
THE ALMOND CONFERENCE
50
YEARS

Special Grower Breakfast Session: Managing Input Costs

December 8, 2022

Moderator: Michael Roots (ABC)
Speakers: Josette Lewis (ABC)
Peter DeBoer (Yara)
Justin Nay (Integral Ag., Inc.)
Lucas Avila (Manulife Investment Management)
Brittney Goodrich (UC ANR)

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Peter DeBoer

Yara North America

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Planet Earth – In chaos since 2020

Spring 2020 – COVID-19

- Massive Supply Chain Disruption

Summer 2020 – Tariffs on fertilizer imports

- Especially problematic for the Western US

Fall 2020 – China stops fertilizer exports

Winter 2021 – European natural gas spikes & stays high

Winter 2022 – Russia/Ukraine conflict

Impacts of globalism

Winter 2022 – Russia/Ukraine conflict

Russian fertilizer exports and market share in 2021			
Product	**Tonnage**	**Export market share**	**Export market rank**
MOP	11,832,717	27%	3rd
Ammonium nitrate	4,313,229	49%	1st
Urea	6,999,814	18%	1st
NPKs	5,928,142	38%	1st
Ammonia	4,424,342	30%	1st
DAP/MAP	4,048,081	14%	4th
Sulphur	1,805,567	9%	3rd

Where we stand today…

- Massive inflation, including record high food costs
- Higher costs & transit times for global & local logistics
- Steep increases in European natural gas
- Labor shortages
- Strong dollar relative to other currencies
- Declining crop values (and yields in the west)

What can we do?

- Maximize your productivity
- Ask lots of questions
- Leverage new technologies and approaches
- Stay focused on the long term
- Stay positive

Justin Nay

Integral Ag Inc.

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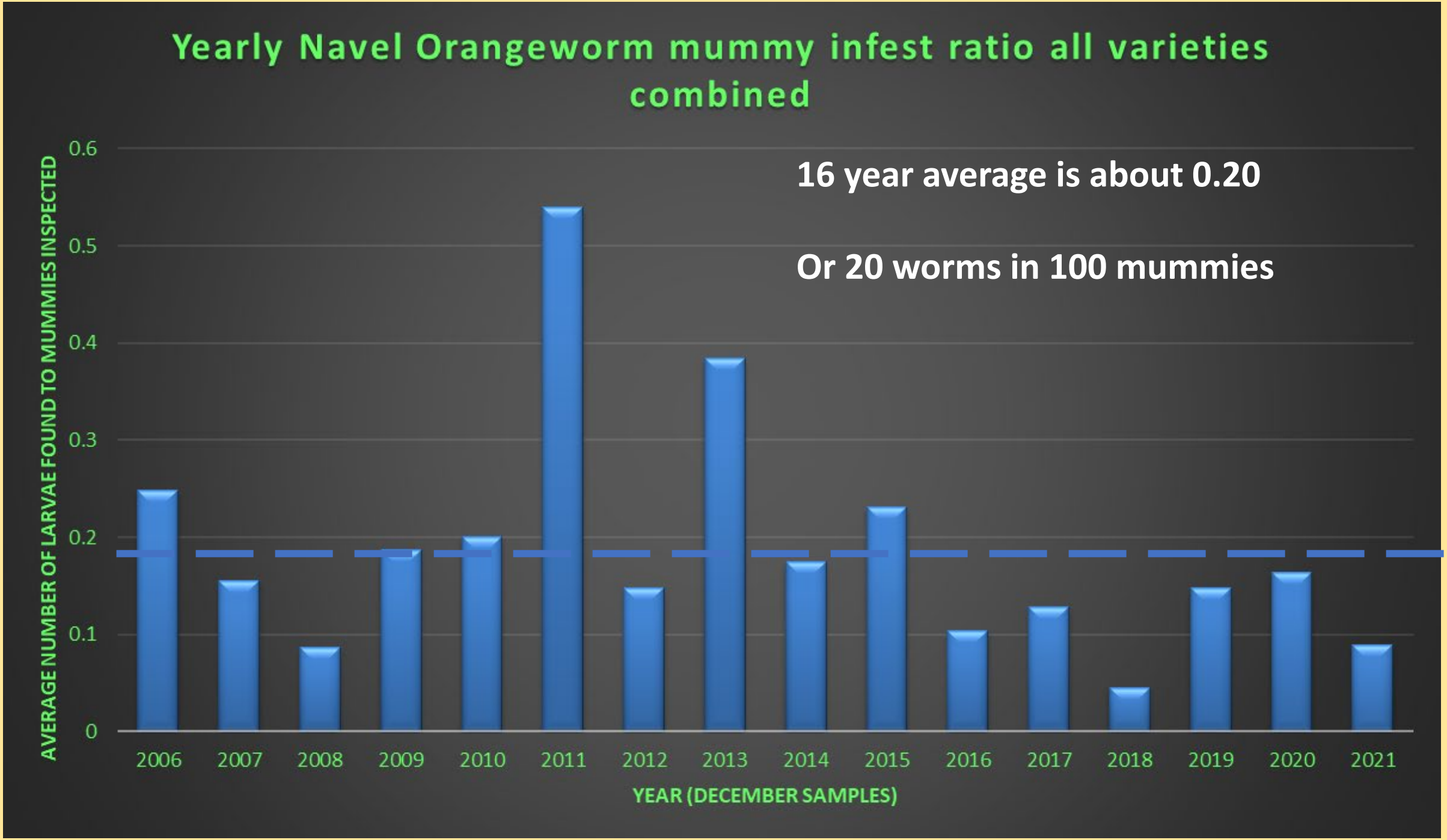
How to get more out of your NOW budget

