
THE ALMOND CONFERENCE
50
YEARS

50 YEARS of The Almond Conference

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We Want to Hear from You!

The Almond Board is conducting research to understand your experiences, perceptions and needs/wants of The Almond Conference. This information will improve future conferences. During the conference, we'll conduct several focus group sessions and short individual interviews.

Focus Group Sessions

These will be in Room 15 (Level 2–across from Ballroom B-5) during the following times:

Wednesday, December 7, 2022

- 9:30–10:30 a.m.
- 11:45 a.m.–12:45 p.m.
- 4:00–5:00 p.m.

Thursday, December 8, 2022

- 10:30–11:30 a.m.

If you are interested in being a part of the focus group, please use this QR code to select a time!

Short Individual Interviews

Throughout the conference, Vivayic, the research organization, will also ask select attendees about their conference experiences.

Vivayic will have a neon yellow ribbon on their name badges that says, **"Tell me more."**

Please take a few moments to provide your insights if asked.

OPENING RECEPTION

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3:30 – 5:00 p.m.
Almond Conference Expo

THE ALMOND CONFERENCE

50 YEARS

Almond Food Quality & Safety Resources

December 6, 2022

Moderator: Miranda Thomas (ABC)
Speakers: Guangwei Huang (ABC)
Tim Birmingham (ABC)

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Almond Board of California

AGENDA

01. INTRODUCTION

02. RESOURCE OBJECTIVES & VISION

03. ABC INVENTORY

04. STAKEHOLDER INTERVIEWS

05. NEW RESOURCES

06. WHAT'S TO COME

PANEL INTRODUCTIONS

Tim Birmingham
Almond Board of California
Director, Quality Assurance and Industry Services

Career Highlights

- Over 25 years of experience in food processing, product quality, process validation, food safety and microbiology.
- Implementation of the mandatory treatment program for California almonds and Pre-Export Checks program for aflatoxin control, and the development of validation guidelines within the low moisture food industry.
- Maintains industry relationships such as FSMA and serves part of the U.S. Delegation on the Codex Committee on Food Hygiene.
- Liaison for ABC's Food Quality and Safety Services Committee and its food quality and safety research portfolio.

Guangwei Huang
Almond Board of California
Associate Director, Food Research and Technology

Career Highlights

- Over 30 years of experience in food safety, quality assurance and preservation, processing, product innovation and application, co-product upcycling, and harvesting technologies.
- Developed validation guidelines for implementation of the almond mandatory pasteurization rule and educates food professionals on product use.
- Member of IFT, IAFP, and AACC, an Executive Board of Director for Subcommittee of China Snack Foods.
- Liaison for ABC's Biomass Workgroup, direct and manage research for Food Quality and Safety Services Committee, and the Strategic Ag Innovation Committee.

OBJECTIVE

Easily accessed comprehensive technical information on almond quality & safety

AUDIENCE

- QA/QC, Food Safety professionals
- Almond handlers
- Food manufactures
- Roasters & packers
- Traders, importers, retailers
- Product developers

AQFS RESOURCES

PHASE I- EVALUATION

1. CREATE AN EXTENSIVE INVENTORY LIST OF ABC QUALITY AND FOOD SAFETY RESOURCES.
2. IDENTIFY OUTDATED RESOURCES.
3. REVIEW WEBSITE CONTENT AND LOCATION OF RESOURCES.

