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AUTHORS

- Sonia Rios, UCCE Farm Advisor, Riverside/San Diego County
- Ben Faber, UCCE Farm Advisor, Ventura/Santa Barbara County
- Eta Takele, UCCE Farm Advisor, Riverside
- Mark Hoddle, UCR Entomologist
- Julie Pedraza, California State University, Fresno

Sonia Rios, Editor

FARM ADVISORS AND SPECIALISTS

Greg Douhan – Area Citrus Advisor, Tulare, Fresno, Madera
Phone: 559-684-3312
Email: gdouhan@ucanr.edu
Website: http://cetulare.ucanr.edu

Akif Eskalen – Subtropical Extension Pathologist UC Riverside
Phone: (951) 827-3499
Email: akif.eskalen@ucr.edu
Website: http://facultydirectory.ucr.edu

Ben Faber – Subtropical Horticulture, Ventura/Santa Barbara
Phone: (805) 645-1462
Email: bafaber@ucdavis.edu
Website: http://ceventura.ucdavis.edu

Craig Kallsen – Subtropical Horticulture & Pistachio, Kern
Phone: (661) 868-6221
Email: cekallsen@ucdavis.edu
Website: http://cekern.ucdavis.edu

Sonia Rios – Subtropical Horticulture, Riverside/San Diego
Phone: (951) 683-8718
Email: sirios@ucanr.edu
Website: http://cesandiego.ucanr.edu

Philippe Rolshausen – Extension Specialist Subtropical Crops, UCR
Phone: (951) 827-6988
Email: philippe.rolshausen@ucr.edu
Website: http://ucanr.edu/sites/Rolshausen/

Eta Takele – Area Ag Economics Advisor
Phone: (951) 683-6491 ext 243
Email: ettakele@ucdavis.edu
Website: http://ceriverside.ucdavis.edu

South American Palm Weevil is a Threat to Coachella Valley Date and Ornamental Palm Growers

Sonia Rios
UCCE Riverside County,
21150 Box Springs Road, Ste 202,
Moreno Valley, CA 92557-8718
sirios@ucanr.edu

Mark Hoddle
Department of Entomology,
UC Riverside, CA 92521
mark.hoddle@ucr.edu

Date growers in the California deserts have many insects to worry about such as carob moth, hibiscus mealybug, and giant palm borer. Now the industry is under threat from another potential pest, the highly damaging and invasive South American palm weevil *(SAPW)* (*Rhynchophorus palmarum*). It was first identified by county and state agriculture officials in 2011 in San Ysidro in San Diego. They made the discovery while looking for a closely related palm weevil, *R. vulneratus* (originally mis-identified as the notorious red palm weevil, *R. ferrugineus*), which was found in Laguna Beach and declared eradicated in Jan. 2015. SAPW has been reported on at least 35 plant species in 12 families and is especially economically important on plantation crops such as oil and ornamental palms of which date palm, *Phoenix dactylifera*, is a recorded host (CABI 2016; Dean 1979; Esser and Meredith 1987). SAPW has killed hundreds of Canary Island date palms (*P. canariensis*) in Tijuana and parts of San Diego County. These large urban infestations pose a significant risk to the multi-million dollar date palm industries (edible fruit and ornamentals) in the Coachella Valley. Losses of ornamental Canary Island date palms in San Diego County, are probably significant and likely now reaching millions of dollars in killed palms, reduced aesthetics, and increase removal costs.