Justin E Nay, PhD

Integral Ag., Inc.

Chico, CA


Yearly Navel Orangeworm mummy infest ratio all varieties combined
16 year average is about 0.20
Or 20 worms in 100 mummies
AVERAGE NUMBER OF LARVAE FOUND TO MUMMIES INSPECTED
0.6
0.5
0.4
0.3
0.2
0.1
0
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
YEAR (DECEMBER SAMPLES)

NOW math 101

2 mummies per tree
100 trees per acre
0.2 worms per mummy
= 40 worms per acre (20♀)

140 trees per acre @ 2 mummies per tree and 0.2 infest = 28♀ / acre

Three Step Process

Step 3. Calculate moths (females) per acre

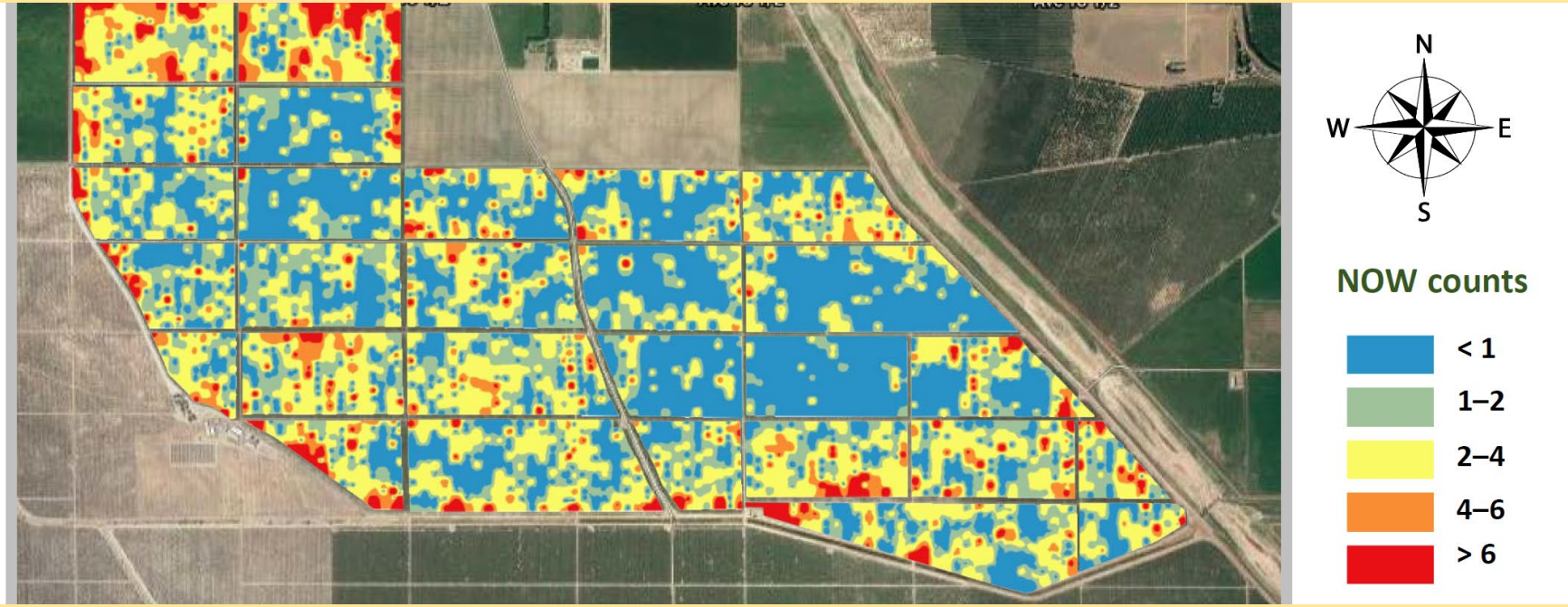
To perform Step 3, enter number of NOW larvae found in orchard samples			
	Enter 1 if none found		
	Total worms (meats and hulls)	# of nuts inspected	Calculated infest worms per acre per variety
Enter number of NOW larvae in mummies (Var. 1)	63	100	83.2
Enter number of NOW larvae in mummies (Var. 2)	14	100	5.3
Enter number of NOW larvae in mummies (Var. 3)	26	50	3.6
Enter number of NOW larvae in mummies (Var. 4)	1	1	0.0
	Total worms per acre		92.1
	Total female NOW per acre		46.1

