HEALTHY FOOD SYSTEMS • HEALTHY ENVIRONMENTS • HEALTHY COMMUNITIES • HEALTHY CALIFORNIANS

University of California
Agriculture and Natural Resources
Making a Difference for California

UCCE

Olive Notes
Tulare County

Vol. 9, Issue 1, April 2012

2012 SSJV Olive Day

Monday, April 23, 2012

Tulare County Agricultural Building
4437 So. Laspina St., Tulare, CA

8:00-8:30 AM	**Registration**
8:30-8:45	**Table Olive Industry Update** *Adin Hester, President, Olive Grower's Council*
8:45-9:00	**Olive Oil Industry Update** *Dan Flynn, Executive Director, UC Davis Olive Center*
9:00-9:30	**Update on Mechanical Harvest Program** *Louise Ferguson, Extension Specialist, Plant Science, UC Davis*
9:30-9:50	**Olive Knot and Verticillium Management** *Elizabeth Fichtner, UCCE Farm Advisor Tulare County*
9:50-10:10	**COFFEE BREAK**
10:10-10:30	**Use of Olive Mill Waste Water for Management of Olive Diseases** *Ali Rhouma, Laboratory for Improvement and Protection of Olive Genetic Resources, Olive Tree Institute, BP 208, 1087 Tunis ,Tunisia*
10:30-11:00	**Water Management of Olive** *Bill Krueger, UCCE Farm Advisor Glenn County*
11:00-11:30	**"Update on Insect Pest Management" in Olive** *Marshall Johnson, IPM Specialist/Entomologist, Kearney Ag. Res. & Ext. Ctr.*

◆ 1.0 Hour of Continuing Education Credits Requested ◆
◆ 1.5 Hours of CCA Requested ◆

Understanding Alternate Bearing in Olive

Elizabeth Fichtner, UCCE Tulare County, Katie Wilson, Research Assistant, Carol Lovatt, UC Riverside

Alternate or biennial bearing is a phenomenon where fruit production alternates between large crops consisting of smaller, lower value fruit during an "ON" year and smaller crops consisting of larger, higher value fruit during an "OFF" year. Alternate bearing is not unique to olive, but also affects other perennial California crops including (but not limited to) pecan, pistachio, apple, avocado and citrus, especially mandarins. The large swings in biennial fruit production impact the overall industry, from growers to harvesters, to processors. The 2009 and 2010 seasons exemplify the magnitude of the affect of alternate bearing on olive production and crop value in Tulare County (Table 1).

Table 1. Tulare County Olive Production

	Yield (Tons/Acre)	Value (Dollars)
2009 "OFF"	0.40	5,750,000
2010 "ON"	7.23	74,128,000

Causes of alternate bearing in olive

In olive, the current year's fruit is borne on the prior year's vegetative growth. The current year's fruit, and specifically the pit, inhibits the vegetative growth that supports flower buds for the following year (Sibbett 2000). Consequently, during an "ON" year, fruit production directly inhibits vegetative growth. A recent Israeli study (Dag et al 2010) demonstrates the inhibitory effect of fruit on vegetative shoot growth and return bloom in the oil cultivar 'Coratina'. Similarly, in 2011 we investigated the relationship between fruit load and vegetative growth on 'Manzanillo' olives in two commercial orchards in Tulare County. In our study, we assessed the influence of fruit on vegetative growth on 'ON' trees in comparison to 'OFF' trees. Additionally, within 'ON' trees, we assessed vegetative growth on branches bearing fruit and branches not bearing fruit. Our study demonstrated the inhibitory effect of fruit number (crop load) on vegetative growth (Table 2). Vegetative shoot growth was lower for shoots that did not set fruit (-fruit) on 'ON' trees than shoots –fruit on 'OFF' trees indicating a whole-tree effect of crop load in alternate bearing. Additionally, our data demonstrate that fruit-bearing branches exhibit even less vegetative growth than non-fruit-bearing branches on 'ON' trees, providing evidence of a strong localized effect of fruit on shoot growth (Table 2).

Table 2. Effect of ON- and OFF-crop tree status and the presence (+fruit) or absence (-fruit) of fruit set on a shoot on shoot extension growth. (Orchard 2, Exeter, CA, 2011).

Tree status	No. fruit per shoot	Net shoot growth (mm) and no. of nodes per shoot			
		15 July - 17 Aug		18 Aug - 4 Oct	
ON-crop tree		-- mm --	-- no. --	-- mm --	-- no. --
shoot +fruit	22.8 a[z]	0.0 c	0.1 c	0.0 a	0.1 a
shoot -fruit	0.0 b	9.0 b	0.6 b	1.0 a	0.1 a
OFF-crop tree					
shoot -fruit	0.0 b	24.0 a	1.3 a	1.0 a	0.1 a
P-value	<0.0001	<0.0001	<0.0001	0.4004	0.6024

[z] Values in a vertical column followed by different letters are significantly different at specified *P* levels by Fisher's LSD Test.

Alternate bearing is typically initiated by adverse climate. Once initiated, in the absence of additional environmental constraints affecting crop load, the bearing status of an orchard alternates between 'ON' and 'OFF' years, with 'ON' years exhibiting less vegetative growth than 'OFF' years. This biennial cycle, however, can be reset by adverse environmental conditions affecting bloom and fruit set. Adverse conditions 8-10 weeks prior to bloom may cause abortion of female flower parts, resulting in a high proportion of staminate (male) flowers that do not give rise to fruit. Additionally, adverse weather conditions at bloom may impact pollination and subsequent fruit set. Any conditions resulting in loss of crop during an anticipated "ON" year may render the season an "OFF" year.

Mitigation of Alternate Bearing

Reduction of fruit load prior to the major period of vegetative shoot growth during an "ON" year may mitigate alternate bearing. Chemical thinning with NAA at bloom may result in a smaller crop with larger sized fruit during an "ON" year, and allow for more vegetative growth to support the following year's crop.

Current Research on Mitigation of Alternate Bearing using Plant Growth Regulators

During the anticipated "ON" year of 2012, we are investigating the use of plant growth regulator applications for mitigation of alternate bearing. In our current study, we are injecting individual scaffolds of mature 'Manzanillo' olives with a suite of plant growth regulator treatment combinations with the goal of enhancing spring bud break, summer vegetative shoot growth, and return bloom. If plant growth regulator treatments show promise for mitigation of alternate bearing, further research will be conducted to address efficacy of topical spray applications.

Selected Literature

Dag, A., Bustan, A., Avni, A., Tzipori, I, Lavee, S., Riov, J. 2010. Timing of fruit removal affects concurrent vegetative growth and subsequent return bloom and yield in olive (*Olea europaea* L.). Scientia Horticulturae 123:469-472.

Sibbett, S. 2000. Alternate bearing in olive trees. California Olive Oil News. Vol. 3, Issue 12.

University of California
Cooperative Extension
Tulare County
4437B S Laspina St
Tulare, CA 93274-9537

Nonprofit Org
US Postage Paid
Visalia, CA 93277
Permit NO. 240

2012 SSJV Olive Day

Monday, April 23, 2012

Elizabeth Fichtner
Farm Advisor