE OLIVE DATA

The following information is the completed 2015-2016 Ripe Olive Data. This data includes:

- Shipments, Pack, and Ending Inventory-All Styles
- Chart-Pack, Shipments, and Ending Inventory
- Pack, Shipments, and Carry Out-All Styles
- Chart-Pack, Shipments, and Ending Inventory-Pitted
- Pack, Shipments, and Ending Inventory- Pitted
- Chart-Pack, Shipments, and Ending Inventory-Sliced
- Pack, Shipments, and Ending Inventory-Whole, Broken Pitted, Ltd.
- Chart-Consumer and Food Service Shipments- % by Month
- Shipments by Month-Whole and Pitted
- Chart-Consumer and Food Service Sliced Shipments- % by Month
- Shipments by Month-Limited Styles
- Chart-Shipments by Size Grade-Whole and Pitted
- Shipments by Size Grade- Whole and Pitted
- Shipments by Size Container-All Styles
- Pack by Size of Container- All Styles
- Chart-Pack by Size Grade- Whole and Pitted
- Sizes Packed- Whole & Pitted

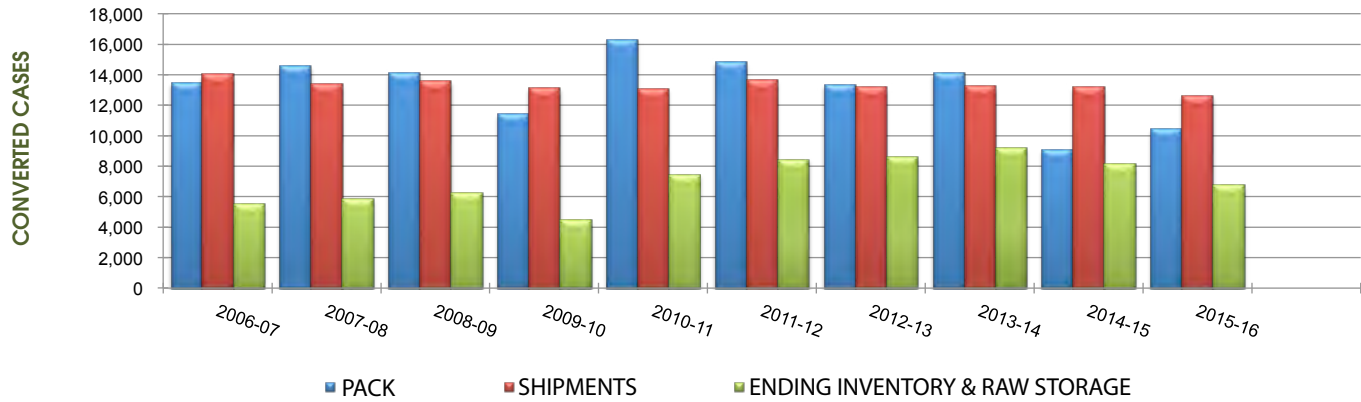
SHIPMENTS, PACK, AND ENDING INVENTORY SUMMARY 2014-15 TO 2015-16

(Converted cases 24/300 basis)

	Shipments			Pack			Ending Inventory		
	2015-16	2014-15	% Chnge	2015-16	2014-15	% Chnge	2015-16	2014-15	% Chnge
TOTAL	12,658,432	13,217,772	-4.2	10,442,791	9,090,482	14.9	6,770,021	8,178,359	-17.2
MARKETS									
Consumer	9,694,647	9,990,132	-3.0	8,018,202	7,119,038	12.6	5,500,472	6,585,126	-16.5
Food Service	2,963,786	3,227,640	-8.2	2,424,589	1,971,445	23.0	1,269,549	1,593,232	-20.3
STYLES									
Whole	12,471	11,941	4.4	114,767	181,225	-36.7	19,070	18,093	5.4
Pitted	7,915,074	8,199,230	-3.5	6,748,970	5,552,897	21.5	4,865,579	5,709,622	-14.8
Wedge	23,177	26,358	-12.1	11,654	30,576	-61.9	21,835	33,519	-34.9
Sliced	4,432,319	4,677,552	-5.2	3,385,478	3,127,624	8.2	1,708,589	2,217,742	-23.0
Chopped	250,745	275,556	-9.0	161,116	685,033	-76.5	136,063	175,894	-22.6
Broken Pitted	24,647	27,136	-9.2	20,806	13,127	58.5	18,885	23,489	-19.6
KEY ITEMS									
24/300 Pitted	7,559,668	7,786,839	-2.9	6,328,124	5,359,780	18.1	4,561,417	5,462,797	-16.5
6/10 Pitted	336,199	394,223	-14.7	389,490	186,662	108.7	273,887	230,426	18.9
6/10 Sliced	2,581,195	2,779,640	-7.1	1,906,659	4,729,288	-59.7	942,811	1,296,906	-27.3
24/300 Whole	8,202	9,671	-15.2	10,533	181,225	-94.2	18,527	16,036	15.5
6/10 Whole	4,269	2,270	88.1	104,234	0	0.0	543	2,057	-73.6
6/10 Wedge	21,457	24,965	-14.1	11,654	28,078	-58.5	20,935	30,779	-32.0
2.25 Sliced	758,151	822,458	-7.8	601,314	517,142	16.3	292,510	329,702	-11.3
4.25 Chopped	225,286	245,018	-8.1	147,776	155,177	-4.8	104,689	139,714	-25.1

Source: COC/NASS

PACK, SHIPMENTS & ENDING INVENTORY ALL STYLES



Source: COC/NASS

**PACK, SHIPMENTS, AND CARRY OUT
CANNED RIPE & GREEN RIPE - WHOLE & PITTED
BROKEN PITTED - LIMITED
2006-07 TO 2015-16
(Thousands of cases 24/300 basis)**