SAPW has a long rostrum (this is the beetle's snout) and is large often up to 1 ½ inches to 2 inches in length (CDFA 2018). SAPW is now California's biggest weevil species! Inside the palm crown, weevil larvae feed on the meristematic tissue and it is this feeding that kills the palm crown which results in palm death. Larvae pupate inside 3-inch cocoons made of palm fibers. The pupal stage typically lasts two to three weeks. Adult weevils emerge from these protective cocoons, mate, and they are capable of flying significant distances, perhaps as far as 15 miles in a

single day, to find new palm hosts. Female weevils use their snout to chew holes in the apical regions of the palm and they lay eggs in these holes. Larvae that hatch from eggs burrow into the palm crown and feed turning the meristem tissue in a fermenting "mash". Feeding wounds that result in fermenting damage in association with aggregation pheromone released by male weevils create a highly attractive airborne cocktail of odors that weevils fly too. Adult weevils can live for at least 40 days, often longer (CDFA, 2018).

A single infected palm can result in the production of hundreds of weevils and detection of weevil infested palms at the early stages of attack can be difficult to identify because larvae live inside their host trees. The first obvious symptom of attack is a crown that is starting to collapse. Unless palms are treated within systemic insecticides at the early stages of attack, infested palms will ultimately die in as little as 2-3 months once visual symptoms become apparent.

In addition to direct physical damage SAPW inflict via feeding, it is a primary vector of the nematode that causes red ring disease (RRD), a fatal wilt disease of palms. Fortunately, RRD has not yet been detected in SAPWs or palms attacked in San Diego (Hoddle et. al. 2016). Removal of infected trees is necessary not only to remove breeding weevil populations from the environment, but also to minimize risk of harm to people, pets, and property from crown and frond drop.

More information on the SAPW invasion and to report suspect palms please visit this website: http://cisr.ucr.edu/palmarum.html

A Template for Estimating Value of Tree Loss

Etaferahu Takele, UCCE Area Farm Management Farm Advisor, Southern California
UCCE Riverside County,
21150 Box Springs Road, Ste 202,
Moreno Valley, CA 92557-8718

The 2017 fire in southern California brought about huge damage to residential homes, farms and land. The Thomas fire in Ventura County and the surrounding area and the Lilac fire in the San Diego and Riverside counties impacted tens of thousands of acres of irrigated crop and range land. The University of California Cooperative Extension in collaboration with several agencies conducted timely educational workshops entitled Emergency Avocado & Citrus Post-Wildfire information in Fall Brook and Fire Recovery and Frost Refresher in Ventura County and presented education on assessing values of losses and after fire management. This paper elaborates on the use of a Computer Template entitled the Tree loss calculator. This calculator was published by the University of California Cooperative Extension specialist, Karen Klonsky (UC Davis Emeritus) and her staff research associate

Pete Livingston which can be downloaded from https://coststudies.ucdavis.edu/en/tree-vine-loss/. This article discusses the calculation procedures and complements the guideline provided in the Template.

The calculator is an Excel spreadsheet template. It requires only basic knowledge of Excel and the formulas are embedded within the Template. A user guide/instruction page is available with the template. Only some basic information about the lost tree or vine is needed such as age of tree at loss; productivity history of the tree; estimated life of the tree; product price; some production costs such as harvesting and pruning (costs that vary with age of trees) and a discount rate for calculating the net present value of the loss.

Loss calculation can be done in two ways: (1) without replacement of the lost tree or vine and (2) with replacement of the lost tree or vine.

In the case of loss calculation without replacement; the calculator estimates the net income (gross income minus production costs) that would have been received from the tree or vine for the remainder of its life (had it not been lost). For example, if the tree was lost at age 12, the loss calculator would estimate the sum of net incomes (for 14 years i.e. from age 12 to age 25 (tree life assumption).

In the case of Loss calculation with replacement of the tree or vine; estimation includes replacement costs or costs of replanting a new tree in year 1 and removing stumps if needed; plus, estimation of income credit (gross income minus production costs such as pruning and harvesting) from the old tree until the new tree reaches the age of loss.