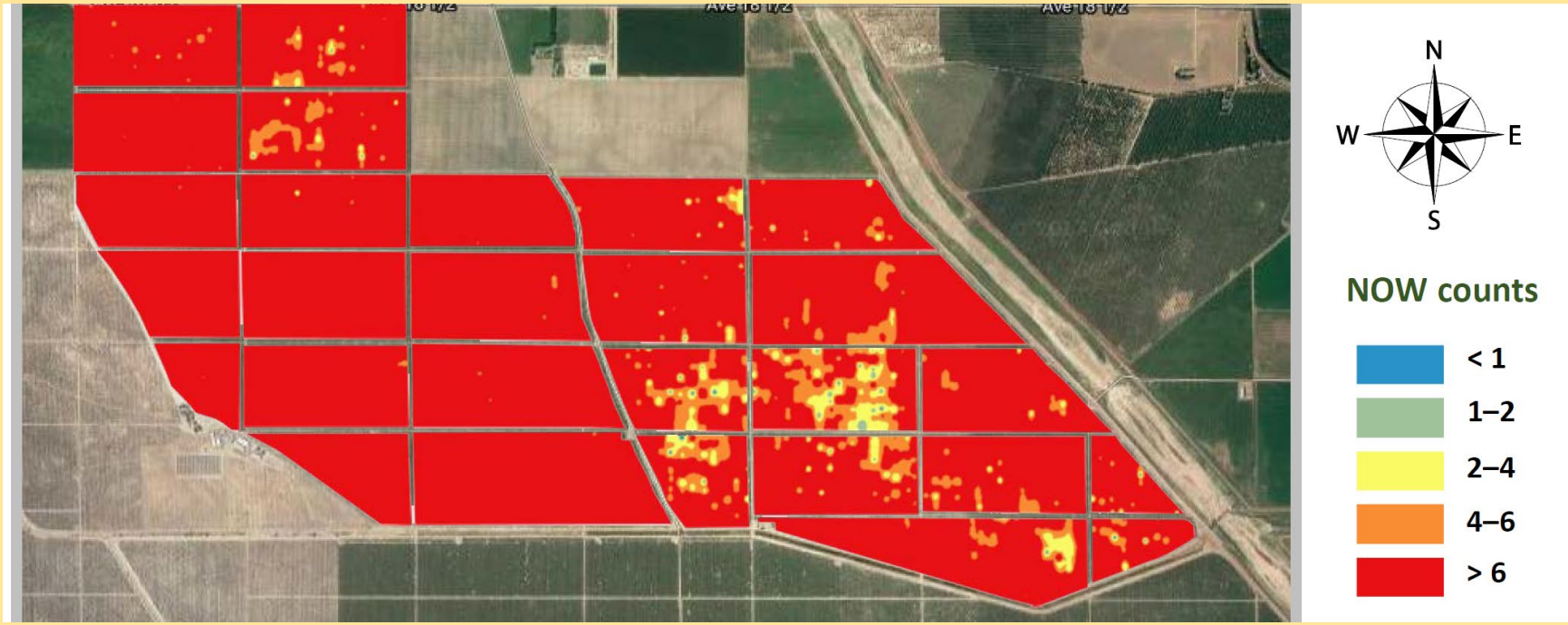
These calculations can assist in a more efficient allocation of resources on sanitation based on **NOW infest and variety**.


CONVIRON
GEN 1000
PURIFIED WATER

More in a Peterson trap is not better!

Sure its better ROI for the cost of the trap but it means you are pushing the system to far





2017
&
2018

2 traps per acre

Attempt to put up 1 trap for every 6 NOW ♀ per acre

Lots of assumptions like
2000 pound + of 22-24 nut / oz
normal flight timing
early harvest

Better ROI on your NOW management decisions

1) Sanitation – $ to kill moths, mummy nuts are second
2) Spring Population Size - $ to spray or not to spray
3) Mass Trapping – assist sanitation, provide info on population size, kill moths

Thank you.
Math class is over.

