

# FARM ADVISORS

## Comparing Pest and Disease Management Practices and Costs in Orchard Establishment and Production Practices of Avocados using Conventional and Organic Methods

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### Establishment and Production Costs

In 2012, we published four avocado costs of orchard establishment and production studies; two for conventional practices, and two for organic practices in the major producing counties in California. We divided the production areas into two parts to show the differences in production practices and costs. The northern region includes Ventura, Santa Barbara and San Luis Obispo counties and the southern region includes San Diego and Riverside counties. The studies were based on most common establishment and production practices in each region based on growers' interview and farm advisers' reviews. The cost figures are based on 2011 prices of inputs.

We present in Table 1, the summary of establishment and production costs and returns per acre. Establishment costs include the accumulated net costs (gross returns less costs) during the establishment period from year 1 to 6. Production costs estimates include annual returns and

costs for practices from year 7 on when the trees are considered close or at full maturity. Generally, establishment and production costs are higher for organic practices than conventional practices in both regions mainly because of higher pest management and fertilization costs. Costs are also higher for the southern region for both conventional and organic practices mainly due to relatively higher water costs. Gross returns are higher for the northern region due to higher yields obtained from high-density plantings (180 trees per acre in the north versus 145 trees per acre in the south). For details, please refer to the reports at <http://coststudies.ucdavis.edu/current.php>.

In this article, we present pest management practices and costs differences by regions and by production practices (conventional versus organic). The trade names we used are based on growers' interviews. No endorsement of named product intended nor did criticism imply of similar products that are not mentioned.

Table 1. Summary of Costs of Establishment and Production and Returns per Acre, By Production System and Region, 2011

	Avocado Production Systems							
	Conventional Production System				Organic Production System			
	Northern Region		Southern Region		Northern Region		Southern Region	
	Ventura & Santa Barbara	San Luis Obispo	San Diego	Riverside	Ventura & Santa Barbara	San Luis Obispo	San Diego	Riverside
Spacing	22'x11'	22'x11'	20'x15'	20'x15'	22'x11'	22'x11'	20'x15'	20'x15'
Trees per Acre	180	180	145	145	180	180	145	145
Establishment Costs (Yrs. 1-6)	\$35,111	\$35,176	\$38,235	\$32,407	\$39,552	\$39,773	\$43,626	\$37,798
Production (Mature) Year Yield (Yr. 7 +)	12,400 lbs.	11,200 lbs.	9,000 lbs.	9,000 lbs.	10,500 lbs.	9,500 lbs.	7,700 lbs.	7,700 lbs.
Production Cost (Yr. 7 +)	\$10,912	\$10,196	\$12,980	\$10,613	\$12,222	\$11,579	\$14,420	\$12,053
Gross Returns at Production	\$13,268	\$11,984	\$9,630	\$9,630	\$13,335	\$12,065	\$9,779	\$9,779
Gross Margin (Returns above Operating & Cash Overhead Costs)	\$7,382	\$6,819	\$544	\$2,542	\$6,499	\$5,886	-\$327	\$1,671
Returns to Management (Returns above Total Costs)	\$2,356	\$1,788	-\$3,350	-\$983	\$1,113	\$486	-\$4,641	-\$2,274

Note: Gross returns are price per pound times yield. Gross margin are returns above operating and cash overhead costs and returns to management are returns above total costs.