Below is a sample spreadsheet for a loss of an avocado tree. The data used for the sample is from Cost studies developed in 2011. https://coststudyfiles.ucdavis.edu/uploads/cs_public/63/ff/63ff6438-9231-4e91-ab1f-fb8894c9ecf1/avocadoconventionalvsbslo2011.pdf

GENERAL DATA INPUT - CROP:		Avocados - Ventura County-without replacing tree			DATE:	1/10/2018			
Replace default costs and values where appropriate:									
Age of tree when lost:		12	years old						
Expected tree life		25	years						
Crop value:		$1.07	per	Pound					
Harvest cost:		$0.115	per	Pound					
Discount rate:		4.00	%						
Spacing - R x T:		22	ft x	11	ft	*OR*	180	Trees per acre	

Enter tree - pruning cost plus other additional costs: $/tree & yield: Pounds/acre

Year	Pruning, other*	Yield	Year	Pruning, other*	Yield	
1			7	$2.33	12,400	
2			8	$2.33	12,400	Data: https://coststudyfiles.ucdavis.edu/uploads/cs_public/63/ff/63ff6438-9231-4e91-ab1f-fb8894c9ecf1/avocadoconventionalvsbslo2011.pdf
3		825	9	$2.33	12,400	Avocado Sample Establishment and Production Costs and Profitability Analysis for Ventura, Santa Barbara and San Luis Obispo counties, 2011
4	$1.17	3,300	10	$2.33	12,400	Conventional Production Practices
5	$1.40	6,600	11	$2.33	12,400	
6	$1.87	9,900	12	$2.33	12,400	

* Other costs per tree include spot fumigation, extra fertilizer, and extra irrigation that may be required with replanted trees.

COST/VALUE SECTION: Trees/acre: *180*

AGE OF TREE LOST	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
YIELD LOST FROM TREE															
Pounds of fruit or nuts/ac	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	
Pounds of fruit or nuts/tree	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	
NET INCOME LOST FROM TREE															
Income lost	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	
Decrease in pruning cost	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	
Decrease in harvest cost	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	
ANNUAL NET INCOME LOST	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	
VALUE OF TREE LOST @ AGE	12	$670.32													

GENERAL DATA INPUT - CROP: Avocados - Ventura County (to replace tree)   **DATE:** 1/10/2018

Replace default costs and values where appropriate:

Age of tree replaced:	12	years old
Stump removal cost:	$12.27	each
New tree cost:	$32.53	each
Planting cost/tree:	$3.90	each	Unit
Crop value:	$1.07	per	Pound
Harvest cost:	$0.115	per	Pound
Discount rate:	4.00	%
Spacing - R x T:	22	ft x	11	ft	*OR*	180	Trees per acre

Enter new tree - pruning cost plus other additional costs: $/tree & yield: Pounds/acre

Year	Pruning, other*	Yield	Year	Pruning, other*	Yield	
1			7	$2.33	12,400	
2			8	$2.33	12,400	Data: https://coststudyfiles.ucdavis.edu/uploads/cs_public/63/ff/63ff6438-9231-4e91-ab1f-fb8894c9ecf1/avocadoconventionalvsbslo2011.pdf
3		825	9	$2.33	12,400	Avocado Sample Establishment and Production Costs and Profitability Analysis for Ventura, Santa Barbara and San Luis Obispo counties, 2011
4	$1.17	3,300	10	$2.33	12,400	Conventional Production Practices
5	$1.40	6,600	11	$2.33	12,400	
6	$1.87	9,900	12	$2.33	12,400	

* Other costs per tree include spot fumigation, extra fertilizer, and extra irrigation that may be required with replanted trees.