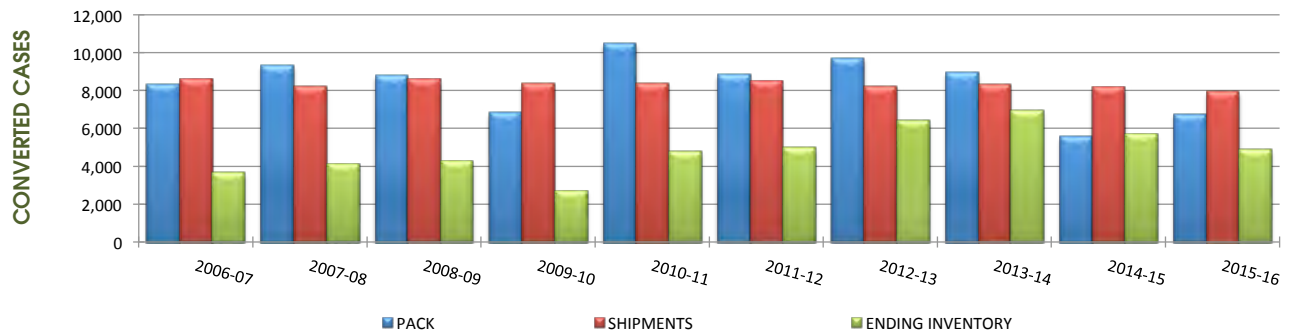
Season	Carry In		Pack	Shipments	Carry Out	
	Inventory	Storage			Inventory	Storage
2006-07	5,891.8	8,386.1	13,474.3	14,087.5	5,158.8	371.8
2007-08	5,158.8	371.8	14,561.7	13,434.0	5,845.6	4,270.2
2008-09	5,845.6	4,270.2	14,153.2	13,581.0	6,272.7	757.4
2009-10	6,272.7	757.4	11,432.4	13,147.0	4,506.8	916.5
2010-11	4,506.8	916.5	16,350.6	13,072.7	7,474.2	12,322.0
2011-12	7,474.2	12,322.0	14,851.6	13,711.7	8,466.9	1,536.7
2012-13	8,466.9	1,536.7	13,353.0	13,229.1	8,592.3	2,431.7
2013-14	8,592.3	2,431.7	14,112.6	13,284.6	9,185.3	3,879.5
2014-15	9,185.3	3,879.5	9,090.5	13,217.7	8,178.4	1,529.4
2015-16	8,178.4	1,529.4	10,442.8	12,658.4	6,770.0	3,257.4

Storage converted at 155 cases per ton.

Note: Inventory is finished goods; Storage is bulk olives.

Source: COC/NASS

PACK, SHIPMENTS, & ENDING INVENTORY PITTED



Source: COC/NASS

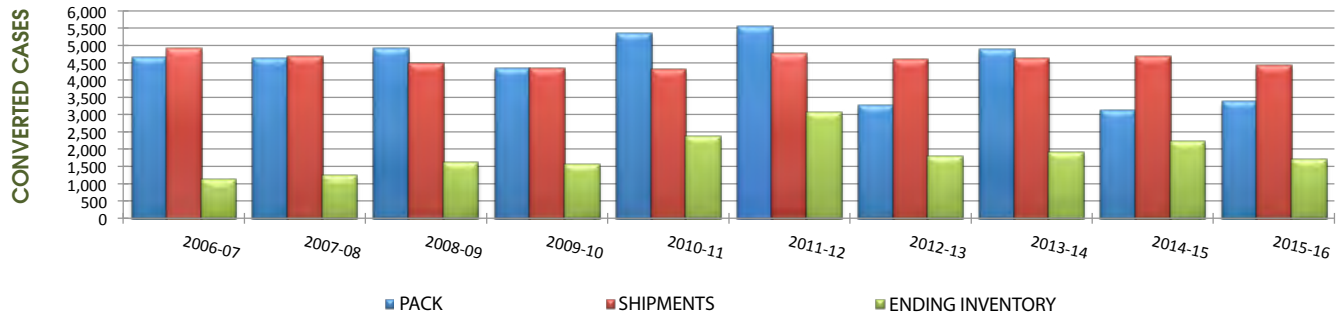
PACK, SHIPMENTS, AND ENDING INVENTORY
CANNED RIPE OLIVES - PITTED
2006-07 TO 2015-16
(Thousands of cases 24/300 Basis)

Season	Beginning Inventory	Pack	Shipments	Ending Inventory
2006-07	3,978.7	8,330.3	8,601.6	3,647.3
2007-08	3,647.3	9,324.7	8,229.4	4,143.8
2008-09	4,143.8	8,794.1	8,604.7	4,275.0
2009-10	4,275.0	6,834.9	8,356.3	2,734.3
2010-11	2,734.3	10,473.4	8,381.4	4,795.2
2011-12	4,795.2	8,825.7	8,544.4	4,996.0
2012-13	4,966.0	9,720.2	8,235.7	6,409.6
2013-14	6,409.6	8,922.8	8,294.6	6,952.6
2014-15	6,952.6	5,552.9	8,199.2	5,709.6
2015-16	5,709.6	6,749.0	7,915.1	4,865.6

Includes Green Ripe

Source: COC/NASS

PACK, SHIPMENTS & ENDING INVENTORY SLICED



Source: COC/NASS

**PACK, SHIPMENTS AND ENDING INVENTORY
CANNED RIPE OLIVES
WHOLE - BROKEN PITTED - LIMITED
2011-12 TO 2015-16**

(Thousands of cases 24/300 Basis)

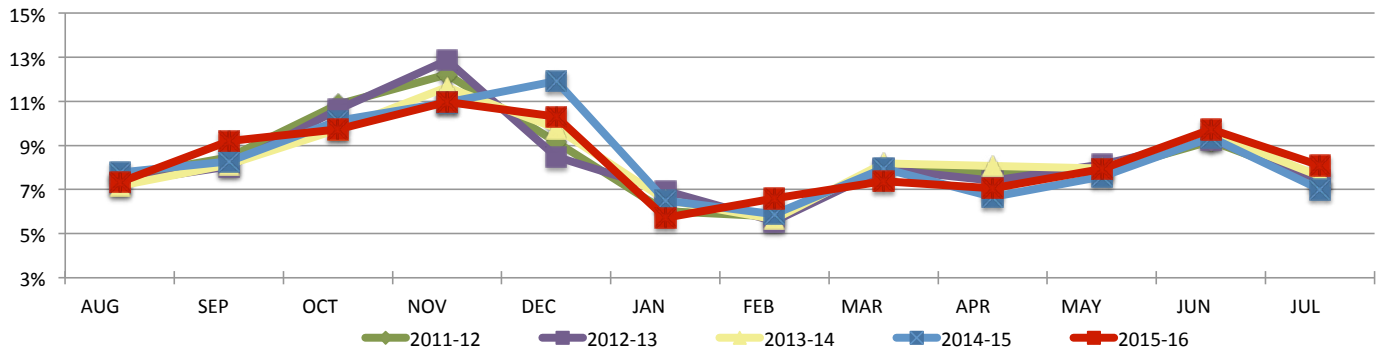
Style	Season	Beginning Inventory	Pack	Shipments	Ending Inventory
Whole*	2011-12	21	21	13.9	21
	2012-13	18.4	22.3	12.4	26.7
	2013-14	26.7	19.9	12.1	20.7
	2014-15	20.7	181.2	11.9	18.1
	2015-16	18.1	114.8	12.5	19.1
Broken Pitted*	2011-12	41.4	56.4	17.1	81.1
	2012-13	81.1	7.8	23.6	65.2
	2013-14	65.2	0.4	27.3	37.9
	2014-15	37.9	13.1	27.1	23.5
	2015-16	23.5	20.8	24.6	18.9
Wedged**	2011-12	17.5	31.0	29.4	18.1
	2012-13	18.1	40.2	24.6	33.2
	2013-14	33.2	24.5	27.1	29.4
	2014-15	29.4	30.6	26.4	33.5
	2015-16	33.5	11.7	23.2	21.8
Sliced	2011-12	2,355.6	5,529.5	4,772.5	3,056.9
	2012-13	3,056.9	3,250.9	4,601.6	1,784.5
	2013-14	2,784.5	4,880.0	4,627.3	1,913.4
	2014-15	1,913.4	3,127.6	4,677.6	2,217.7
	2015-16	2,217.7	3,385.5	4,432.3	1,708.6
Chopped	2011-12	243.4	393.3	334.7	296.4
	2012-13	296.4	311.6	331.2	273.0
	2013-14	273.0	265.0	296.0	231.3
	2014-15	231.3	185.0	275.6	175.9
	2015-16	175.9	161.1	250.7	136.1

