Sustainability and Almonds: Where are We?

Gabriele Ludwig
Almond Board of California

Jeff Dlott
SureHarvest

Tim Birmingham
Almond Board of California
Rapidly changing world affecting resources and costs

The world is changing...

• More people
• Less land
• More pressure on fewer resources
  ➔ Increased production costs

Fortunately, almond growers are adept at adapting!

Almond harvest: 1939 2009
Rapidly Changing World:
Almonds - With Increased Size Comes Increased Scrutiny

Almonds are:
# 2 crop in total acreage in California
# 3 crop in total value in California
# 1 crop in export value in California

⇒ MUCH MORE VISIBLE
ABC Strategic Environment

A Crop of Choice

Almond farming in California is considered by all to be a crop that is good for the state and the country, and has a long term comparative, competitive advantage versus other countries of origin.

The Nut of Choice

The use and consumption of almonds is considered essential to global importers, manufacturers, product developers, marketers, retailers, and consumers.
So, why a Sustainability Program?

For Almonds to be a crop of choice to grow:

Need to continue to learn about and share practices to improve production efficiencies (profits)

- Optimize the efficient use of natural resources (e.g., water, nutrients, energy)

- Optimize the efficiency of field operations (e.g., pest management, harvest)

→ AND document almond growers’ thoughtfulness
So, why a Sustainability Program?

To be a Crop of Choice need buyers and the license to operate

Need for transparency of production practices in the marketplace

Need for conveying accurate production information to public policy makers and regulatory agencies

➡️ To Document and Tell the Almond Story!
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.
California Almond Sustainability Program

Five self-assessment modules;
- Irrigation Management
- Nutrient Management
- Energy Management
- Pest Management
- Air Quality

Drafted:
- Financial Management
- Ecosystems Management
- Water Quality (integrated into existing modules)
- Social Responsibility (HR/ Neighbors) next

www.sustainablealmondgrowing.org
Sustainability and Almonds: Where are We?

Jeff Dlott
SureHarvest
Sustainability Trends
and the
2014 Almond Sustainability Report

Jeff Dlott, Ph.D.
Outline
Sustainability Trends: Business View
Sustainability Trends

1. Sustainability Being Embedded into Overall Strategy

2. Greater Emphasis on Value Creation
   - Reduce Costs
   - Grow Sales
   - Manage Risks
   - Enhance Brand

3. “More with Less” is Becoming a Need to Have not a Nice to Have
   - Real Resource Constraints (e.g. water, land, etc.)

4. Trust and Transparency More Important than Ever
Sustainability as Strategy?

“Doug McMillon Elected New Chief Executive Officer of Wal-Mart Stores, Inc.”

“A merchant at heart, Doug has…a keen sense of where our customers globally are heading next.

He has also shown strong leadership on environmental sustainability and a commitment to using Walmart's size and scale to make a difference...”

Rob Walton
chairman of Walmart's board of directors
November 25, 2013
Trend 1: Strategy & Sustainability
Launched 20-years ago – first global survey of executives’ behavior and attitudes of management tools

More than 1,200 global executives interviewed for this 14th report
### Top 10 Management Tools

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### Strategy and Benchmarking Top Management Tools
SUSTAINABILITY FROM THE GROUND UP

**Top 10 Management Tools**

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<tr>
<th>Year</th>
<th>Strategic Planning</th>
<th>Benchmarking</th>
<th>CRM</th>
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**HBR Spotlight**

**Strategy & Society**
The Link Between Competitive Advantage and Corporate Social Responsibility

by Michael E. Porter and Mark R. Kramer

HARVARD BUSINESS REVIEW • HBR.ORG • DECEMBER 2006

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**California Almonds**
Almond Board of California

**Day 2: Wednesday, December 4**
Crop of Choice Overview

**Day 2: Wednesday, December 4**
Nut of Choice Overview
Focus on Competitive Advantage

HBR Spotlight

Strategy & Society
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by Michael E. Porter and Mark R. Kramer

# 1 Retailer

# 1 Specialty Crop

DAY 2: WEDNESDAY, DECEMBER 4
CROP OF CHOICE OVERVIEW

DAY 2: WEDNESDAY, DECEMBER 4
NUT OF CHOICE OVERVIEW

CALIFORNIA ALMOND SUSTAINABILITY PROGRAM™
Trend 2: Sustainability and Value Creation
2. Greater Emphasis on Value Creation

Create and Sustain Value

- Reduce Costs
- Grow Sales
- Manage Risks
- Enhance Brand

Best Practices

Analyze if value is generated by implementing the practices
Value Analysis & Mapping for the Farm

Useful for Agriculture?