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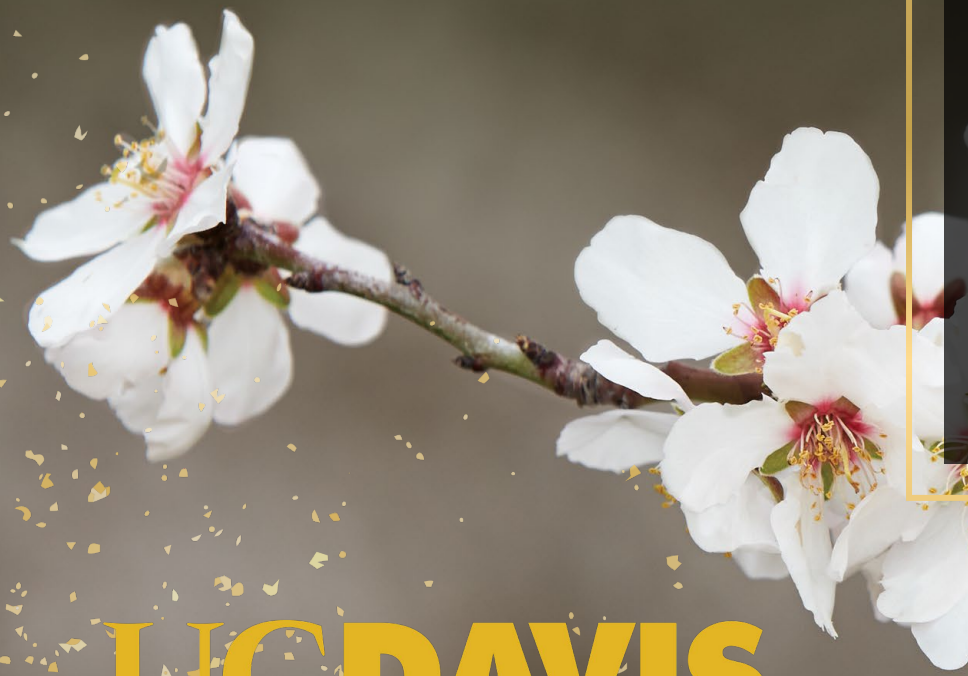
50 YEARS

Maximizing Profitability in Almond Production

Brittney Goodrich, UC ANR



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Profit maximization in theory

$$\max_{e,\ t_H,\ t_L} \quad E[\pi] = p(e)(Py_H - t_H) + (1 - p(e))(Py_L - t_L) - \alpha_i \quad s.\ t.$$

$$p(e)[1 - \exp(-At_H)] + (1 - p(e))[1 - \exp(-At_L)] - ce - F \geq 0, \quad (\lambda)$$

$$p'(e)[\exp(-At_L) - \exp(-At_H)] - c = 0, \quad (\mu)$$

$$P\Delta y = (t_H^* - t_L^*) + \frac{\mu^* p''(e^*)c}{(p'(e^*))^2},$$

$$t_H^* = -\frac{1}{A}\ln\left[(1 - ce^* - F) + \frac{p(e^*)c}{p'(e^*)} - \frac{c}{p'(e^*)}\right],$$

$$t_L^* = -\frac{1}{A}\ln\left[(1 - ce^* - F) + \frac{p(e^*)c}{p'(e^*)}\right],$$

$$\mu^* = \frac{p(e^*)(1 - p(e^*))}{Ap'(e^*)}\left[\left((1 - ce^* - F) + \frac{p(e^*)c}{p'(e^*)}\right)^{-1} - \left((1 - ce^* - F) - \frac{(1 - p(e^*))c}{p'(e^*)}\right)^{-1}\right],$$

$$\lambda^* = -\frac{1}{A}\left[(1 - p(e^*))\left((1 - ce^* - F) + \frac{p(e^*)c}{p'(e^*)}\right)^{-1}\right.$$

$$\left. + p(e^*)\left((1 - ce^* - F) - \frac{(1 - p(e^*))c}{p'(e^*)}\right)^{-1}\right].$$

