Topics in Subtropics Newsletter

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News from the Subtropical Tree Crop Farm Advisors in California

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MANDARIN RIND BREAKDOWN

Ben Faber, UCCE Ventura County

Although you never know about the weather, we do know that if heavy rain occurs after color break in mandarins there can be significant rind breakdown. This problem can destroy much of the crop and the problem is largely preventable.

Pre-harvest rind decay of mandarins in California generally occurs shortly after rain falls and is most severe on Satsuma mandarins. Although some researchers have associated the problem with fungi such as *Alernaria* species, isolations from affected fret have been inconsistent. Inoculations with isolated fungi only sometimes reproduce disease symptoms and only on water-soaked fruit. Furthermore, in preliminary field trials that were conducted in Butte Co. in the fall of 2002 and 2003, fungicide treatments that included Topsin-M, Pristine and Abound only reduced the incidence of disease from 99% in the control to approximately 90%. These data suggested that mandarin rind breakdown is a physiological, abiotic disorder of fruit rather than a pathological problem and the fungi isolated are rather secondary causes of rind decay than primary pathogens.

Rind breakdown of citrus was previously reported by Fawcett and others in the 1930s. Wet weather combined with a sudden decrease in temperature was shown to result in generation of rind oil and collapse of cells just under the cuticle. In laboratory and field trials in 2003 (Adaskaveg, Forster and Connell; 2010), fruit treatments with water repellants reduced the incidence of rind breakdown to very low levels. Field trials were again conducted in the fall of 2004. Fungicide treatments were ineffective in these trials. In all trials, application of Vapor-Gard or Omni oil significantly reduced the disorder. In all programs with Vapor-Gard and Omni oil, a first application was made at the end of October and there was no significant difference in efficacy when additional applications were done. When trees were protected from rainfall using a tent, the disorder could not be detected, indicating the rind breakdown is correlated to rainfall.

In summary, results from the trials support previous findings by Fawcett that mandarin rind disorder is an abiotic, weather-related problem of mature fruit that has undergone a green to orange color change. Using a water repellant helps protect the fruit.

Table 1. Effect of fungicides and rain protecting materials on mandarin rind disorder in Butte Co. 2004

No.	Treatment*	Product Rates (/200gals/A)	Application Dates				Incidence of MRD (%) & LSD
			Oct. 22	Nov. 9	Nov. 19	Nov. 26	
1	Check	---	---	---	---	---	33.67 A
2	Abound	12.8oz	@	---	@	---	31.25 A
4	Vapor Gard	1gal	@	@	---	@	5.85 B
5	Vapor Gard	1gal	@	---	---	---	4.00 B
7	Omni Oil	6qt-0.75%	@	@	---	@	1.25 BC
8	Omni Oil	6qt-0.75%	@	---	---	---	1.96 BC
9	Vapor Gard/Nordox	1 gal/6 lb	@	---	---	---	5.80 B
10	Tent Protected	---	---	---	---	---	0 C

* - Treatments were applied using an air-blast sprayer calibrated to 200 gal/A.
** - Incidence of mandarin rind disorder (MRD) is based on the evaluation of 100 fruit per tree.

https://apsjournals.apsnet.org/doi/pdf/10.1094/PDIS-07-10-0484
Etiology and Management of a Mandarin Rind Disorder in California

BREAKING THE AVOCADO ALTERNATE BEARING CYCLE

Ben Faber, UCCE Ventura County

Alternate bearing is a condition not unique to the avocado but many other crops as well. Citrus, pears, apples, and apricots are just a few other crops which struggle with this problem. The question of what causes alternate bearing and how to minimize it are the subject of ongoing research which will hopefully give us better answers in the future.

Why should we care?

If the avocado markets paid the same price for all sizes from one year to the next and the total pounds produced over an on year and off year cycle were the same, it probably wouldn't matter much. The problem is that such a world does not exist and significantly higher financial rewards are made in years where fruit is scarce than in years where fruit is plentiful. If you're growing avocados to make a profit, you should be concerned about reducing or eliminating alternate bearing.

