Sustainability: The California Almond Journey

Gabriele Ludwig, Ph.D.

Almond Board of California

17th Australian Almond Conference

Pullman Hotel Melbourne, Albert Park, Victoria

November 8th - 10th, 2016

HOSTED BY:
The Almond Board of Australia

SUPPORTED BY:
Horticulture Innovation Australia Ltd

Dr Gabriele Ludwig

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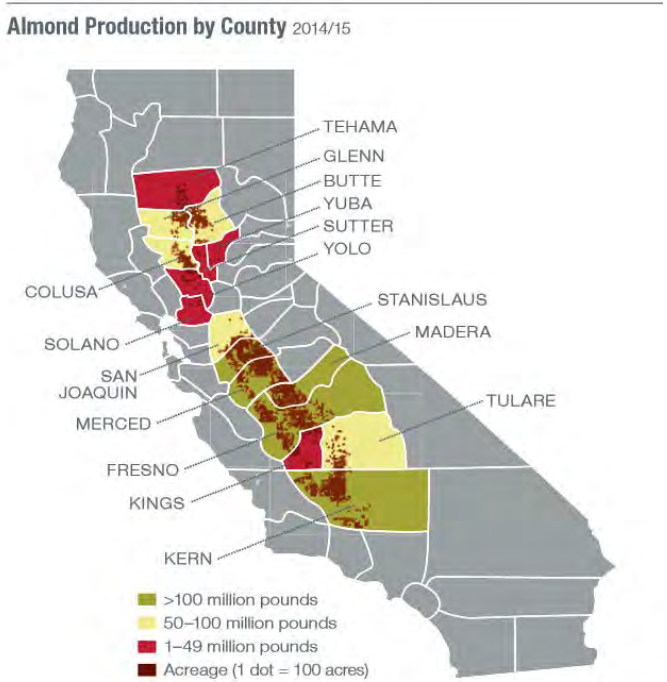
Director, Sustainability & Environmental Affairs, **Almond Board of California**

Gabriele Ludwig has been working for the Almond Board of California for some 11 years. The Almond Board of California is a federal marketing order that focuses on research and generic marketing of almonds and is funded by a grower assessment. At the Almond Board, Gabriele gets to combine her passion for agriculture and the environment with research and policy. As Director for Sustainability and Environmental Affairs, she was instrumental in the development of the California Almond Sustainability Program, and continues to encourage a diverse range of research on almonds and environmental issues.

She is currently a participant of the California Roundtable for Ag and the Environment, Board chair for the non-profit Coalition for Urban/Rural Environmental Stewardship, and serves on several government agencies' advisory committees. Prior to joining the Almond Board, she worked for the consulting firm Schramm, Williams & Associates in Washington, DC. She received her PhD. in plant physiology from the University of California, Davis and her B.A. in Biology from Wellesley College.

The Scope of the California Almond Industry

- Spanning 500 miles (800 km) throughout the Central Valley
  - 2015: 445,154 hectares total
  - 360,170 hectares bearing
- 100% of U.S. production
  - 82% of worldwide production
  - Shipments 67% export; 33% domestic
- $4.8 billion in farm value*
  - California's #1 ag export**
  - Top U.S. specialty export crop
- 97,000 almond industry-related jobs generated in Central Valley,
  - 104,000 statewide***
  - $11 billion contributions to State GDP



Sources:
*USDA Agricultural Statistics Service, Pacific Region (NASS/PR)
**U.S. Department of Commerce, Foreign Trade Statistics
*** *Source: Economic Impacts of the California Almond Industry: UC Ag Issues Center*

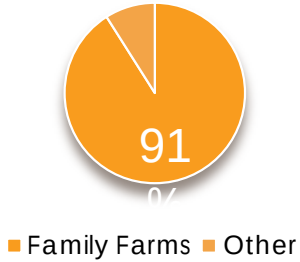
california almonds
Almond Board of California

Diverse Industry: Family Farms

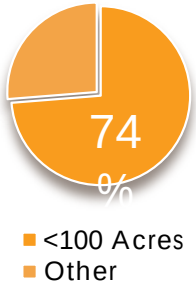
Multigenerational, family farmers are at the heart of California's Almond community.

6,800 almond growers
105 almond processors

More than 90% Family Farms



Nearly 3/4 Under 100 Acres (40.5 ha)



What's New about "Agricultural Sustainability?"

Almond Harvest, 1930

"My family has been farming this ground for four generations – now that's sustainability."