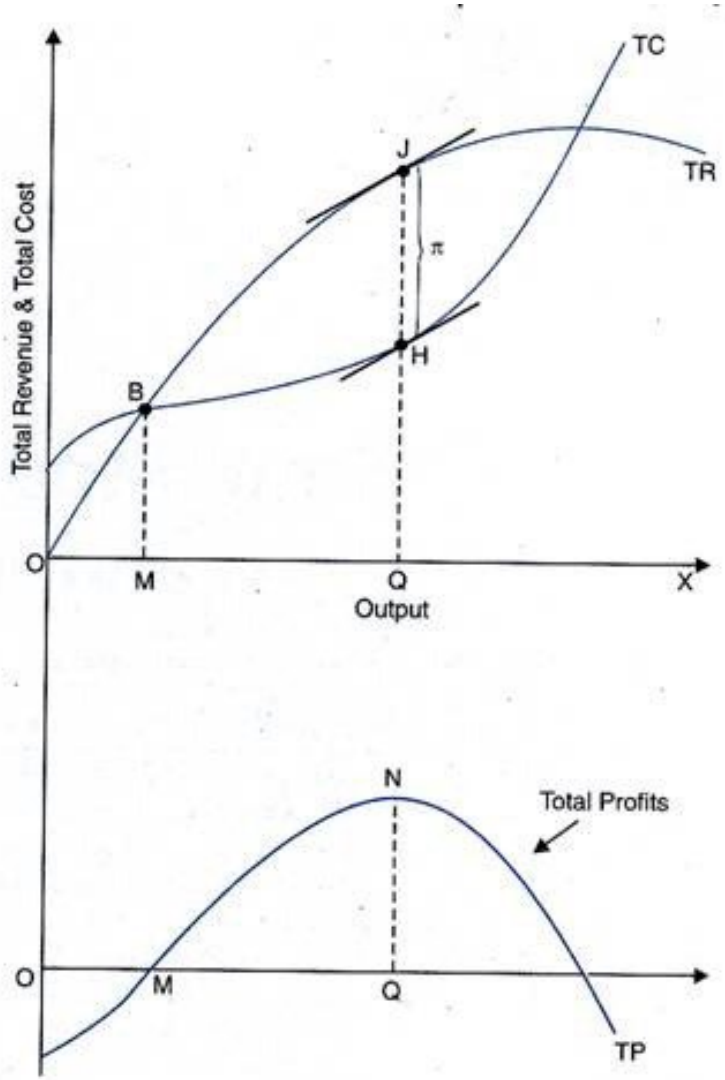


Fig. 2.1. *Profit-Maximising Model of the Firm*

Profit maximization in practice

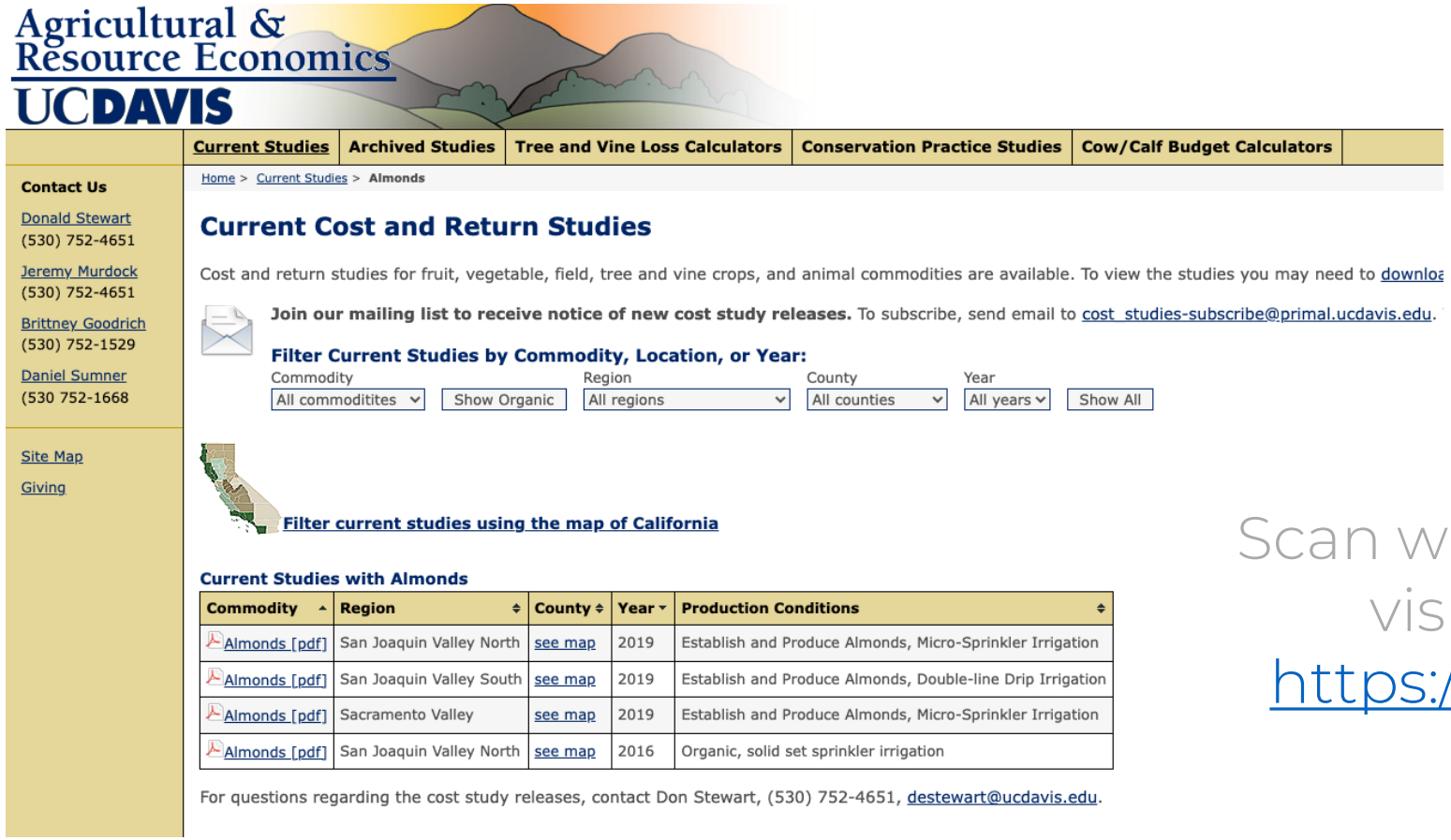
Even more complicated!