* Includes Green Ripe

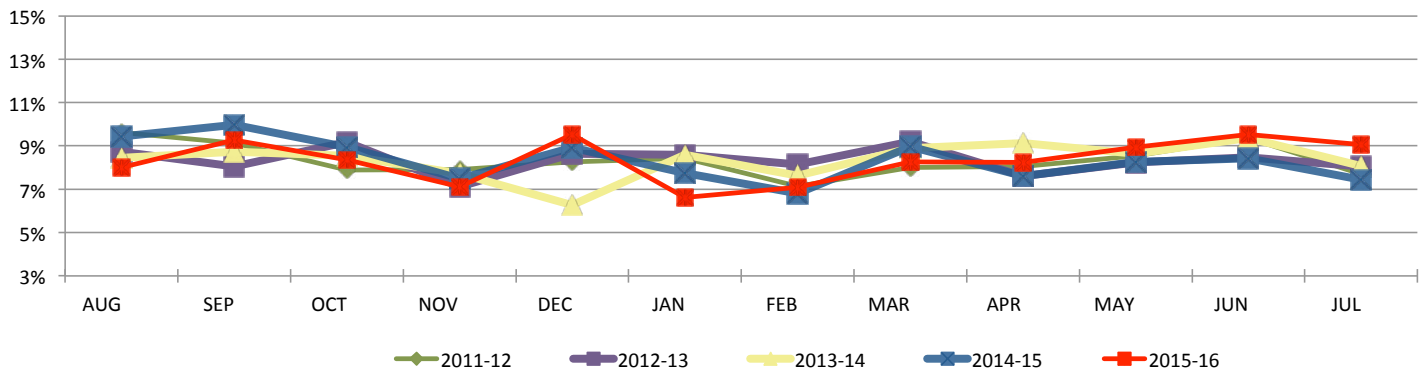
** Includes small amount of halved

Source: COC/NASS

CONSUMER SHIPMENTS - % BY MONTH



FOOD SERVICE SHIPMENTS - % BY MONTH



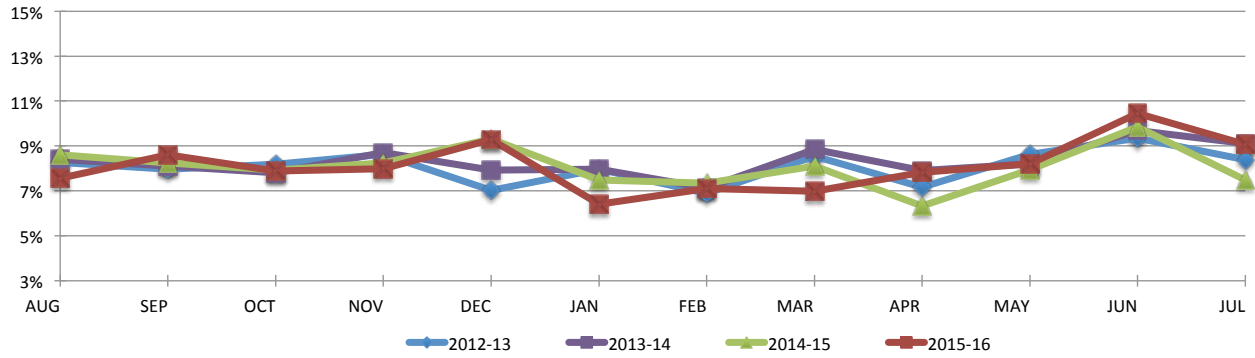
Source: COC/NASS

**SHIPMENTS BY MONTH
CANNED RIPE & GREEN RIPE - WHOLE & PITTED
2006-07 TO 2015-16
(Thousands of cases 24/300 Basis)**

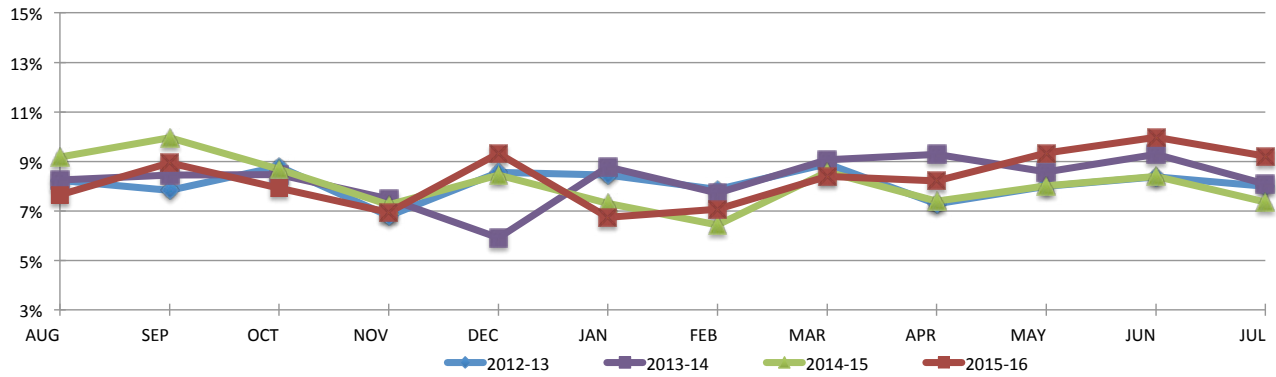
Month	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
August	804.2	561.8	693.2	620.1	610.1	637.7	583.8	567.9	618.7	556.0
September	828.9	592.2	825.8	724.1	723.1	722.8	642.1	652.0	664.3	709.7
October	879.8	921.6	925.6	982.0	947.5	962.5	896.9	835.4	853.2	797.2
November	1,038.5	1,192.2	1,125.9	970.0	1,083.0	1091.8	1102.5	997.3	924.0	908.8
December	823.2	770.4	809.8	797.1	700.7	814.4	712.4	819.4	995.5	827.0
January	589.0	376.4	428.8	447.8	493.9	485.3	535.3	518.7	494.4	435.0
February	544.6	439.3	487.3	431.8	413.3	463.9	422.8	435.0	433.2	496.4
March	636.7	635.7	671.7	718.1	679.5	656.7	632.9	652.3	638.1	578.7
April	615.5	551.0	559.2	533.7	672.8	625.2	602.3	656.3	541.3	545.4
May	565.2	742.9	635.9	671.7	605.7	632.7	641.7	643.4	599.5	593.5
June	754.2	772.6	795.6	773.7	790.1	764.1	742	771.3	733.0	720.3
July	512.5	652.0	608.0	628.5	600.4	598.1	575.0	587.2	543.2	597.3
TOTAL	8,592.3	8,208.1	8,566.8	8,298.6	8,320.1	8,455.2	8,089.7	8,136.2	8,038.4	7,765.3
Green-W/ Ptd	33.8	42.9	54.4	75.7	75.7	102.8	158.3	170.4	172.8	162.4