But will your grandchildren be able to do the same? The world is changing…

- More people
- Less land
- More pressure on fewer resources

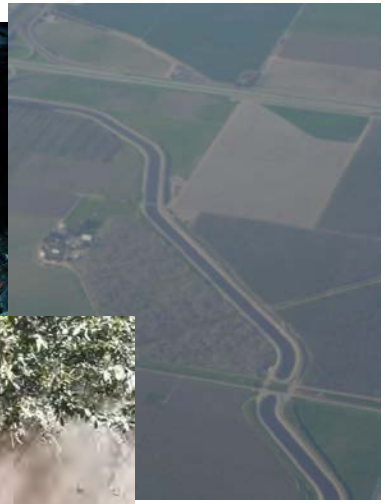
Fortunately, almond growers do adapt...

Rapidly changing world affecting resources and costs

- Water availability
- Arable land
- Energy / Greenhouse gases/ Climate change
- Water quality
- Air quality
- Increasing global p[illegible]

Regulatory Issues Affecting California Almond Growing

- Water Availability
  - Sustainable Groundwater Management Act (SGMA)
  - Endangered Species Act
  - Delta restoration/ SJ River restoration
  - Dam relicensing/ unimpaired flows
- Water Quality
  - Porter Cologne Act
    - Irrigated Lands Regulatory Program
    - CV-SALTs
  - Clean Water Act (TMDLs)
  - Waters of the United States (WOTUS) (aka Clean Water Rule)
- Air Quality
  - Clean Air Act
    - PM2.5, PM10, Ozone (smog), Montreal Protocol (ozone layer depleting substances)
  - AB32 – reduction in Greenhouse Gases


Social License

Definition: The privilege of operating with minimal formalized restrictions (legislation, regulation, or market requirements) based on maintaining public trust by doing what's right.

Public Trust: A belief that activities are consistent with social expectations and the values of the community and other stakeholders.

Source: Charlie Arnot (Center for Food Integrity)

The Social License To Operate

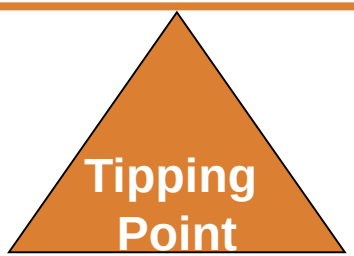
Flexible
Responsive
Lower Cost

Rigid
Bureaucratic
Higher Cost

Social License

- Ethics
- Values
- Expectations
- Self-Regulation

High Trust
Complete Autonomy



Single triggering event
Cumulative impact

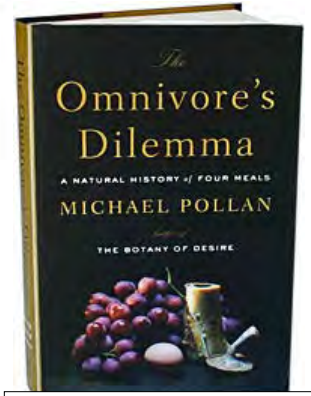
Social Control

- Regulation
- Legislation
- Litigation
- Compliance

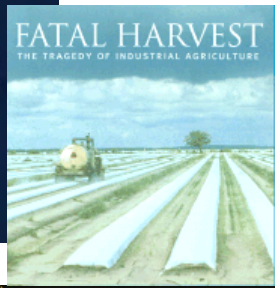
Low Trust
Prohibition

Source: Charlie Arnot (Center for Food Integrity)

Sowing Distrust about Our Food Production Systems



'Industrial Agriculture'



March 20, 2009

Obamas to Plant Vegetable Garden at White House

By MARIAN BURROS

WASHINGTON — Michelle Obama will begin digging up a patch of the South Lawn on Friday World War II. There will be no beets — the president does not like them — but arugula will m

While the organic garden will provide food for the first family's meals and formal dinners, its r vegetables at a time when obesity and diabetes have become a national concern.

"My hope," the first lady said in an interview in her East Wing office, "is that through children

Twenty-three fifth graders from Bancroft Elementary School in Washington will help her dig Obama girls' swing set.)