## Avocado Pest and Disease Management Practices and Costs

### *Thrips and Persea Mites Control*

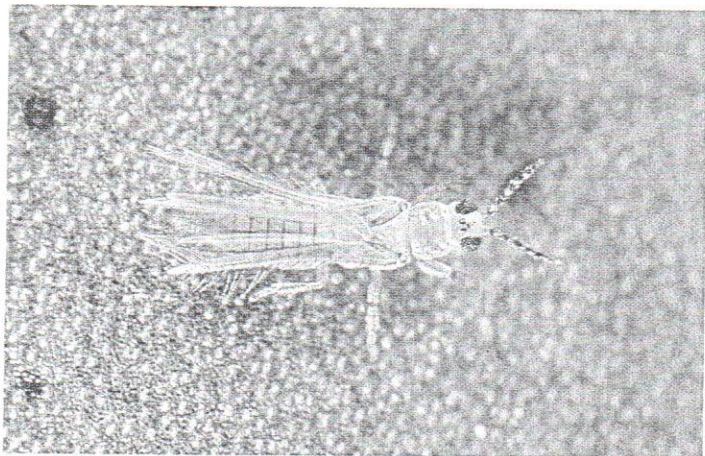
There are several varieties of pests found in avocado orchards in California. However, our studies focus on the costs of the key pests including thrips, persea mites, gophers, and squirrels. Treatment for thrips and persea mites is done every year starting in the third year of establishment. In conventional production, thrips and persea mites are treated by aerial application with materials such as abamectin and narrow range 415 (NR415) oil in all regions. The differences between regions are the number of aerial applications and the amount of material applied. There are two applications per acre annually in the north: first a mixture of 15 ounce abamectin and 1 gallon NR415 oil, and second 4 gallons of NR415 oil. In the south, there is only one aerial application per acre annually with a mixture of 15 ounce abamectin and 1 gallon NR415 oil. The cost of abamectin is ~\$1 per ounce and that of NR415 oil is \$10 per gallon. Aerial application costs \$87 per acre per time in the north

and \$125 per acre per time in the south. There is also an annual pest control adviser fee of \$36 per acre in the south. The overall approximation of insecticide control cost for conventional production equals \$239 per acre annually in the north and \$186 per acre annually in the south.

In organic production, the same key pests found in conventional production are also the major problems. Treatment practices for the regions are the same as described above except that in organic production spinosad is used instead of abamectin. Spinosad is applied at 3 ounce per acre annually in both regions. The cost of spinosad is about \$34 per ounce. The overall approximation cost of thrips and persea mites control equals \$326 per acre annually in the north and \$273 per acre annually in the south.

### *Gopher and Squirrel Control*

Gopher control is done in the first three years of establishment while squirrel controls are done annually during the establishment and production years regardless of production region. Gopher and squirrel control practices are similar in both regions except in labor hours.



**Photo A:** Key pests found in the major producing regions. Left to Right: Thrips, Gopher, Persea Mites, and Squirrels. Photo by Jack Kelly Clark, courtesy University of California Statewide IPM Program.



Gopher traps are used 2 per acre and last for 3 years. Each trap costs \$7.50. Squirrel control using anticoagulant bait is applied at 2.64 pounds per acre annually. It costs \$3.00 per pound. Also, one squirrel trap is used for 2 acres and lasts for 10 years. Each trap costs \$20. However, more labor hours (1.5 hours per acre in the south versus 1.0 hour per acre in the north) is required for inspecting the field and removing dead squirrels in the south due to the steeper slope orchard. Labor costs are estimated at \$14 per hour wage rate. The overall annual gopher and squirrel control costs in the north are approximated at \$53.65 per acre for the first three years and \$20.65 per acre from year four on. In the south, the annual costs include approximately \$63.15 per acre for the first three years and \$30.15 per acre from year four on.

In organic production, gopher and squirrel control are similar to the conventional practices described for each region with the exception that organic bait is used instead of anticoagulant bait. Organic bait is applied at 0.75 pounds per acre annually and costs \$7.00 per pound. The overall annual costs for gopher and squirrel control in organic avocado production in the north are approximated at \$53.65 per acre for the first three years and \$20.65 per acre from year four on. In the south, the annual control costs are approximated at \$60.65 per acre for the first three years and \$27.65 per acre from year four on. The overall pest management costs are provided in Table 2 and operations schedule is provided in Table 3.