TOTALS	8,626.1	8,251.0	8,621.2	8,374.3	8,395.8	8,558.0	8,248.0	8,306.6	8,211.2	7,927.7

Source: COC/NASS

CONSUMER SLICED & CHOPPED SHIPMENTS - % BY MONTH



FOOD SERVICE SLICED SHIPMENTS - % BY MONTH



Source: COC/NASS

**SHIPMENTS BY MONTH
CANNED RIPE OLIVES - LIMITED STYLES ***
2006-07 TO 2015-16

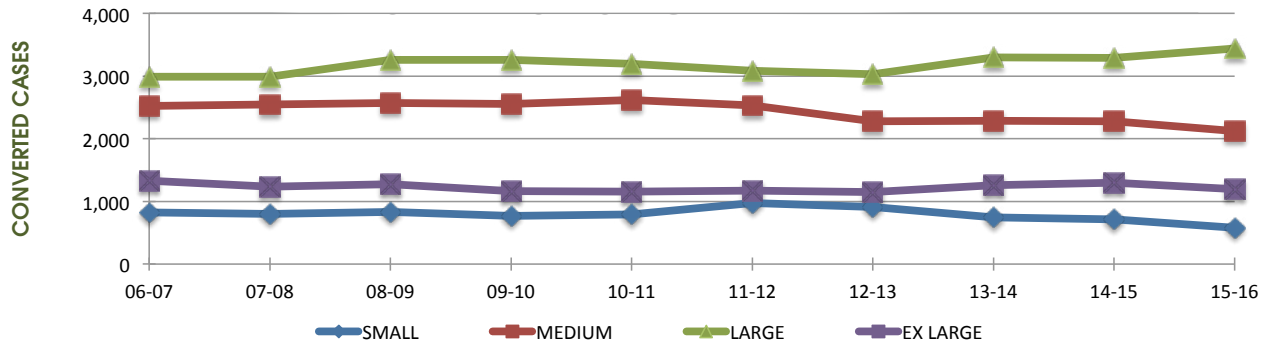
(Thousands of cases 24/300 Basis)

Month	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
August	571.5	431.6	398.4	400.4	376.5	468.3	420.7	411.8	448.8	378.0
September	494.4	416.8	499.9	419.1	405.6	453.6	410.6	432.7	470.6	438.0
October	435.6	412.9	401.2	422.2	390.1	408.3	439.2	401.5	430.5	376.2
November	435.7	440.2	366.4	410.3	370.8	417.8	385.2	401.0	391.9	350.7
December	460.7	368.5	385.5	413.7	327.3	400.2	401.1	343.9	459.6	434.8
January	434.7	369.8	352.7	331.4	358.3	420.6	423.2	400.8	390.6	303.1
February	399.9	367.5	352.7	356.1	362.8	369.5	384.6	369.4	361.9	337.2
March	450.2	421.4	438.1	427.4	403.1	422.8	444.0	442.7	428.7	366.2
April	438.0	377.4	389.3	360.1	397.8	420.5	370.0	433.4	358.6	370.8
May	428.7	429.7	432.5	373.9	380.4	452.1	421.1	416.8	407.1	423.9
June	441.4	450.8	453.4	434.3	487.1	490.6	442.3	471.9	451.4	488.4
July	398.2	631.5	437.6	395.1	400.1	412.0	415.6	424.9	379.8	439.2
TOTALS	5,389.0	5,118.1	4,907.7	4,744.0	4,659.9	5,136.3	4,957.6	4,950.8	4,979.5	4,706.5

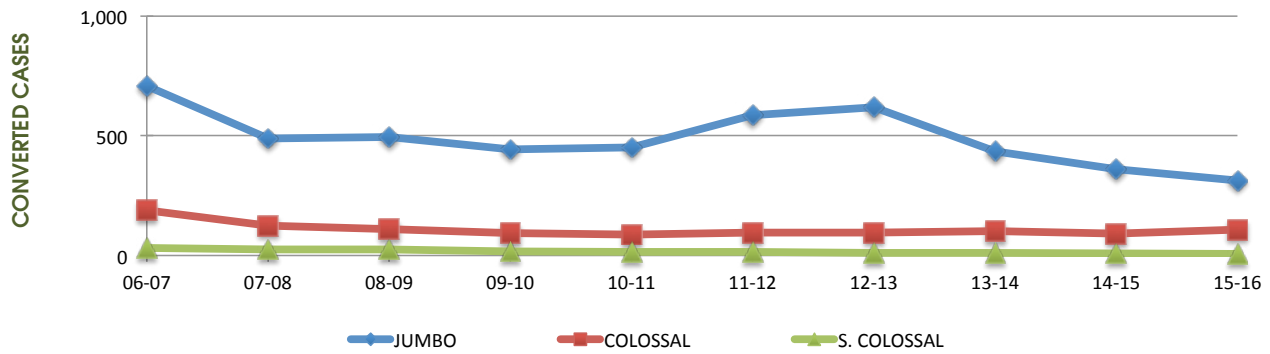
*Limited styles consist of Sliced, Chopped and Wedged