COST SECTION: Trees/acre: *180*

YEAR			1	2	3	4	5	6	7	8	9	10	11	12
EXPECTED YIELD AND INCOME FOR REPLANTED TREE														
Pounds of fruit or nuts/ac					825	3,300	6,600	9,900	12,400	12,400	12,400	12,400	12,400	12,400
Pounds of fruit or nuts/tree					4.58	18.33	36.67	55.00	68.89	68.89	68.89	68.89	68.89	68.89
REPLACEMENT COSTS FOR NEW TREE														
Replacement costs														
Stump removal		$12.27												
New tree			$32.53											
Plant tree			$3.90											
Pruning						$1.17	$1.40	$1.87	$2.33	$2.33	$2.33	$2.33	$2.33	$2.33
Harvest					$0.53	$2.11	$4.22	$6.33	$7.92	$7.92	$7.92	$7.92	$7.92	$7.92
Income credit					-$4.90	-$19.62	-$39.23	-$58.85	-$73.71	-$73.71	-$73.71	-$73.71	-$73.71	-$73.71
NET COST OF THE NEW TREE		$12.27	$36.43		-$4.38	-$16.34	-$33.62	-$50.66	-$63.46	-$63.46	-$63.46	-$63.46	-$63.46	-$63.46
YIELD LOST FROM OLD TREE														
Pounds of fruit or nuts/ac			12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400	12,400
Pounds of fruit or nuts/tree			68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89	68.89
NET INCOME LOST FROM OLD TREE														
Income lost			$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71	$73.71
Decrease in pruning cost			-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33	-$2.33
Decrease in harvest cost			-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92	-$7.92
NET INCOME LOST FROM OLD TREE			$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46	$63.46
ANNUAL LOSS (Net cost plus net income lost)			$75.73	$99.89	$63.46	$59.08	$47.12	$29.84	$12.80					
VALUE OF TREE LOST @ AGE	12	$357.90												

After the Fire and Before the Rain, What to Do

Sonia Rios, UCCE Riverside/San Diego

Julie Pedraza California State University, Fresno

Ben Faber UCCE Ventura

Firefighters from all over the country worked around the clock to put out fires throughout the state of California. Fires could be devastating to growers and, in some ways, they could be beneficial by reducing populations of weeds and unwanted vegetation. However, after the loss of vegetation after a fire, growers have to prepare for the next possible disaster- mudslides, debris flow and flashfloods. Vegetation that once secured soil and gravel, preventing erosion on mountain and hill slopes is no longer there. Instead the waxy residue from burnt plant debris has formed into a baked waxy layer that prevents water from infiltrating more than a few inches into the soil, creating a water-proof surface layer. When a significant amount of rainfall occurs after a fire, it becomes an environment for a mudslide.

According to Randy Brooks (2017), author of the article *"After the Fires: Hydrophobic Soils,"* during a fire, burning plants release gases from waxy plant substances that permeate through the soil pore space, coating soil particles with a hydrophobic substance, thus repelling water. Over time, the wax-like, hydrophobic layer that has formed a few inches below the soil could persist in repelling water causing damage years later. Orchard trees with shallow roots can be destroyed and/or develop weakened root systems if a mudslide occurs post-fire. As rain continues to fall, large chunks of topsoil can break loose and slide down sloped landscapes. In some cases, mud and debris can exceed 35 mph, causing massive damage and major mudslides.

Rapid moving mudslides can enter into infiltration basins, irrigation canals, and reservoirs moving silty-clay sand suspension sediment that could clog pumps and irrigation lines creating an expensive problem for growers (Meixner, 2004).

Erosion in Orchards Post-Fire

Post-fire rains result in the transport of fertile soil particles into downstream waterways. These sediments can carry unwanted pesticides and nutrients that adhere to them. Erosion problems can include water pollution, loss of soil quality, increased flooding, impairment of stream ecosystems, decreased groundwater storage, release of carb

on, slope failures, degradation of habitat and loss of species, damage to downstream lands and properties. Not to mention the amount of time and costs associated with addressing these issues.

Preventable Management Practices

Orchard floor management can include anything from the addition of soil amendments to changes in tillage practices. One way to minimize soil erosion is to implement management practices that improve soil structure. Soil structure is the arrangement of mineral particles into aggregates. A well-structured soil having stable aggregates can easily accommodate infiltrating water that decreases runoff and reduces erosion (O'Geen and Schwankl, 2006). In addition, stable aggregates resist particle detachment, prevent the formation of crusts, and are less susceptible to compaction. Light tillage where possible can break up the hydrophobic topsoil layer post-fire, followed by planting a cover crop, such as a grass or a forb can prevent soil erosion and be a moderate barrier in the event of a mudslide.