### Weed Management Practices

Conventional weed management practices use a combination of herbicide spraying and weed whipping. The regions use similar kinds of herbicide such as glyphosate beginning the first year of establishment. Application rates differ by region: 8 ounces per acre applied 3 times in the north and 30 ounces per acre applied 3 times in the south. Glyphosate cost \$0.11 per ounce. Application labor hour is more for the steeper slope orchards in the south (4 hours per acre annually in the north versus 4.5 hours per acre annually in the south). Weed whipping is done more times in the north especially in the establishment years. Annual frequency and hours include: 4 times ~2 hours per acre for years 1-5, 3 times ~1.5 hours per acre for year 6, and 2 times ~1 hour per acre from year 7 on. In the south, weed whipping is done once and takes ~2 hours per acre for year 1-5 and 1 hour per acre from year 6 on.

Organic practices use only weed whipping. Number of weed whipping done is the same for each region as described for conventional practices. However, more labor hours are put in organic practices than conventional. In the north, 3 hours per acre is used for each weed whipping. In the south, 5 hours per acre is used for years 1-5; and 2 hours per acre from year 6 on. The less emphasis in weed whipping in the south is to minimize costs due to high production costs in this area. The overall weed management costs are provided in Table 2 and operations schedule is provided in Table 3.

**Table 2. Costs Comparison between Conventional and Organic Systems for Pest and Weed Management, and Phytophthora Root Rot Treatment for Establishment and Production Years**

	Establishment Years (1-6)				Production Year (7+)				
	Conventional System		Organic System		Conventional System		Organic System		
	Northern Producing Region	Southern Producing Region	Northern Producing Region	Southern Producing Region	Northern Producing Region	Southern Producing Region	Northern Producing Region	Southern Producing Region	
	Region	Region	Region	Region	Region	Region	Region	Region	
<b>Pest Management:</b>									
Insect Control	\$956	\$744	\$1,304	\$1,090	\$239	\$186	\$326	\$273	
Rodent Control	\$238	\$280	\$223	\$265	\$23	\$30	\$21	\$28	
Weed Management	\$502	\$552	\$966	\$378	\$71	\$80	\$84	\$28	
Phytophthora Root Rot Treatment									
Treatment	\$360	\$360	\$698	\$1,165	\$60	\$60	\$116	\$194	
<b>Total</b>	<b>\$2,056</b>	<b>\$1,936</b>	<b>\$3,191</b>	<b>\$2,898</b>	<b>\$393</b>	<b>\$356</b>	<b>\$547</b>	<b>\$522</b>	
<b>Total Establishment</b>	<b>\$35,111</b>	<b>\$38,235</b>	<b>\$39,552</b>	<b>\$43,626</b>	<b>Total Production</b>	<b>\$10,912</b>	<b>\$12,980</b>	<b>\$12,222</b>	<b>\$14,420</b>
<b>% of Total Establishment Cost</b>	<b>5.86%</b>	<b>5.06%</b>	<b>8.07%</b>	<b>6.64%</b>	<b>% of Total Production Cost</b>	<b>3.60%</b>	<b>2.75%</b>	<b>4.48%</b>	<b>3.62%</b>

\* Based on 2011 Cultural Practices Costs from Ventura and Santa Barbara and San Diego.

Table 3. Applications Schedule for Pest Management, Weed Management, and Phytophthora Root Rot for Establishment and Production Years by Region and Production Method