Source: COC/NASS

SHIPMENTS BY SIZE GRADE



SHIPMENTS BY SIZE GRADE



Source: COC/NASS

**SHIPMENTS BY SIZE GRADE
CANNED RIPE & GREEN RIPE - WHOLE & PITTED
2006-07 TO 2015-16**

(Thousands of cases 24/300 Basis)

Size Grade	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Small	823.6	798.9	834.4	765.1	795.9	975.7	909.4	747.5	716.8	579.1
Medium	2,524.3	2,549.6	2,569.6	2,551.6	2,616.1	2525.5	2276.1	2,283.1	2,273.8	2,121.4
Large	2,985.3	2,990.1	3,258.8	3,248.8	3,186.7	3078.3	3031.6	3,293.9	3,291.2	3,440.2
Ex Large	1,330.4	1,231.4	1,254.3	1,160.3	1,151.2	1173.8	1148.5	1,262.1	1,296.3	1,197.8
Ex Lg Sev	0.0	0.7	20.3	11.3	0.0	0	0	0	0	0
Jumbo	707.5	488.7	493.9	435.7	445.4	580.4	618.2	435.4	360	312.9
Colossal	189.5	124.2	110.0	92.1	85.2	93.9	94.7	102.6	90.6	108
Sup Col	31.7	24.4	25.6	15.9	15.6	13.9	11.4	11.8	9.7	5.8
TOTALS	8,592.3	8,208.0	8,566.9	8,280.8	8,296.1	8,441.5	8,089.9	8,136.4	8,038.4	7,765.2
G.Rp-Wh/Ptd	33.8	43.0	54.4	75.7	85.3	102.8	158.3	170.4	172.8	162.4
TOTALS	8,626.1	8,251.0	8,621.3	8,356.5	8,381.4	8,544.3	8,248.2	8,306.8	8,211.2	7,927.6

Source: COC/NASS

**SHIPMENTS BY SIZE OF CONTAINER
CANNED RIPE & GREEN RIPE - WHOLE & PITTED
BROKEN PITTED - LIMITED USE STYLES
2011-12 TO 2015-16**

(Thousands of cases 24/300 Basis)

Container	Styles	2011-12	2012-13	2013-14	2014-15	2015-16
No. 10 (600 x 700)	Whole	4.0	3.1	3.0	2.3	4.3
	Pitted	431.1	389.7	372.9	394.2	336.2
	Bkn Pitted	-	-	-	-	-
	Wedged	27.5	23.1	25.3	25.0	21.5
	Sliced	3,122.8	2,922.0	2,817.7	2,779.6	2,581.2
	Chopped	27.8	25.3	31.0	26.5	20.7
	Grn Ripe Ptd	-	-	-	-	-
Foodservice Total		3,613.2	3,363.2	3,249.9	3,227.6	2,963.9
No. 300 (300 x 407)	Whole	9.7	9.4	9.1	9.7	8.2
	Pitted	8,090.3	7,824.0	7,903.2	7,786.8	7,559.7
	Bkn Pitted	17.1	23.6	27.3	27.1	24.6
	Wedged	-	-	-	-	-
	Sliced	171.5	220.2	301.7	369.1	383.3
	Chopped	1.3	1.9	2.1	4.0	4.8
	Grn Ripe Wh/Ptd	102.8	158.3	170.4	172.8	162.4
Buffer (211 x 304)	Whole	-	-	-	-	-
	Pitted	23.0	22.1	18.5	18.2	19.2
	Bkn Pitted	-	-	-	-	-
	Wedged	-	-	-	-	-
	Sliced	607.4	633.4	666.1	706.4	709.7
	Chopped	241.1	7.3	0.0	0.0	0.0
2-1/4 OZ (211 x 200)	Wedged	1.9	1.6	1.8	1.4	1.7
	Sliced	870.8	826.1	841.8	822.5	758.2
4-1/4 OZ (211 x 200)	Chopped	304.1	296.8	262.6	245.0	225.3
Consumer Total		10,441.0	10,024.7	10,204.6	10,163.0	9,857.1
TOTALS		14,054.2	13,387.9	13,454.5	13,390.6	12,821.0

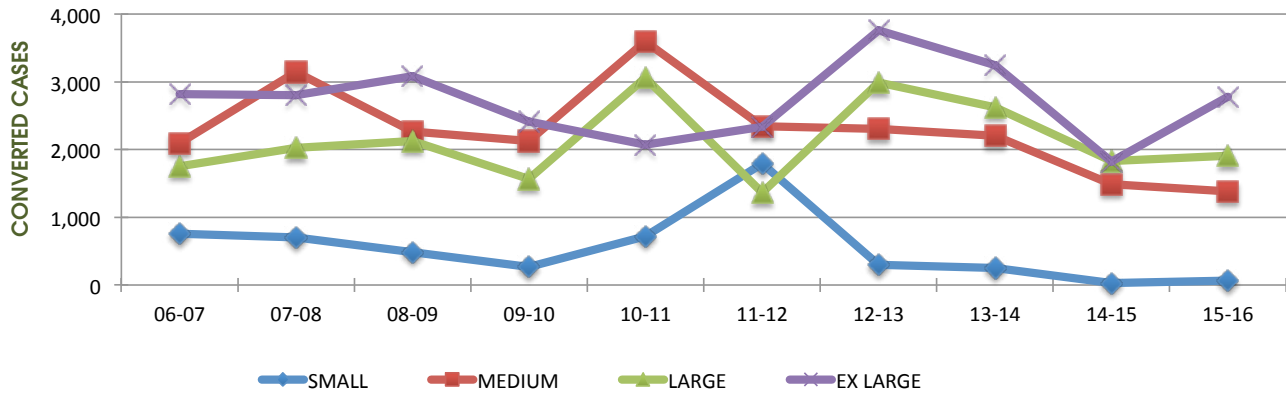
Source: COC/NASS

PACK BY SIZE OF CONTAINER
CANNED RIPE & GREEN RIPE - WHOLE & PITTED
BROKEN PITTED - LIMITED USE STYLES
2011-12 TO 2015-16
(Thousands of cases 24/300 Basis)