Why does alternate bearing occur?

There are a number of factors recognized by researchers as contributing to alternate bearing including plant hormones, carbohydrate reserves and competition within the plant for resources. Environmental conditions can also play a major role which, for the most part, are outside of the grower's ability to control. Understanding how these factors influence alternate bearing and what we can do about it are key toward reducing or eliminating it in our groves.

Hormones:

Gibberellins are considered to be one of the primary hormones produced naturally within the avocado which can influence alternate bearing. They are produced in the embryos of the developing fruit which has led some researchers to suggest fruit thinning after a particularly heavy fruit set to minimize alternate bearing. While labor intensive (there are no EPA approved chemical thinning alternatives for avocados), this step also decreases the carbohydrate sink that retained fruit makes on the trees resources further reducing alternate bearing.

Carbohydrates:

Carbohydrates are produced through photosynthesis and provide the energy needed by the avocado to produce fruit, leaves, stems and roots. Depending on the status of the tree and other factors, these available carbohydrates are distributed to areas of the tree where they are needed. When a tree sets a heavy crop, a disproportionate amount of these carbohydrates are often used to develop that crop resulting in lower development of the leaves, stems and roots. While it's the fruit that we're after as commercial growers these other components of the tree are vital to sustain ongoing production in future years and maintain the overall health of the tree. Without maintaining a healthy and robust canopy, roots and limbs, the tree will decline and production will suffer. When an extremely heavy crop is set, the tree may not even have enough carbohydrates available to support full fruit development resulting in small fruit throughout the tree. If the grower does not thin the fruit when these conditions are present, special care should be given to ensure that the tree is supplied with ample amounts of nutrients and water to support

the existing crop and hopefully allow the tree to produce sufficient carbohydrates for the other needs of the tree. Nature has provided the tree with a defense mechanism to deal with excess fruit set called branch breaking. Many growers overcome this natural defense mechanism by propping up their branches with boards or other devices to prevent branch breaking but special care should be given to those trees where this is done as noted above.

Competition:

As noted above, the different parts of the tree are all competing for the plants resources which are typically stored as carbohydrates. By reducing the demand for these resources through fruit removal, pruning or other practices the results of this competition can be minimized resulting in a reduction of alternate bearing tendencies.

Environment:

For the most part there's not much a grower can do to alter the groves environment, but this factor clearly plays a significant role in alternate bearing. In years where there is excessive heat or cold during the bloom period pollination may be minimal resulting in an off year condition. Alternatively, when conditions are ideal, a very heavy crop may set resulting in an on year. By engaging in cultural practices that reduce alternate bearing these environmental factors on alternate bearing may be minimized but the environment is the wild card that all growers must deal with in our groves.

Strategies:

Strategies are dependent on whether or not the grove is in an "on" year condition or "off" year condition. On years are when there is a heavy fruit set on the trees and off years are when there is a light fruit set on the trees. In any given grove you may find trees that are in both conditions so the practical approach toward managing you grove is to go with whatever the majority of the trees are showing (either an "on" year or "off" year condition). Below are some suggestions depending on the condition of your grove.

On years:

1. Apply higher amounts of fertilizer on your grove than you would normally to support the heavy crop load. Consider thinning the fruit.
2. Heavier pruning will help reduce the crop load and encourage new fruiting wood for next year's fruit set.

Off years:

1. Apply lower amounts of fertilizer than in an on year.
2. Prune less in an off year.
3. Consider girdling in October to promote fruit set the following year.

Summary:

Alternate bearing is a condition that can be controlled through cultural practices but not eliminated. Even the best groves experience some degree of alternate bearing but, by minimizing the effects, enjoy higher financial returns on their groves.