Tools to help evaluate profitability:

- UC Davis Cost and Returns Studies
    - Enterprise budgets

- Partial budget analysis: Evaluate changes in a practice

UC Davis Cost and Return Studies



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Site Map
Giving

Home > Current Studies > Almonds

Current Cost and Return Studies

Cost and return studies for fruit, vegetable, field, tree and vine crops, and animal commodities are available. To view the studies you may need to downloa

Join our mailing list to receive notice of new cost study releases. To subscribe, send email to cost_studies-subscribe@primal.ucdavis.edu.

Filter Current Studies by Commodity, Location, or Year:

Commodity: All commoditites | Show Organic | Region: All regions | County: All counties | Year: All years | Show All

Filter current studies using the map of California

Current Studies with Almonds

Commodity	Region	County	Year	Production Conditions
Almonds [pdf]	San Joaquin Valley North	see map	2019	Establish and Produce Almonds, Micro-Sprinkler Irrigation
Almonds [pdf]	San Joaquin Valley South	see map	2019	Establish and Produce Almonds, Double-line Drip Irrigation
Almonds [pdf]	Sacramento Valley	see map	2019	Establish and Produce Almonds, Micro-Sprinkler Irrigation
Almonds [pdf]	San Joaquin Valley North	see map	2016	Organic, solid set sprinkler irrigation

For questions regarding the cost study releases, contact Don Stewart, (530) 752-4651, destewart@ucdavis.edu.

Scan with smartphone camera to visit cost studies website
https://coststudies.ucdavis.edu/

Almond Cost Study Updates

Since 2019:

- Prices down ~30%

- Input prices up**
  - Machine labor: ~4%
  - Non-Machine Labor: ~29%
  - Nitrogen: ~171%
  - Insecticides: ~39%
  - Herbicides: ~127%
  - Fuel: ~48%

- Tighter margins mean maximizing yield may no longer be optimal

**Estimated from current prices in other cost studies in progress

TABLE 3. COSTS AND RETURNS PER ACRE TO PRODUCE ALMONDS
San Joaquin Valley-South 2019

	Quantity/ Acre	Unit	Price or Cost/Unit	Value or Cost/Acre	Your Cost
GROSS RETURNS					
Almonds	3,000	Lb	2 50	7,500	
TOTAL GROSS RETURNS				7,500	
OPERATING COSTS					
Herbicide:				**36**	
Matrix SG	1 50	Oz	14 39	22	
Gramoxone SL	3 00	Pint	3 00	9	
Roundup PowerMax	1 40	Pint	3 75	5	
Fungicide:				**250**	
Liquid Copper Spray	2 00	FlOz	0 87	2	
Bravo Weather Stik	4 00	FlOz	0 45	2	
Quash	7 00	FlOz	10 00	70	
Vanguard WG	10.00	Oz	4 95	50	
Pristine	14 50	FlOz	3 40	49	
Luna Sensation	10.00	FlOz	7 75	78	
Insecticide:				**170**	
Zeal	3 00	FlOz	20 75	62	
Intrepid 2F	24 00	FlOz	2 25	54	
Altacor	4 00	FlOz	10 61	42	
Clinch	1 00	Lb	11 80	12	
Rodenticide:				**9**	
Vertebrate Pest Bait	4 50	Lb	1 92	9	
Custom:				**1,001**	
Pruning (Hand) and Stacking	1 00	Acre	120 00	120	
Shred Prunings	0 25	Hour	110 00	28	
Pollination Fee	2 00	Hive	200 00	400	
Irrigation Pump Test	0 01	Each	200 00	1	
Soil Analysis	1 00	Acre	2 00	2	
Leaf Analysis	2 00	Acre	2 25	5	
Hull Analysis	1 00	Acre	1 00	1	
Hand Poling	4 00	Acre	50 00	200	
Hull/Shell Nuts	3,000 00	Lb	0 07	210	
PCA/CCA Fee (Prod Yrs.)	1 00	Acre	35 00	35	
Irrigation:				**1,277**	
Water SJV south	58.00	AcIn	22 00	1,276	
Water Analysis	0 02	Each	50 00	1	
Fertilizer:				**391**	
UAN32 (32-0-0)	250 00	Lb N	0 45	113	
KTS (0-0-25) 25% w/17% Sulfur	400 00	Lb	0 36	144	
Potassium Sulfate (K_2SO_4)	200 00	Lb	0 49	98	
10-34-0 (Ammonium Phosphate)	117 66	Lb	0 30	35	
Zinc Sulfate 36%	1 00	Lb	0 95	1	
Labor:				**586**	
Equipment Operator Labor	12.33	hrs	25 51	315	
Irrigation Labor	7 25	hrs	17 72	128	
Non-Machine Labor	8 07	hrs	17 72	143	
Machinery:				**200**	
Fuel-Gas	2 57	gal	3 63	9	
Fuel-Diesel	32.98	gal	3 95	130	
Lube				21	
Machinery Repair				39	
Interest on Operating Capital @ 5.25%				67 45	
TOTAL OPERATING COSTS/ACRE				3,987	
TOTAL OPERATING COSTS/LB				1 32	
NET RETURNS ABOVE OPERATING COSTS				3,513	