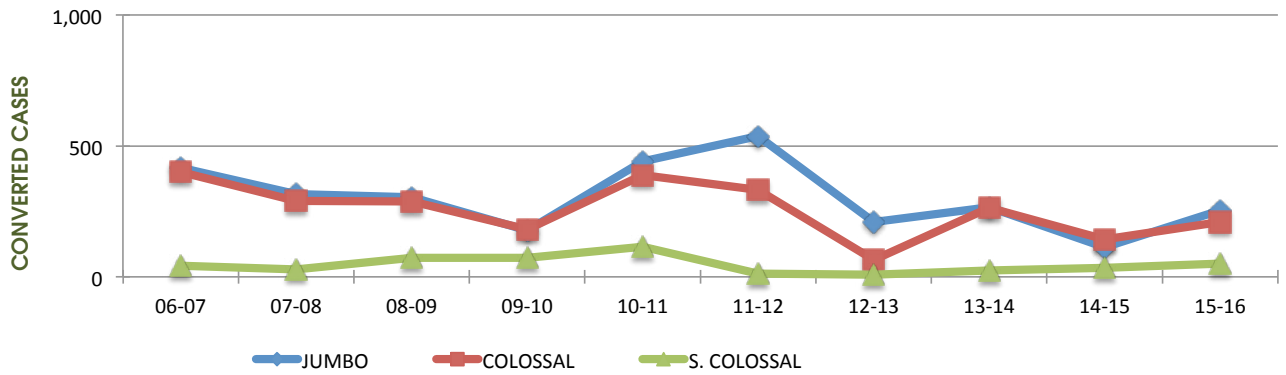
Container	Styles	2011-12	2012-13	2013-14	2014-15	2015-16
No. 10 (603 x 700)	Whole	2.7	3.4	5.0	0.0	104.2
	Pitted	403.1	458.3	373.3	186.7	389.5
	Bkn Pitted	-	-	-	-	-
	Wedge	28.7	36.7	24.5	28.1	11.7
	Sliced	3,845.4	1,752.0	2,921.9	1,729.3	1,906.7
	Chopped	17.6	47.5	40.6	27.4	12.6
	Grn Ripe Ptd	-	-	-	-	-
Foodservice Total		4,297.5	2,297.9	3,365.3	1,971.5	2,424.7
No. 300 (300 x 407)	Whole	13.0	18.8	14.9	181.2	10.5
	Pitted	8,395.0	9,237.6	8,534.4	5,359.8	6,328.1
	Bkn Pitted	56.4	7.8	422.0	13.1	20.8
	Wedge	-	-	-	-	-
	Sliced	303.9	143.4	365.3	372.5	270.4
	Chopped	0.0	3.6	5.6	2.4	787.3
	Grn Ripe Wh/Ptd	106.0	72.3	33.1	87.0	96.3
Buffer (211 x 304)	Whole	-	-	-	-	-
	Pitted	27.5	24.3	15.1	6.5	31.4
	Bkn Pitted	-	-	-	-	-
	Wedge	-	-	-	-	-
	Sliced	624.8	532.6	762.0	508.7	607.1
	Chopped	-	-	-	-	-
		-	-	-	-	-
2-1/4 OZ (211 x 200)	Wedge	2.3	3.5	-	2.5	-
	Sliced	755.4	823.0	830.7	517.1	601.3
4-1/4 OZ (211 x 200)	Chopped	375.8	260.4	218.8	155.2	147.8
Consumer Total		10,660.1	11,127.3	11,201.9	7,206.0	8,901.0
TOTALS		14,957.6	13,425.2	14,567.2	9,177.5	11,325.7

Source: COC/NASS

PACK BY SIZE GRADE



PACK BY SIZE GRADE



Source: COC/NASS

**CUMULATIVE PACKED BY SIZE
CANNED RIPE & GREEN RIPE - WHOLE & PITTED
2006-07 TO 2015-16**

(Thousands of cases 24/300 Basis)

Size Grade	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Small	758.8	703.7	484.8	264.2	717.8	1,792.8	302.5	254.9	29.0	65.6
Medium	2,099.9	3,149.2	2,269.5	2,131.6	3,596.4	2,345.6	2,306.8	2,204.3	1,490.8	1,382.9
Large	1,750.0	2,023.8	2,131.2	1,566.1	3,063.7	1,365.0	2,995.2	2,629.1	1,833.6	1,910.3
Ex Lg	2,768.2	2,775.5	3,050.1	2,421.1	2,078.1	2,333.9	3,760.8	3,249.9	1,822.1	2,779.2
Ex Lg Sev	55.7	28.2	34.9	7.7	28.3	1.7	0.0	0.0	0.0	0.3
Jumbo	417.4	315.9	305.0	183.2	445.5	536.8	210.0	264.9	112.5	254.2
Colossal	401.1	289.0	286.6	187.4	391.5	331.6	64.8	263.0	143.8	209.2
Sup Col	43.1	29.4	73.2	72.2	118.4	12.3	8.0	23.6	34.0	51.0
TOTAL	8,294.2	9,314.7	8,635.3	6,833.5	10,439.7	8,719.7	9,648.1	8,889.7	5,465.8	6,652.7
GR-W/Ptd	60.3	29.9	175.5	25.0	54.7	106.0	72.3	33.1	87.0	96.3
TOTALS	8,354.5	9,344.6	8,810.8	6,858.5	10,494.4	8,825.7	9,720.4	8,922.8	5,552.8	6,749.0

Source: COC/NASS

CROP AND PRICES

The following information includes the crop and prices for the California Ripe Olive Industry. This data includes:

- Producing County Report: In Tonnage
- 2015-2016 Producing County Report: In Commercial Acreage
- California Olives Received: Sevillano, Manzanillo, and Other Varieties
- Olive Grower Prices and Deliveries (In Canning and Limited Size Tons)
- California Olive Receipts By Variety Delivered to Regular Handlers
- Grower Deliveries to Handlers By Size Grade



PRODUCING COUNTY REPORT: IN TONNAGE

2015 HARVEST

County	SEVI	MANZ	OTHER	Grand totals
Butte	21	366	173	560
Colusa	-	-	-	-
Fresno	95	2,729	-	2,824
Glenn	1,534	16,636	15	18,185
Kern	-	-	-	-
Madera	17	292	-	309
San Joaquin	-	3	-	3
Shasta	213	109	15	337
Tehama	4,946	12,131	236	17,313
Tulare	1,038	36,982	43	38,063
Grand Total	7,864	69,248	482	77,594

2016 HARVEST

County	SEVI	MANZ	OTHER	Grand totals
Butte	3	81	40	124
Colusa	-	-	-	-
Fresno	81	1,435	-	1,516
Glenn	2,334	14,535	6	16,875
Kern	-	-	-	-
Madera	58	388	-	446
San Joaquin	-	-	-	-
Shasta	41	18	88	147
Tehama	3,604	13,431	71	17,106
Tulare	929	29,274	158	30,361
Grand Total	7,050	59,162	363	66,575

Source: COC/NASS

*Tonnage is reported based on actual production of the current year. Tonnage from varieties, within counties may vary from year to year.