Millennials (at least the US version)

Desire and expectation from Millennials (next generation almonds users) for:

- A connection to lifestyle brands/products
- Authenticity
- Transparency and ingredient focus
- Health
- Greater good

Millennials are:

- Less trusting of brands
- More willing to switch
- Comfortable with unknown brands & products

➔ Want food that is good for them, good for their community, good for the planet

➔ Almonds are part of sustainable eating lifestyle

1. Health as a prime driver of sustainability
2. If a food is not healthy, it's not sustainable


Hershey's CSR Framework
ENVIRONMENT
Minimize impact while meeting functional requirements
- Sustainable Product Design
- Sustainable Sourcing
- Efficient Business Operations
MARKETPLACE
Engage in fair and ethical business dealings
- Integrity of Supply
- Consumer Well-Being
- Alignment with Customers
Continuing Milton Hershey's legacy of commitment to consumers, community and children, we provide high-quality Hershey products while conducting our business in a socially responsible and environmentally sustainable manner.
COMMUNITY
Positively impact society and local communities where we live and work
- Corporate Philanthropy
- Contribution of Expertise
- Employee Giving & Volunteerism
WORKPLACE
Foster a desirable place to work
- Safety & Wellness at Work
- Openness & Inclusiveness
- Employee Value Proposition
HERSHEY'S
The Hershey Company


Kellogg's
2009 Corporate Responsibility Report—Executive Summary
"Bringing Our Best To You."


16
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.earn more about how we deliver on our commitments
Nestlé
150 Years of Good Food, Good Life
Nutrition, water, rural development, our focus areas
Creating Shared Value
Sustainability
Protect the future
Compliance
Laws, business principles, codes of conduct


Supplier Sustainability Assessment
Walmart
Sam's Club


GENERAL MILLS
Global Responsibility
2016
Health & Wellness
Sustainability
Workplace
Community


MARS
OUR SUSTAINABLE IN A GENERATION APPROACH
Operational efficiency
Capital efficiency
New technology
Renewable energy
2010
2020
2030
2040
The ratios between the four strands of our strategy will change over time as our fossil fuel and greenhouse gas reduction program develops

California Almond Sustainability Program (CASP)

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Research at the Almond Board of California

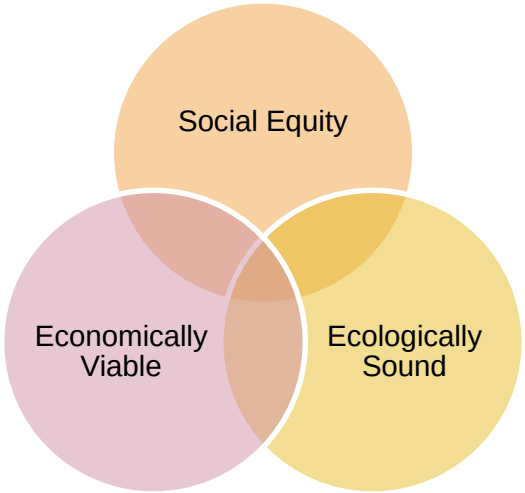
- Consistently funding and executing initiatives since 1973
- Total investment of more than **$50 million** to date.

➔ Tradition of Continuous Improvement

California Almond Industry's Sustainability Definition

Sustainable almond farming utilizes production practices that are economically viable and are based upon scientific research, common sense and a respect for the environment, neighbors and employees.

The result is a plentiful, healthy and safe food product.

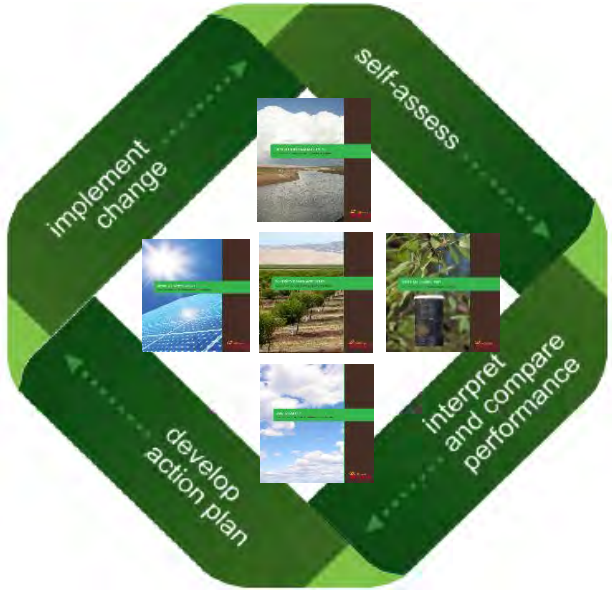


Definition developed using the 3 E's (or P's) and grower focus groups in 2005.