A GREAT FRIEND AND FARMER HAS PASSED

Ben Faber, UCCE Ventura County

It was announced recently that James Lloyd-Butler passed away on January 25. He was a great gentleman who loved learning, had a great love of family and was one of the best, if not the best farmer in Ventura County. He contributed significantly to the community in many ways, especially to share his love of agriculture. He was always ready to receive visitors to show how agriculture could be performed in harmony with the land. In 2018, he was recognized for his contribution to the avocado world with the following dedication from the California Avocado Society. I learned a lot from him. I, and many others, will miss him.

CALIFORNIA AVOCADO SOCIETY
AWARD OF MERIT

TO: JIM LLOYD-BUTLER

Our 2018 Award of Honor this year goes to a “first class person”, a “gracious host” and a “dream to work with”. Who is this gentleman? James Lloyd-Butler

Born here in 1925 and grew up on Rancho Santa Clara del Norte, which is one of the Mexican land grants in the Santa Clara Valley, the others being Rancho Santa Paula y Saticoy, Sespe, Olivas and Camulos. This was a farm of mainly walnuts and barley, some of it leased out to others for farming. His father managed the farm. He worked on the farm in the summers and remembers harvesting Valencia’s for sale to C&H Market at 10 cents a dozen. Lemons were only planted in the 1930’s. There were only a few avocado trees at the time, 5 having been donated by Louie the Ranch Foreman in the name of the 5 siblings growing up there. Jim went off to Oxnard High School, got embroiled in the navy, stationed in Saipan in 1945. Came back and did 2 years of college at St. Mary's in Moraga, then two years at Cal Poly San Dimas-Voor, his unit, where he also attended some lectures at UC Riverside.

Then off to make his fortune, he worked for Jack Broome at Rancho Guadalasca, another Mexican land grant. There he was superintendent of row crops – sugar beets, peppers and canning tomatoes – from 1955 – 63. And he got married to Cynthia Marsh and soon there were two kids, Camilla and Tom. Fruitful years for Jim.

Then he stretched his legs with a bit of adventure into real estate, but soon went back to ranch management and then from 1970 -82 he worked agriculture through the Bank of A. Levy. The family farm was managed by Hoffman, Vance and Worthington with the supervision of his dad. At the time there were 3 ac. of Zutano, 3 ac. of Bacon and 6 ac. of that new variety called Hass.

With the death of his father, he took over the ranch management. At the time there were still only a few avocados, mainly lemons. From the 1980's to the present the avocado acreage expanded from 20 to 110 acres, along with a similar amount of lemons. Now the avocados are a mix of Hass, GEM, Lamb Hass, Carmen, and SirPrize and is he ever a believer in pollinizers – Walter Hole, Zutano, Ettinger and Bacon. He's done high density and has been seriously pruning since 1995. He's worked with different rootstocks and has been a serious collaborator with the university, working with Mary Lu Arpaia, Mark Hoddle, Joe Morse, John Menge and others.

He has always surrounded himself with wise guys, people he consults. George Powers, the manager of the farm before he was born, Roger Edwards from Limoneira, Jack Broome of Oxnard, Bud Lee and Bob Burns from UC Coop Extension, Darrel Nelson, and Roger Essick.

One of the worst decisions was to plant litchi and longans at my recommendation. They never fruited here.

Gordon Frankie, the UC Berkeley Bee Biologist, who has done work here, writes:
He has been a very generous person who has greatly helped us in researching the visitors to avocado flowers. He has shown considerable interest with all of our findings, and has always offered help from his workers for all the many ideas we have explored at his ranch. He also shows curiosity and a willingness to go beyond most growers in exploring the ways that we could try new ideas, for example, expanding the bee gardens to encourage more flower visitors.

I'd like you to join me in recognizing the wonderful works that Jim has made to our community.

The Pollination/Beneficial Insect Garden that Jim helped build.

CALCULATING THE VALUE OF A LEMON TREE LOSS

Etaferahu Takele, Area Farm Management Advisor, UCCE Southern California
and Don Stewart, Staff Research Associate, Ag Issues Center

This article provides a sample estimate value of a lemon tree when a loss occurs due to fire or any other cause. Tree loss or damage by fire in southern California have occurred frequently (see a picture of an example of fire damage of citrus trees in southern California). Estimates may be needed for compensation.