- Reduce Costs
- Grow Sales
- Manage Risks
- Enhance Brand
Grower Economic Value Generation

- Reduce Costs
- Manage Risks
- Enhance Brand

- Water Use Efficiency
- Nutrient Use Efficiency
- Energy Use Efficiency
- Pesticide Use Efficiency
- Optimize Yields
- Sustain High Quality or Improve Quality and Consistency
- Meet Air Quality Compliance Standards
- Simplify Efforts to Document and Communicate Sustainability BMPs to Buyers, Regulators and other Stakeholders

PEST MANAGEMENT ECONOMIC IMPACTS: STRENGTHS
The top six ways that growers are saving money through pest management practices (% of orchards):

- Mummy Nut Removal: 84%
- Sprayer Off for Row Turns: 94%
- Sprayer Adjustments by Growth Stage: 78%
- Reduced Orchard Roadway Dust: 93%
- Timely Sprayer Calibration: 92%
- Reduced Nut Damage Through Timely Pickup: 98%
Environmental Value Generation

- Conserve Resources
- Sustain & Enhance Biodiversity
- Minimize Environmental Impacts

- Water Use Efficiency
- Increase Use of Renewable Energy Sources
- Utilize Integrated Pest Management
- Enhance Soil Quality
- Enhance Pollinator Diversity and/or Abundance
- Minimize Particulate Matter
- Minimize Greenhouse Gases
- Minimize Harmful Ozone Precursors
- Minimize Nutrient Loss
- Minimize Soil Loss
- Minimize Pesticide Off-Farm Movement

WATER USAGE ENVIRONMENTAL IMPACTS: STRENGTHS
The top three ways that almond growers conserve water while protecting the environment (% of assessed orchards):

- Integrated Fertilization and irrigation: 73%
- Demand-Based Irrigation: 83%
- Optimized Irrigation Infrastructure: 80%
Trend 3: Producing More with Less
“Food production will have to increase by 70% over the next 40 years in order to meet soaring demand”

UN Food and Agriculture Organization
**SUSTAINABILITY FROM THE GROUND UP**

**NUTRIENT MANAGEMENT ECONOMIC IMPACTS: STRENGTHS**

The top six ways that growers are saving money through nutrient management practices (% of orchards):

- Integrated Fertilization and Irrigation: 73%
- Demand-Based Irrigation: 88%
- Optimized Fertilization: 78%
- Retained Nutrients in Root Zone: 92%
- pH Adjustments for Nutrient Availability: 80%
- Multiple Nitrogen Applications: 90%

**Crop Nutrient Status & Demand in Almond: Patrick Brown**

Development of Leaf Sampling Methods & Nutrient-Budget Fertilization

Patrick Brown, Salfal Muhammad and Sebastian Son Silva

**NUTRIENT MANAGEMENT ECONOMIC IMPACTS: OPPORTUNITIES**

The top six ways growers could increase savings through nutrient management practices (% of orchards):

- Variable-Rate Fertilization Technology: 22%
- Real-Time Crop Evapotranspiration: 43%
- Nutrient Management Plan: 40%
- Enhanced Infiltration Through Tillage: 20%
- Retained Nutrients via Soil Enhancements: 44%
- Calculated Nitrate in Well Water: 59%
Trend 4:
Trust and Transparency
Transparent Actions Lead to Trust
Sustainability Trends and the 2014 Almond Sustainability Report

- Sustainability Becoming Embedded into Overall Strategy
- Greater Emphasis on Value Creation
  - Reduce Costs
  - Grow Sales
  - Manage Risks
  - Enhance Brand
- “More with Less” is Becoming a Need to Have not a Nice to Have
  - Real Resource Constraints (e.g. water, land, etc.)
- Trust and Transparency More Important than Ever
Summary: Trends and ABC CASP

Your Confidential Benchmark Report

WATER USAGE ECONOMIC IMPACTS: STRENGTHS
- Integrated Fertilization and Irrigation: 73
- Demand-Based Irrigation: 83
- Optimized Irrigation Infrastructure: 80
Sustainability and Almonds: Where are We?