California Almond Sustainability Program (CASP)

- Established in 2009, CASP encourages almond grower and handler self-assessments to track adoption of responsible farming practices
- Current CASP modules
  - Irrigation management
  - Nutrient management
  - Air quality
  - Water quality
  - Energy efficiency
  - Ecosystem
  - Financial management
  - Pest management
  - Workplace and communities

Cycle of Continuous Improvement



Format of Self-Assessment

Ask: Did you use or not use a practice in the most recent growing season

Occasionally ask how much input was applied

Practices asked about were based on research and extension recommendations, other expert sources

Each module was reviewed together by experts and industry members

Nutrient Management

1	How many pounds of nitrogen (N) were applied per acre for this orchard in the season being assessed?	lbs/acre
2	How many pounds of phosphorus (P) were applied per acre for this orchard in the season being assessed? (NOTE: Please use actual P instead of P_2O_5*)	lbs/acre
3	How many pounds of potassium (K) were applied per acre for this orchard in the season being assessed? (NOTE: Please use actual K instead of K_2O*)	lbs/acre
4	What is the percent soil organic matter for this orchard, as measured in the past 5 years**? IF YOU HAVEN'T TESTED FOR THIS, CHECK HERE ☐	%

	For my orchard, I am using the following practices and/or technologies for maximizing nutrient management efficiency:		Not familiar with this	I haven't tried it	I have tried it	My current practice	Not applicable
	SOURCE						
5	The following sources of nitrogen were utilized in this orchard in the past year. (Select all that apply):	a. commercial in-organic nitrogen fertilizer	☐	☐	☐	☐	
		b. manure (not recommended for food safety reasons) ☑	☐	☐	☐	☐	
		c. compost ☑	☐	☐	☐	☐	
		d. nitrogen-fixing cover crops	☐	☐	☐	☐	
6	If compost, manure, or nitrogen-fixing cover crops were used, their nitrogen contribution to the crop was estimated and used in calculating the total nitrogen applied.		☐	☐	☐	☐	☐
7	Irrigation well water (if used) has been analyzed for its nitrogen content at least once during the past 3 years.		☐	☐	☐	☐	☐
	a. If the test indicates the water has nitrogen, the amount of nitrogen applied via irrigation over the season is calculated and used in calculating the total nitrogen applied.		☐	☐	☐	☐	☐

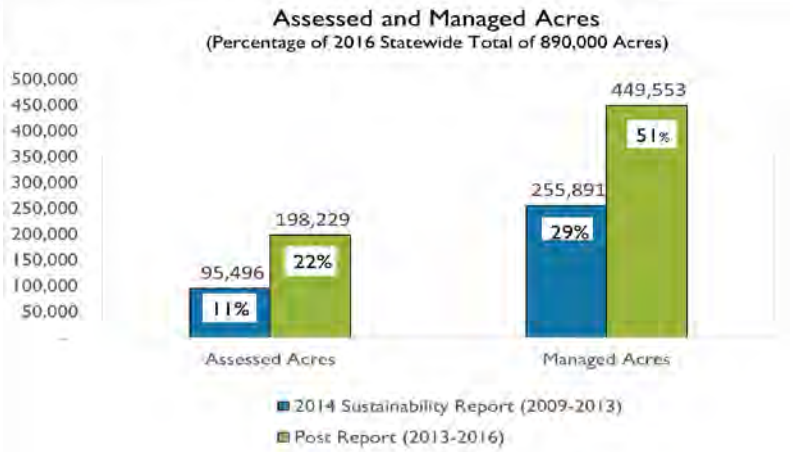
Feedback to Grower

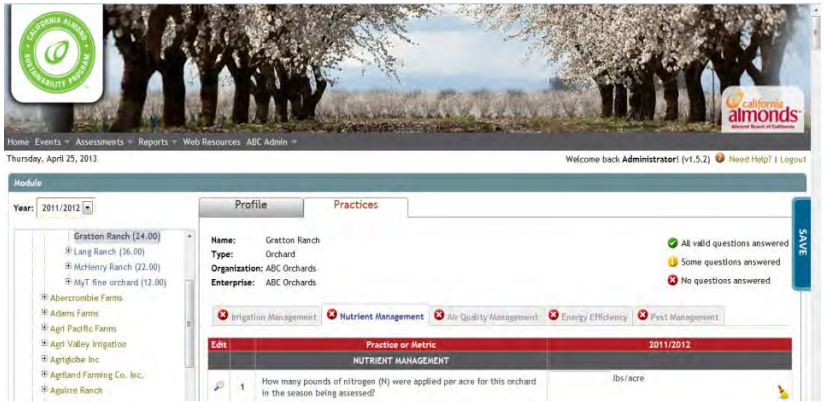
Report comparing grower to other participants