Picture provided by Ben Faber, Farm Advisor, Ventura County

The following example is calculated using the *Tree and Vine loss calculator* ***Excel Template*** *Version 2.0 © Regents of the University of California, 1995 by Karen Klonsky and Pete Livingston, Cooperative Extension Specialist and Staff Research Associate*. The template is available for download at https://coststudies.ucdavis.edu/en/tree-vine-loss . Tree loss values can be calculated in two options. One, with replanting where loss is estimated until the replacement tree eventually generates equivalent income to what the old tree would have generated. The other option without replanting, the value of which is estimated over the expected life of the tree. The reason for without replanting may be due to age of the orchard or there is an easement, right of way, or other reason.

The template, as we described before requires only basic knowledge of Excel. The formulas for calculation are embedded and a user guide/instruction page available with the template. Only some data regarding the tree lost is needed which includes the age of the tree at loss; its productivity history; estimated life; product price; and some production costs such as harvesting and pruning (costs that will vary with age of trees) as well as a discount rate for calculating the net present value (NPV) of the loss.

The value of loss is provided in NPV which is a discounted cash flows due to the time value of money (TMV). TMV is the concept that money you have now is worth more than that expected in the future due to its earning potential through investment and changes caused because of inflation or other factors. The discount rate or the rate used to account for time, will depend on the type of analysis undertaken. The appropriate discount rate could be the opportunity cost of putting money to work elsewhere—simply put, it's the rate of return one could earn in the marketplace for an investment of comparable size and risk.

Option 1: With Replanting

Assuming that a single tree in an orchard lost at age 7 and removed before harvest but too late to replant that year, and replanted the following year. The compensation is the sum of the annual differences between the net income that would have been realized if the tree had survived (had not been lost) and the net income that is realized from the replacement tree until the lost tree and the new planted tree reach the age of comparable yield.

Option 2: Without Replanting

The compensation is the present value of the net income that would have been realized if the tree had survived through its expected life. The expected annual loss from the lost tree equals the expected revenue minus the pruning and harvest costs that would have been incurred if the tree had not been lost. Costs for damage to investments such as irrigation systems or trellis systems are not included in this calculation and should be determined separately.

Example:

In the example table below, The data for costs and income are based on the Sample Costs To Establish An Orchard And Produce Eureka Lemons study developed in 2020 for Ventura County. (https://coststudyfiles.ucdavis.edu/uploads/cs_public/38/fa/38fa8f9c-c93b-4c62-9740-a850bbc40df9/2020lemonsventuracounty.pdf. The loss value estimate was $436.70 for option with planting and $2,133.66 for option without replanting.

Data Entry and Printing

Data should only be entered into the yellow shaded cells in the General Data Input section. The spreadsheet is not password protected and should not be modified, otherwise the formulas will be messed up and the template will be out of use. The spreadsheet will automatically recalculate the net present value whenever new data is entered. Cells with zeros (0) in them will appear as blanks. The tree/vine spacing if not known or is on a non-square pattern, then the number of trees/vines per acre may be entered in the cell. A default print page range is set in the spreadsheet so that the general input and cost sections will print when the print button is pressed. More instruction in the Template.

Example Calculation of A Lemon Tree Loss Value

Data Entry Section

GENERAL DATA INPUT - CROP:	**2020 Lemons Ventura County**			**DATE:**	**12/1/2020**	
Replace default costs and values where appropriate:						
Age of tree replaced:	**7**	**years old**				
Stump removal cost:	**$20.00**	**each**				
New tree cost:	**$17.00**	**each**				
Planting cost/tree:	**$4.80**	**each**	**Unit**			
Crop value:	**$16.42**	**per**	**Carton**			
Harvest cost (picking and Hauling):	**$3.340**	**per**	**Carton**			
Discount rate:	**1.00**	**%**				
Spacing - R x T:		**ft x**		**ft**	***OR***	**155** **Trees per acre**