Partial Budget Analysis

Alternative being considered:				
Additional Costs			**Additional Revenue**	
Reduced Revenue			**Reduced Costs**	
Total additional costs and reduced revenue	$		Total additional revenue and reduced costs	$
Total Net Change in Profit				**$ -**
Per-Acre Net Change in Profit				**$ -**

Partial Budget Analysis

Alternative being considered: Decrease target yield from 4,000 lbs/acre to 3,500 lbs/acre			
Additional Costs		**Additional Revenue**	
Reduced Revenue		**Reduced Costs**	
Reduced yield (500 lbs/acre @ expected price)		Fertilizer? Irrigation? Pollination? Harvest	
Total additional costs and reduced revenue	$	Total additional revenue and reduced costs	$
Total Net Change in Profit			**$ -**
Per-Acre Net Change in Profit			**$ -**

Disclaimer: Consider Any Federal Crop Insurance Policies

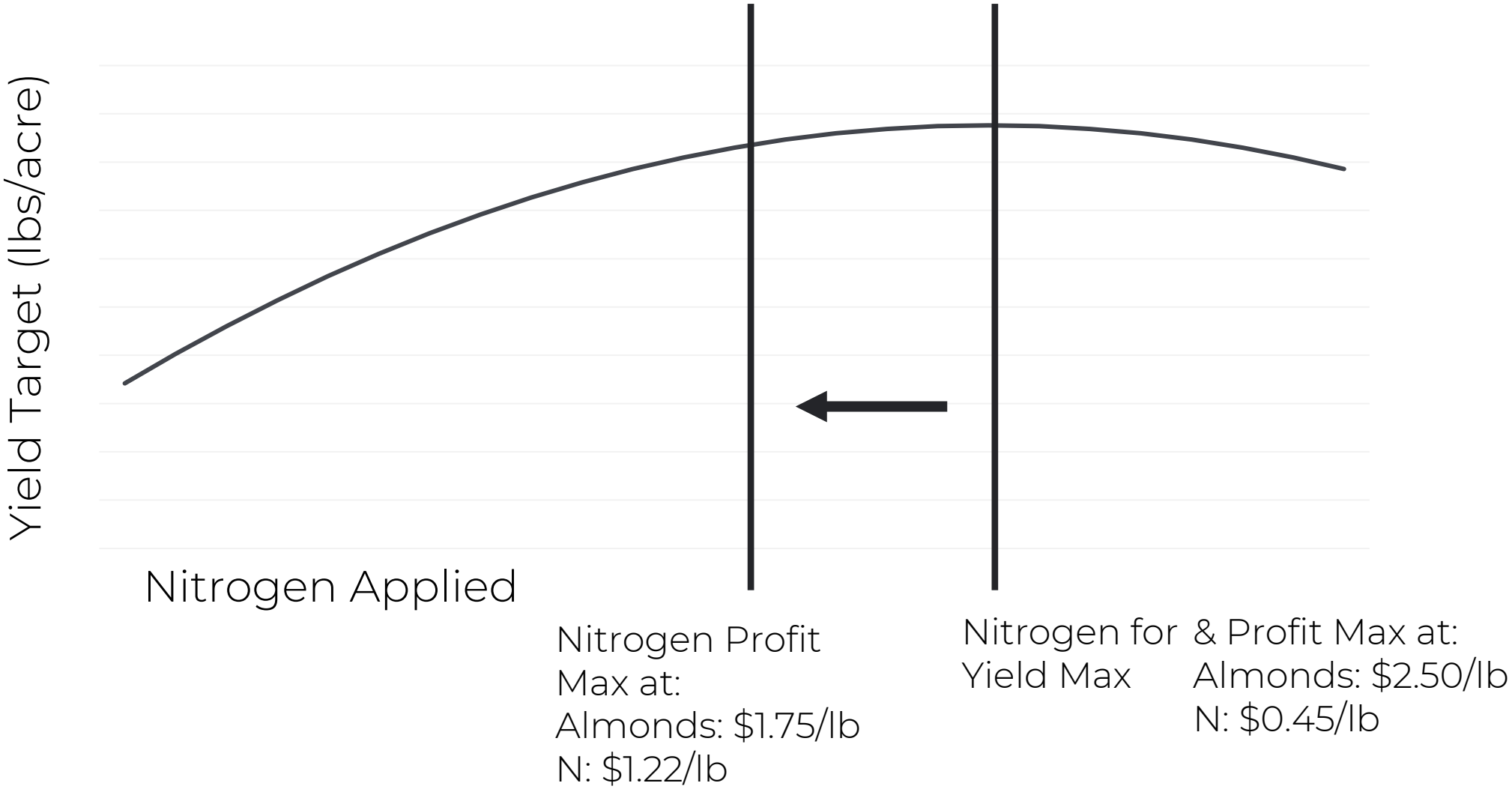
In 2022: 72% of almond acreage insured by USDA RMA