California Almond Sustainability Program — 2010

	Practice or Metric	Your Selection	Use Statewide
	Irrigation Management Module		
	Orchard Establishment		
1	Were you involved in this orchard's establishment? *If No, click "No" and skip to question 16.*	Yes	85.6 %
2	Soil maps (e.g., NRCS soil series or web soil survey) were used to identify potential variations in soil texture, salinity, water holding capacity, or other factors.	Yes	69.7 %
3	Aerial or satellite photos (e.g., Google Earth) were used to identify potential variations in soil texture, salinity, or other factors.	Yes	54.5 %
4	Yield maps from the previous crop (almonds or another crop) were used to identify potential variations in soil texture, salinity, or other factors.	Yes	57.4 %
5	A GPS map of soil characteristics using sensing technology (e.g., EC, Veris® or SIS) was made and used to identify potential variations in soil texture, salinity, or other factors.		25.4 %
6	Backhoe pits were dug or deep auger/core samples were taken (guided by the above and other observed factors) in strategic places to determine:	Yes	
	6a. texture (percent sand, clay, silt) or saturation percentage	Yes	73.0 %
	6b. compaction layers or other soil stratification	Yes	77.5 %
	6c. salinity	Yes	72.3 %
	6d. pH	Yes	75.8 %
	6e. soil organic matter	Yes	66.1 %
7	Deep ripping, slip plowing, or tree hole backhoe pits were dug to address drainage and/or compaction issues (preferably after first testing for these problems).	Yes	90.7 %
8	If suggested by soil sampling, soils were amended to adjust pH, sodicity, salinity, etc. during orchard development.	Yes	80.1 %
9	Soils were amended with organic matter during orchard development.	Yes	44.1 %
10	All water sources were sampled and lab-evaluated for water quality/irrigation suitability.	Yes	76.6 %

Participation to date (as of July, 2016)





Reporting

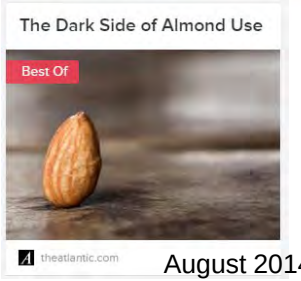
2014 First Report Released

- Based on first 4 years
- Statistical Analysis re representativeness
- Calls out strengths and areas for improvement based on value analysis (which practices have widest impacts used/not used)
- Almond Board has used results for continuing education efforts

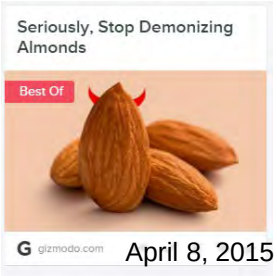
- Next report 2018? See what has changed
- No Third Party Verification to date because of cost

Uses of the Data: Defense

- Through Almond Board research programs, almond farmers have been funding **water efficiency research since 1982** with over **90 projects** funded to date.
- Over the past 20 years, almond growers have improved their water use efficiency by 33%, producing **more crop per drop**.
- **83% of growers practice demand-based irrigation** using a combination of weather data, tree demand data, and/or soil moisture data
- **70% of almond orchards use micro-irrigation**, decreasing water runoff, applying water directly in the root zone, and allowing for precise timing and rate of irrigation.



August 2014

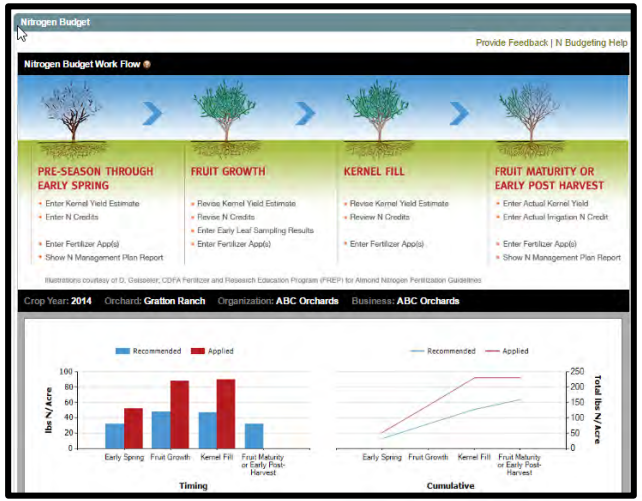


April 8, 2015

July 2015

Use of Data

- Outreach events
  - Bring in experts
  - Demonstrations
  - Calculators (Irrig. and N)
- Regulatory Compliance
  - Required N budgets
  - CUE credits
  - USDA- NRCS funding
- Helping almond customers meet their sustainability needs



What next for the Program?

- Currently updating and streamlining
- Continue to seek additional participation/ re-assessments every 3 years
- Continue to ensure valued in the supply chain
- Continue to seek ways to increase value to growers
- Review endorsement/verification/certification options
- Assess relevance and value of other measures of sustainability e.g. LCA (have for energy and GHG), water, N footprints, etc.

Thank you!

Questions?

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