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

Year	Pruning, other*	Yield	Year	Pruning, other*	Yield
1	**$0.62**		**7**	**$3.23**	**1,018**
2	**$0.62**		**8**	**$3.23**	**1,018**
3	**$1.00**	**245**	**9**	**$3.23**	**1,018**
4	**$1.37**	**408**	**10**	**$3.23**	**1,018**
5	**$3.23**	**648**	**11**	**$3.23**	**1,018**
6	**$3.23**	**895**	**12**	**$3.23**	**1,018**

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

Loss Value with Replanting ($/Tree)

COST SECTION:	**Trees/acre:** *155*												
YEAR	0	1	2	3	4	5	6	7	8	9	10	11	12
EXPECTED YIELD AND INCOME FOR REPLANTED TREE													
Cartons of fruit or nuts/ac				245	408	648	895	1,018	1,018	1,018	1,018	1,018	1,018
Cartons of fruit or nuts/tree				1.58	2.63	4.18	5.77	6.57	6.57	6.57	6.57	6.57	6.57
REPLACEMENT COSTS FOR NEW TREE													
Replacement costs													
Stump removal	$20.00												
New tree		$17.00											
Plant tree		$4.80											
Pruning		$0.62	$0.62	$1.00	$1.37	$3.23	$3.23	$3.23	$3.23	$3.23	$3.23	$3.23	$3.23
Harvest				5.28	8.79	13.96	19.29	21.94	21.94	21.94	21.94	21.94	21.94
Income credit				-25.95	-43.22	-68.65	-94.81	-107.84	-107.84	-107.84	-107.84	-107.84	-107.84
NET COST OF THE NEW TREE	$20.00	$22.42	$0.62	-$19.67	-$33.06	-$51.45	-$72.30	-$82.68	-$82.68	-$82.68	-$82.68	-$82.68	-$82.68
YIELD LOST FROM OLD TREE													
Cartons of fruit or nuts/ac	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018	1,018
Cartons of fruit or nuts/tree	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57	6.57
PROFIT LOST FROM OLD TREE													
Income lost	$107.84	107.84	107.84	107.84	107.84	107.84	107.84	107.84	107.84	107.84	107.84	107.84	107.84
Decrease in pruning cost	-$3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23	-3.23
Decrease in harvest cost	-$21.94	-21.94	-21.94	-21.94	-21.94	-21.94	-21.94	-21.94	-21.94	-21.94	-21.94	-21.94	-21.94
TOTAL PROFIT LOST FROM OLD TREE	$82.68	82.68	82.68	82.68	82.68	82.68	82.68	82.68	82.68	82.68	82.68	82.68	82.68
ANNUAL LOSS (Net cost plus profit lost)	$102.68	105.10	83.30	63.00	49.61	31.22	10.38						

VALUE OF TREE LOST @ AGE	7	**$436.70**

Loss Value Without Replanting ($/Tree)

COST/VALUE SECTION:		**Trees/acre:**	***155***				
AGE OF TREE LOST	6	7	8	9	10	11	12+
YIELD LOST FROM TREE							
Cartons of fruit or nuts/ac	895	1,018	1,018	1,018	1,018	1,018	1,018
Cartons of fruit or nuts/tree	5.77	6.57	6.57	6.57	6.57	6.57	6.57
NET INCOME LOST FROM TREE							
Income lost	$94.81	$107.84	$107.84	$107.84	$107.84	$107.84	$107.84
Decrease in pruning cost	-$3.23	-$3.23	-$3.23	-$3.23	-$3.23	-$3.23	-$3.23
Decrease in harvest cost	-$19.29	-$21.94	-$21.94	-$21.94	-$21.94	-$21.94	-$21.94
ANNUAL NET INCOME LOST	$72.30	$82.68	$82.68	$82.68	$82.68	$82.68	$82.68

VALUE OF TREE LOST @ AGE	**6**	**$2,123.40**

12+ means the loss estimation includes years 13-35 (the productive life of the tree) @$ 82.68 per year.

References:

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