- Crop insurance policies based on prior years' production or Actual Production History (APH)
  - Reducing target yields will reduce APH and level of yield you can insure in future years

- Also, from USDA RMA Almond Crop Provisions:
  - "You must report…
    - Any change in practices, or any other circumstance that may reduce the expected yield below the yield upon which the insurance guarantee is based…"

- Best to check with your crop insurance agent

Optimizing Fertilizer



Maximizing profit in pest management

In Development: NOW IPM Program Comparison Decision Tool

- Allows for cost/benefit comparison of different NOW IPM Programs
- Assumptions:

Labor Costs
- Machine operator: $26.46/hour
- Hand: $22.94/hour

Winter Sanitation Costs
- Shake
- Sweep/blow
- Mow
- Hand pole: 2 hours/acre

Total cost: $309.94/acre

Pesticide Application Costs
- .25 hours/acre at $20.34 per application
- Avg materials cost: $56/acre

Total per application: $76.34/acre

Mating Disruption Costs

$120/acre

Returns
- Price: $1.76 per lb
- Yield: 2210 lbs/acre
- Premium schedule from Blue Diamond 2022 Crop Delivery Information

Maximizing profit in pest management

Holding Damage Constant

NOW IPM Program 1:

- Winter sanitation
- Pesticide Application-Spring
- Pesticide Application-Hull Split

NOW IPM Program 2:

- Winter sanitation
- Mating Disruption
- Pesticide Application- Hull Split

	IPM 1	IPM 2
Winter sanitation	$ 310	$ 310
Pesticide Application	$ 153	$ 77
Mating disruption	$ -	$ 120
Total IPM Cost	**$ 463**	**$ 507**
Percentage Rejects	2.1%	2.1%
Almond Price ($/lb with reject premium/discount)	$ 1.77	$ 1.77
Almond Yield (lbs/acre)	2,164	2,164
Total Revenues	**$ 3,830**	**$ 3,830**

Change from IPM 1 to IPM 2:

Costs: Increase by $43/acre

Revenues: No change

Net: Loss of $43/acre

Maximizing profit in pest management

IPM 2 Less Damage than IPM 1

NOW IPM Program 1:

- Winter sanitation
- Pesticide Application-Spring
- Pesticide Application-Hull Split

NOW IPM Program 2:

- Winter sanitation
- Mating Disruption
- Pesticide Application- Hull Split

	IPM 1	IPM 2
Winter sanitation	$ 310	$ 310
Pesticide Application	$ 153	$ 77
Mating disruption	$ -	$ 120
Total IPM Cost	**$ 463**	**$ 507**
Percentage Rejects	2.1%	1.5%
Almond Price ($/lb with reject premium/discount)	$ 1.77	$ 1.79
Almond Yield (lbs/acre)	2,164	2,177
Total revenues	**$ 3,830**	**$ 3,897**

Change from IPM 1 to IPM 2:

Costs: Increase by $43/acre

Revenues: Increase by $67/acre

Net: Gain of $24/acre

Maximizing profits in pollination

Consider Crop Insurance!

- Failure to use adequate number of bee colonies and/or frames per colony is NOT an insurable cause for loss

- Producer must use *minimum* of two 6-frame colonies per acre (or its equivalent)
  - One 12-frame colony per acre
  - 1.5 8-frame colonies per acre

- Or producer may deviate from minimum IF they verify at least one non-loss year using that number/strength of colonies
  - Flexibility allows for deviation for self-fertile varieties

Source: USDA FCIC Almond Loss Adjustment Standards Handbook, 2019 and Succeeding Crop Years

Alter Hive Density and/or Colony Strength?

But must consider: Will this change yields?

Colony strength category	Hives/Acre	Average Colony Strength Requirement	Pollination Fee $/Hive	Pollination Cost $/Acre	Frames/Acre	
Low	3	4	$ 189	$ 567	12	
	2	6	$ 195	$ 390	12	$
Standard	1.5	8	$ 200	$ 300	12	$
	1.8	8	$ 200	$ 360	14.4	$
	2	8	$ 200	$ 400	16	
High	1.2	10	$ 212	$ 254	12	$
	1.5	10	$ 212	$ 318	15	$
	2	10	$ 212	$ 424	20	

Coming in 2023…

- Updated Almond Cost and Returns Studies
- NOW IPM Comparison Tool
- 2023 Almond Pollination Updated in January Issue of West Coast Nut

Scan with smartphone camera to visit:
https://coststudies.ucdavis.edu/

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WHAT DID YOU THINK?

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