Mature avocado groves have high soil organic matter (SOM) due to leaf mulch and fine rootlets that die and decompose in the shallow soils. Soil organic matter promotes good soil aggregation and stable aggregates. The form of SOM that binds soil particles together into aggregates is called humus, which consists of highly decomposed organic material. Humus results from the breakdown of mulches, roots and any amended organic materials like compost or other supplemental mulches.

Periodic application of organic materials is a proven method for improving the water-infiltration capacity of certain soils: those that suffer from weak structure due to low organic matter content (Meek et. al. 1982; Reganold et al., 2001).

In many situations it is neither practical nor feasible to add soil amendments as an erosion control practice. Cover crops are an excellent alternative to reduce soil erosion. They protect the soil from raindrop impact, prevent the formation of surface crusts, increase infiltration rates, and intercept sediment-rich runoff. Cover crops are also a great source of SOM. Critical aspects to consider are nutrient and water competition with crops, cost of additional water for irrigation, shade tolerance, crop height, and maintenance practices such as mowing.

Like most management practices, cover cropping has disadvantages, too. All cover crops use water, some are invasive, some serve as habitat for pests, some can increase the potential for frost damage, and they may be costly to establish (Prichard et al., 1989).

Management practices are ever changing for prevention and protection of orchards every year especially against fire and mudslides. Being informed and assessing the situation post-fire adds value to how we can evaluate the cost of protecting orchards and economically prepare fields from mudslides damages.

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David McNew / Getty Images

Up Coming Events

South American Palm Weevil Conference - The South American palm weevil has successfully invaded and established in San Diego County where it has killed hundreds of Canary Islands date palms. The weevil is spreading quickly and will likely pose a significant threat to date and ornamental palm producers in the Coachella Valley.

Date: March 12, 2018
Location: Coachella Water District, 51501 Tyler St, Coachella, CA 92236
CE and ISA Credits Available
Agenda:
 8:00am: Don Hodel, UCCE LA County, will give an overview of palm biology, diseases, and nutrient deficiencies that can be confused with palm weevil damage
 8:45am: Tom Perring, UC Riverside, will cover date palm pests
9:30am: Mark Hoddle, UC Riverside, will provide updates on the palm weevil invasion in San Diego County
10:15am: BREAK – Sponsored by the California Date Commission
 10:45am: Mike Palat, West Coast Arborists, will review issues that need consideration when removing palm trees killed by palm weevils
 11:00am: Ricardo Aguilar, Aguilar Plant Care, will discuss potential chemical control options for palm weevils in infested areas

11:15am: Agenor Mafra-Neto, ISCATech, will discuss new technologies that are commercially available for controlling palm weevils
12:00pm: Meeting Adjourns

Register for the Meeting Here:
http://ucanr.edu/survey/survey.cfm?surveynumber=22821

Avocado Grower Seminars

The guest speakers for this seminar are as follows:

- Khaled Bali, director and irrigation/water management advisor at UCCE- Imperial County/UC Desert Research and Extension Center
- Tim Spann, California Avocado Commission research program director

April 17, 2018 - 1:00pm - 3:00pm, UC Cooperative Extension Office Auditorium, 2156 Sierra Way San Luis Obispo, CA

April 18, 2018 - 9:00am - 11:00am, UC Cooperative Extension Office Auditorium, 669 County Square Drive Ventura, CA

April 19, 2018-1:00pm - 3:00pm, Fallbrook Public Utility District Board Rm., 990 East Mission Rd. Fallbrook, CA

Topics in Subtropics

Sonia Rios, Subtropical Horticulture Farm Advisor
sirios@ucanr.edu