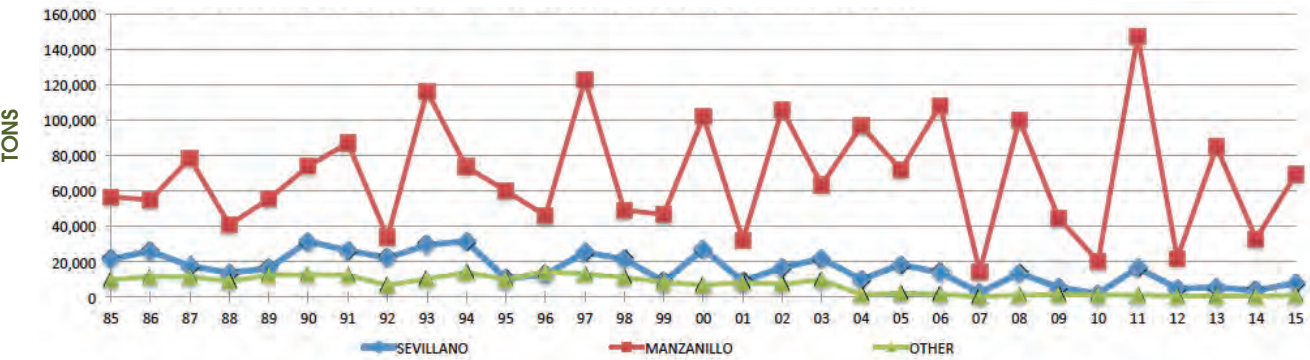
2015-16 Producing County Report: in Commercial Acreage*

County	SEVI	MANZ	OTHER	Acreage
Butte	17	138	145	300
Colusa	-	-	-	-
Fresno	22	422	2	446
Glenn	481	2,942	13	3,436
Kern	-	-	-	-
Madera	18	103	-	121
San Joaquin	85	39	41	165
Shasta	-	12	-	12
Tehama	1,200	2,616	122	3,938
Tulare	309	9,623	59	9,991
Grand Total	2,132	15,895	382	18,409

Source: COC

* Acreage is reported based on actual production of the current year. Acreage may vary from year to year.

**CALIFORNIA OLIVES RECEIVED:
SEVILLANO, MANZANILLO, & OTHER VARIETIES**



Source: COC/NASS

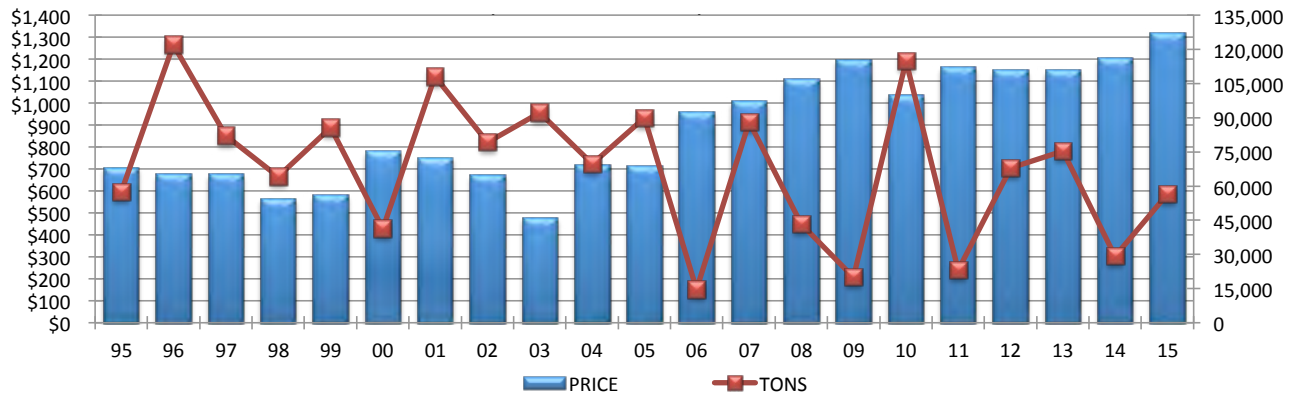
CALIFORNIA OLIVES - GROWER PRICES 1996-97 TO 2015-16

YEAR	Canning Size	Avg. Price \$	Limited Size	Avg. Price \$
	Tons		Tons	
1996-97	12,202	676	28,065	262
1997-98	82,150	676	10,235	288
1998-99	64,161	564	12,830	218
1999-00	85,639	580	36,474	277
2000-01	41,260	781	5,114	331
2001-02	108,143	754	15,297	297
2002-03	79,113	672	9,893	306
2003-04	92,240	478	10,467	254
2004-05	69,737	720	16,126	276
2005-06	93,627	715	21,135	261
2006-07	14,769	961	1,501	249
2007-08	88,072	1,008	19,906	378
2008-09	43,360	1,109	5,891	381
2009-10	20,043	1,197	1,068	375
2010-11	114,930	1,040	36,754	378
2011-12	23,147	1,165	2,082	370
2012-13	68,044	1,150	6,062	334
2013-14	75,305	1,150	10,363	385
2014-15	29,078	1,207	5,648	419
2015-16	56,478	1,320	14,395	640