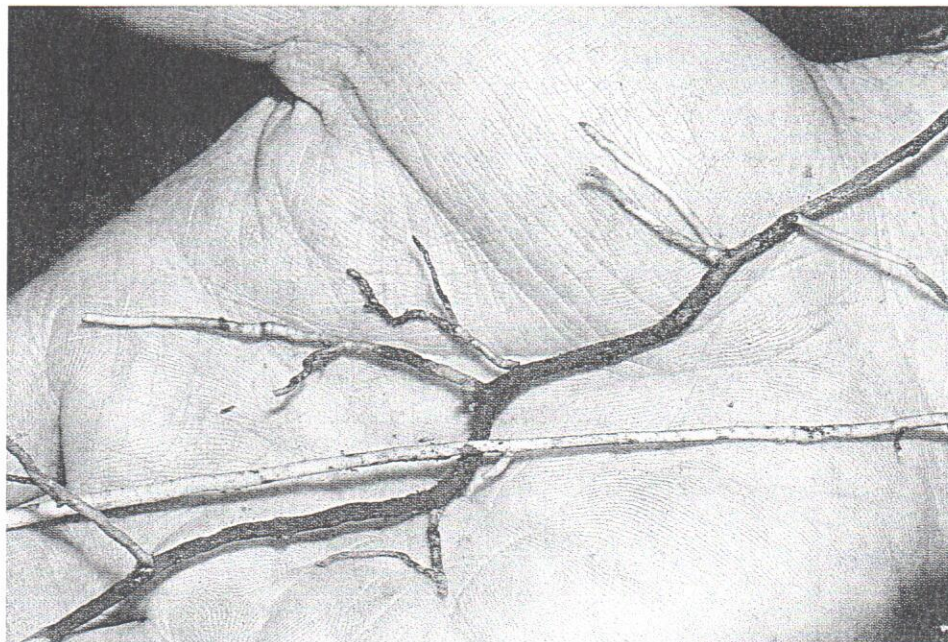
	Northern Region		Southern Region	
	Conventional Production	Organic Production	Conventional Production	Organic Production
<b>Pest Management Applications:</b>				
Thrips & Persea Mites	March & August (Beginning year 3 on)	March & August (Beginning year 3 on)	April (Beginning year 3 on)	April (Beginning year 3 on)
Gopher	January to December (Years 1 to 3)	January to December (Years 1 to 3)	January to December (Years 1 to 3)	January to December (Years 1 to 3)
Squirrels	January to December (Years 1 to 7+)	January to December (Years 1 to 7+)	January to December (Years 1 to 7+)	January to December (Years 1 to 7+)
<b>Weed Management Applications:</b>				
Herbicide	March, June, September (Years 1 to 7+)		February, May, August (Years 1 to 7+)	
Weed Whipping	February, June, September, December (Years 1 to 5) February, June, September (Year 6) February & June (Production years)	February, June, September, December (Years 1 to 5) February, June, September (Year 6) February & June (Production years)	March (Years 1 to 7+)	March (Years 1 to 7+)
<b>Phytophthora Root Rot Applications:</b>				
	May & September (Years 1 to 7+)	August (Years 1 to 7+)	May & September (Years 1 to 7+)	August (Years 1 to 7+)



### *Phytophthora Root Rot Practices*

Phytophthora root rot (PRR) is a huge problem in avocado orchards in California. Treatment starts the first year of establishment. In conventional production, material such as potassium phosphite is applied annually at 2 gallons per acre; \$30 per gallon through the irrigation system in both regions.

In organic production, material such as gypsum is applied beginning the first year of establishment. Gypsum is applied by hand; about 6 hours per acre (2 minutes per tree) annually in the north and 12 hours per acre (5 minutes per tree) annually in the south due to the steeper slope orchards, particularly in San Diego. Gypsum application is 15 pounds per tree at a price of \$0.012 per pound and is the same for both regions.



**Photo B.** Black dead root killed by Phytophthora Root Rot.

Photo by Jack Kelly Clark, courtesy University of California Statewide IPM Program.

### Summary

Avocado orchard pest management cost estimates showed that organic practices cost more than conventional practices (55% higher in the northern region and 50% higher in the southern region during the establishment years and 39% higher in the north and 47% higher in the south during production years). Insect control and weed control are the biggest contributors to higher organic production cost than in the conventional production. Production regions also differ in costs for pest management. In conventional production the northern region showed 6% higher cost in establishment years and 10% in production years. In organic production the northern region showed 10% higher cost in the establishment year and 4% higher in the production year. Insect control and weed management is the biggest contributor to the higher costs in the northern region. 🌱

### Reference

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- University of California Statewide Integrated Pest Management Program. (2013). Avocado Pest Management Guidelines. Retrieved from <http://www.ipm.ucdavis.edu/PMG/selectnewpest.avocado.html>