Gabriele Ludwig
Almond Board of California
Transforming CASP Data for Strategic Use

Participant Data

Interpretation

Strategic Use

Value Mapping

Topics (incl. cross-module)
Rapidly Changing World: Almonds - With Increased Size Comes Increased Scrutiny

- Water use/ground water pumping impacts on local communities
- Harvest dust complaints
- “Monoculture” of Almonds
- Pesticide use around honey bees (Movie “More than Honey”)

Merced County is sinking; researchers blame over-pumping of groundwater

BY J.N. SBRANTI
jnsbranti@modbee.com November 21, 2013

Martin Sullivan: Almond harvest too dusty
Published: October 22, 2013

MID: Wells threaten soil in Stanislaus County
As Stanislaus County supervisors received a glowing report Tuesday on the surge of almond production, a couple of blocks away irrigation leaders somberly discussed the downside. Tuesday, July 23, 2013 at 10:10 PM
14. Year-round orchard floor management resulted in a smooth and level orchard floor to optimize harvest efficiency and minimize dust. 87.7%

15. Operators of sweepers and pickup machines have been trained in techniques to reduce dust. 72.8%

16. To reduce dust, the sweeper head was set at the manufacturer-recommended height (not lower). 79.3%

17. The sweeper head used tines made of wire instead of rubber/plastic. 55.7%

18. Sweepers designed to minimize passes and reduce dust were used. 64.6%

19. When near sensitive surroundings (roads, homes, etc.), conventional pickup machines were driven at reduced speeds and were positioned to discharge debris into the orchard, away from sensitive surroundings. 83.6%

20. Speeds for separator fans on conventional pickup machines were lowered (e.g., 910 rpm instead of 1,080 rpm). 46.1%
What happens in the field affects the market

A Crop of Choice

The Nut of Choice
Sustainability and Almonds: Where are We?

Tim Birmingham
Almond Board of California
2014 Almond Sustainability Report
ALMOND SUSTAINABILITY REPORT

2014

ENVIRONMENTAL IMPACTS:
 OPPORTUNITIES

Where & how products are harvested, these practices, they provide opportunities to reduce energy consumption through more efficient pumping and irrigation management, and with technology and practices such as manure injection and lower-boring rate for any installed variable-speed drives, can lead to a 50% more efficient than regular motors, and 30% lower energy consumption. In addition, use of real-time energy monitoring allows and computer-optimized irrigation to determine and implement more efficient methods to improve crop performance and thus energy use efficiency.
Sustainability Report

• Represents data collected from 2009 - August, 2013
• 1,080 individual participants
  – 575 participants submitted assessments
• 638 Orchards Assessed
• 95,496 acres assessed – represents 255,891 acres
• Details the collective practices
• Calls out strengths and areas for improvement
INTRODUCTION

This is the first California Almond Sustainability Program (CASP) Industry-Wide Report. It details the comprehensive use of best management practices (BMPs) by California Almond growers who have participated in the program by voluntarily assessing and reporting practices on their orchards. This Almond Sustainability Report is the result of more than five years of planning, development and implementation efforts, and is based on more than four decades of grower innovation and research supported by the Almond Board of California (ABC) to define grower profitability, environmental stewardship and market growth.

CASP was officially launched as a program of ABC in the fall of 2008 when the first five growers completed their assessments. ABC has invested and continues to invest in the creation of self-assessment tools that enable growers and handlers to better document and communicate their use of BMPs, and to identify potential opportunities to create additional economic, environmental and community value.

The statewide results presented in the following pages demonstrate that an almond farm in the Central Valley of California is an embodiment of the expectation “The whole is greater than the sum of its parts.” Sustainability is about looking at the whole system.

This report highlights the interrelated nature of farming, in which implementing one practice can have positive (or negative) effects on other practices and their environmental and economic outcomes.

The interrelatedness of topics and practices will be apparent after reading the chapter summaries. For example, efforts that optimize water use efficiency may reduce energy use through reductions in the pumping of water. This, in turn, improves air quality because less fuel is consumed to pump the water. Integrated pest management practices that reduce insecticides or dormant-season spraying reduce fuel consumption and related emissions due to fewer equipment passes, and fewer applications reduce the likelihood of off-site pesticide movement because less pesticide is applied. And, use of facilitation and variable-rate fertilizer applications, which place the right amounts of nutrients in the trees' root zone at the right time, results in less fertilizer applied and less to the environment, improving the quality of groundwater and surface water.