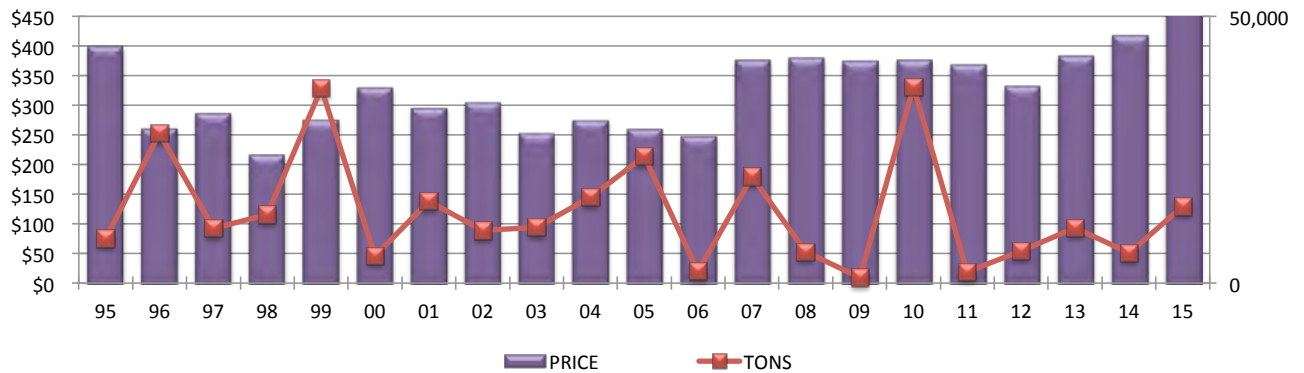
Source: Olive Growers Council (OGC)

Average Price- Independent canner price not including standard bonus, extra bonus, or hauling allowance.

OLIVE GROWER PRICES & DELIVERIES (in CANNING SIZE TONS)



OLIVE GROWER PRICES & DELIVERIES (in LIMITED SIZE TONS)



Source: COC/NASS

**CALIFORNIA OLIVE RECEIPTS BY VARIETY
DELIVERED TO REGULATED HANDLERS
2006-07 TO 2015-16
(in Tons)**

Variety	Season	Canning	Limited	Undersize	Culls *	TOTAL
SEVILLANO	2006-07	2,136	145	133	99	2,513
	2007-08	11,052	1,308	566	517	13,443
	2008-09	4,923	211	187	127	5,448
	2009-10	1,589	140	172	24	1,925
	2010-11	12,956	2,029	868	660	16,513
	2011-12	3,957	347	187	211	4,702
	2012-13	8,737	636	325	255	9,953
	2013-14	4,804	233	157	255	5,449
	2014-15	3,223	287	136	67	3,713
	2015-16	6,643	686	312	223	7,864
MANZANILLO	2006-07	12,530	1,339	193	268	14,330
	2007-08	76,092	18,405	3,403	2,329	100,229
	2008-09	37,581	5,374	960	891	44,806
	2009-10	18,453	928	164	473	20,018
	2010-11	101,234	34,465	6,612	5,082	147,393
	2011-12	19,192	1,735	302	637	21,866
	2012-13	59,307	5,425	674	2,105	67,511
	2013-14	70,501	10,132	1,461	2,787	84,881
	2014-15	26,084	5,388	667	812	32,951
	2015-16	49,855	13,701	3,071	2,623	69,250
OTHER VARIETIES	2006-07	103	17	2	4	126
	2007-08	928	193	25	65	1,211
	2008-09	856	306	104	23	1,289
	2009-10	857	183	28	22	1,090
	2010-11	739	260	33	45	1,077
	2011-12	314	47	6	10	377
	2012-13	427	223	37	27	714
	2013-14	363	77	10	10	460
	2014-15	254	163	28	9	454
	2015-16	623	195	27	19	864
TOTAL	2006-07	14,769	1,501	328	370	16,968
	2007-08	88,072	19,906	3,994	2,911	114,883
	2008-09	43,360	5,891	1,250	1,042	51,543
	2009-10	20,899	1,251	364	519	23,033
	2010-11	114,930	36,754	7,514	5,787	164,985
	2011-12	23,463	2,129	495	858	26,945
	2012-13	68,471	6,284	1,036	2,387	78,178
	2013-14	75,668	10,442	1,628	3,051	90,789
	2014-15	29,561	5,838	831	890	37,120
	2015-16	57,121	14,582	3,410	2,864	77,977

* Includes ungraded fruit

Source: COC/NASS

**GROWER DELIVERIES TO HANDLERS BY SIZE GRADE
2006-07 TO 2015-16
(in Tons)**

Size Grade	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16
Small	1,800	18,392	6,006	1,432	34,193	2,121	8,544	10,979	4,825	8,846
Medium	2,852	19,962	7,868	2,637	28,647	3,247	13,780	17,804	8,246	12,935
Large	3,614	21,970	11,544	5,417	25,507	5,158	16,634	22,791	6,399	11,455
Ex Lg	4,483	17,812	12,999	9,821	13,376	8,852	20,676	19,193	6,833	17,108
Jumbo	705	4,146	1,324	431	6,180	1,133	3,289	1,356	1,268	2,856
Colossal	890	4,146	2,345	596	3,427	1,633	3,097	2,169	1,001	2,002
Sup Col	424	1,644	1,274	566	801	948	1,445	1,033	568	831
Limited	1,501	19,906	5,891	1,251	36,754	2,129	6,285	10,442	5,838	14,582
Canning & Ltd Total	16,269	107,978	49,251	22,151	148,885	25,221	73,750	85,767	34,978	70,615

Source: COC/NASS

IMPORTS

The following information is from U.S. Customs. This data reviews the imports in grower tons from 2005-2006 through 2015-2016.



U.S. CUSTOMS IMPORT DATA IN GROWER TONS

CROP YEAR	WHOLE/PITTED FS & RETAIL	FS SLICED	FS WEDGED & CHOPPED	TOTAL CANNED	BULK (Aug-July)	TOTAL IMPORTS
2006-07	7,045	58,821	3,396	69,261	19,368	88,629
2007-08	8,053	61,601	4,163	73,817	9,265	83,082
2008-09	7,625	50,259	2,093	59,977	15,742	75,719
2009-10	9,775	56,696	4,341	70,812	27,494	98,306
2010-11	8,928	57,458	3,945	70,331	29,212	99,543
2011-12	8,439	60,209	4,475	73,123	4,641	77,764
2012-13	8,898	58,345	3,757	71,000	15,629	86,629
2013-14	10,277	63,923	3,961	78,161	12,878	91,039
2014-15	10,262	58,157	2,608	71,027	21,033	92,060
2015-16	7,762	40,107	1,848	49,717	8,185	57,902

Source: US Customs



Reference Sources:

California Olive Committee (COC)

U.S. Department of Agriculture (USDA)

National Agricultural Statistics Service

(NASS) Olive Grower Council (OGC)

U.S. Customs

www.calolive.org