The California Almond Sustainability Program has drawn from and has become more integrated into Almond Board programs such as Production and Environmental Research, Industry Services, Nutrition Research, Regulatory Affairs and Global Market Development. Production Research has funded research projects that have resulted in dramatically improved yield and production efficiency in almond orchards. Many of these projects have also advanced environmental stewardship, such as increased water use efficiency, nutrient use efficiency and reduced pesticide risk.

Results of this work formed the basis for many BMPs, which have been incorporated into the CASP assessment tools to provide a path to improved production practices. ABC has used its outreach capabilities to increase CASP participation, thereby delivering the results of production and environmental research to growers and handlers, while insights from CASP have also been integrated into conversations with key regulatory and customer stakeholders.

CASP has become a vital and influential program due to substantial grower and handler participation. The CASP assessment tools not only enable participant self-assessment but also serve as a guide and handler educational resources to improve production and processing practices.

About the California Almond Sustainability Program (CASP)

CASP is guided by the following sustainability definition, developed with almond growers and handlers in 2008, and subsequently adopted by the Almond Board:

Sustainable almond farming utilizes production practices that are economically viable and are based upon scientific research, common sense and respect for the environment, neighbors and employees. The result is a plentiful, healthful, safe food product.

CASP has been designed, and continues to evolve, to include the integrated components of grower and handler assessment of practices and metrics; the identification, reporting and communication of results; and the application of results for targeted education and continuous improvement.
Report is divided into four main topic areas:

1. Energy
2. Air Quality
3. Water
   - Usage
   - Quality
4. Land
   - Nutrient Management
   - Pest Management
   - Bees
Across topic areas report based on three main categories and grower practices:

• Environmental impacts
  – Overview
  – Strengths
  – Opportunities

• Economic impacts
  – Overview
  – Strengths
  – Opportunities

• Detailed Analysis
• 1. Energy
  – Environmental impacts
    » Overview
    » Strengths
    » Opportunities
  – Economic impacts
    » Overview
    » Strengths
    » Opportunities
  – Detailed Analysis

• 2. Air Quality

• 3. Water
  – Usage
  – Quality

• 4. Land
  – Nutrient Management
  – Pest Management
  – Bees
2. Air Quality
   - Environmental impacts
     » Overview
     » Strengths
     » Opportunities
   - Economic impacts
     » Overview
     » Strengths
     » Opportunities
   - Detailed Analysis

3. Water
   - Usage
   - Quality

4. Land
   - Nutrient Management
   - Pest Management
   - Bees
1. Energy
2. Air Quality
   - Detailed Analysis
3. Water
   - Usage
   - Quality
4. Land
   - Nutrient Management
   - Pest Management
   - Bees
   » Environmental and Economic impact overview
Let’s look at one topic area – Energy (Pages 12-13)

Intended to provide brief overview of Energy practices impact on the Environment

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis
Strengths and Opportunities: Energy Environmental Impacts (Pages 14 -15)

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis
Strengths and Opportunities - Energy: Environmental Impacts

- Strengths - The top 6 ways that growers protect the environment through energy management practices

- Opportunities – The top 6 ways that growers could improve on practices that impact the environment
Intended to provide brief overview of Energy practices impact on the Environment

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis
Strengths and Opportunities: Energy Economic Impacts (Pages 18-19)

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis
Strengths and Opportunities - Energy: Economic Impacts

- **Strengths** - The top 6 ways that growers save money through energy management practices

- **Opportunities** – The top 6 ways that growers could improve on practices that will increase savings
Detailed Analysis – Energy (Pages 20-24)

- Environmental impacts
  - Overview
  - Strengths
  - Opportunities
- Economic impacts
  - Overview
  - Strengths
  - Opportunities
- Detailed Analysis
Detailed Analysis - Energy

- Describes in detail the key practices that impact the environment and generate economic value
• Repeated for each of the 4 topic areas
The Missing Piece – Data Repository

- Separate report
- Includes all questions from each sustainability module
  - Sample size
    - % “Yes” answers
    - % “No” answers
    - Variations of no
    - Relevancy to different baseline chapters
- Complete 1st Quarter 2014

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<th>RELEVENCY TO TOPIC AREAS</th>
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