INVENTORY CATEGORIZATION

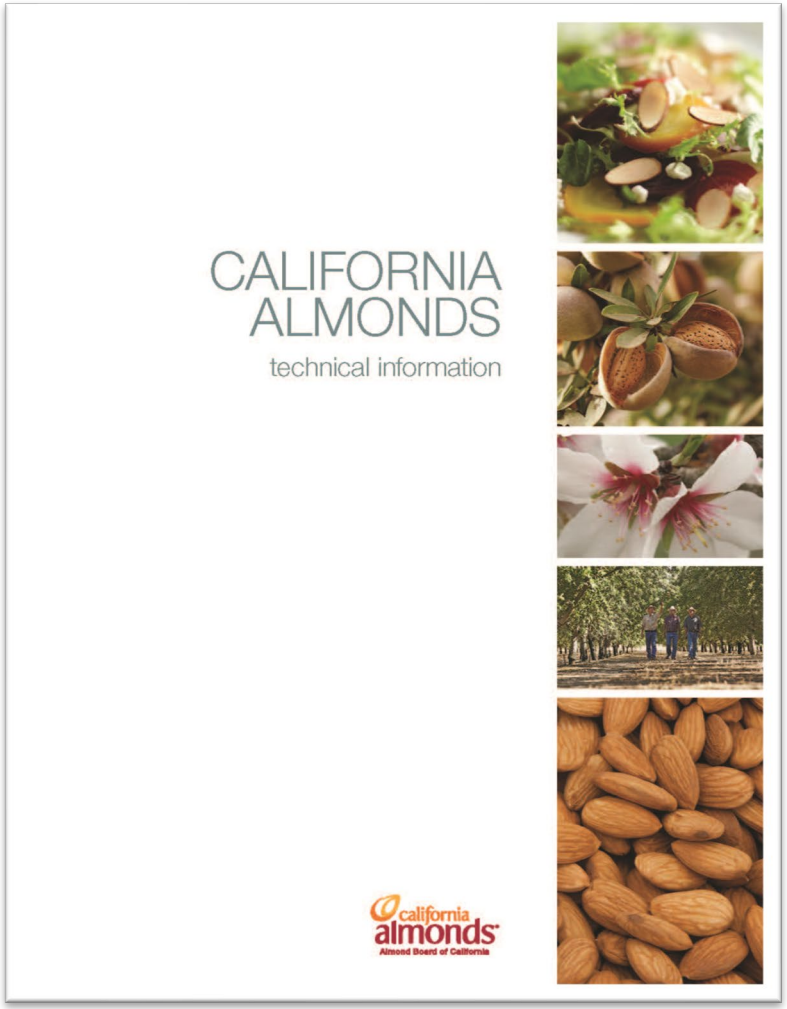
FOOD SAFETY

Pasteurization	PEC & Aflatoxin	FSMA
Food Facility Programs	GAPs	Other Concerns

ALMOND QUALITY

Grades & Standards	Almond Composition	Almond Sensory
Roasting	Shelf Life	Stockpile Management

TECH KIT TRANSLATED VERSIONS



AQFS RESOURCES

PHASE II - INTERVIEWS

1. CONDUCT A SERIES OF INTERVIEWS WITH INDUSTRY STAKEHOLDERS.

2. FURTHER DEFINE AUDIENCE.

3. FORMATS OF DOCUMENTS.
   - FACTSHEETS
   - PODCASTS
   - POWERPOINTS
   - VIDEOS
   - POSTERS/CARDS
   - VALIDATION GUIDELINES

STAKEHOLDERS

01. BLUE DIAMOND
02. DERCO
03. HARRIS WOOLF
04. HERSEY
05. INTERSNACK
06. THE ALMOND COMPANY
07. PROCESS AUTHORITIES

KEY TAKEAWAYS FROM INDUSTRY MEMBERS

VALUES

- TECHNICAL TOOL KIT
- POSITION REPORT

AUDIENCE

- CUSTOMERS
- NEW EMPLOYEES

NEEDS

- USDA GRADES & STANDARDS SUMMARIES
- GRADING PROCESS EXPLANATION
- UPDATED VALIDATION GUIDELINES
- ONGOING TECHNICAL RESOURCES
- MAXIMIZING SHELF LIFE
- ROASTING OF ALL FORMS

TARGET AREAS

- PASTEURIZATION
- HCN
- ACRYLAMIDE
- 4-LOG VS 5-LOG
- PESTICIDES
- CONCEALED DAMAGE
- SALMONELLA

AQFS RESOURCES

PHASE III

1. DRAFT NEW RESOURCES.
2. REORAGANIZATION OF ALMONDS.COM.

AVAILABLE NOW

ALMOND QUALITY RESOURCES

GUANGWEI HUANG

1. GRADES & STANDARDS: grade chart, poster
2. ALMOND COMPOSITION
3. ALMOND SENSORY: Volatile research, sensory evaluation procedure
4. ROASTING: Podcast, Roasting Q&A, Deep Dive, Research updates
5. SHELF-LIFE: Moisture calculator, Q&A, Impact Factors
6. STOCKPILE MANAGEMENT: Best Practices

ALMOND SENSORY PROPERTIES

READING SLIDES

ALMOND SENSORY

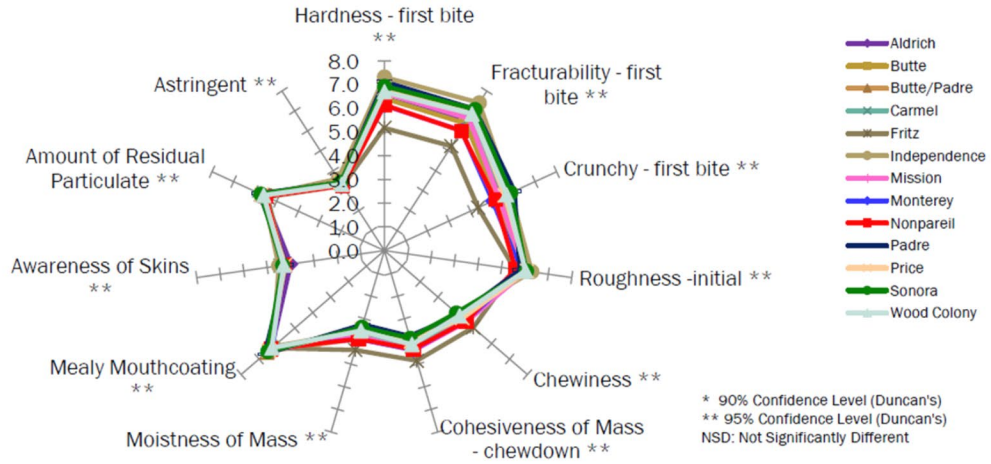
What are the sensory attributes of almonds?

How does almond variety affect sensory characteristics?

This slidedoc summarizes the latest learnings obtained from research projects funded by the Almond Board of California

Guangwei Huang
Associate Director
Food Research and Technology

Hardness, fracturability, crunchy, cohesiveness and moistness of mass show greater variation than other **texture** attributes among almond varieties



9 Adapted from COVANCE 2017 report to ABC, Descriptive Analysis of Almonds

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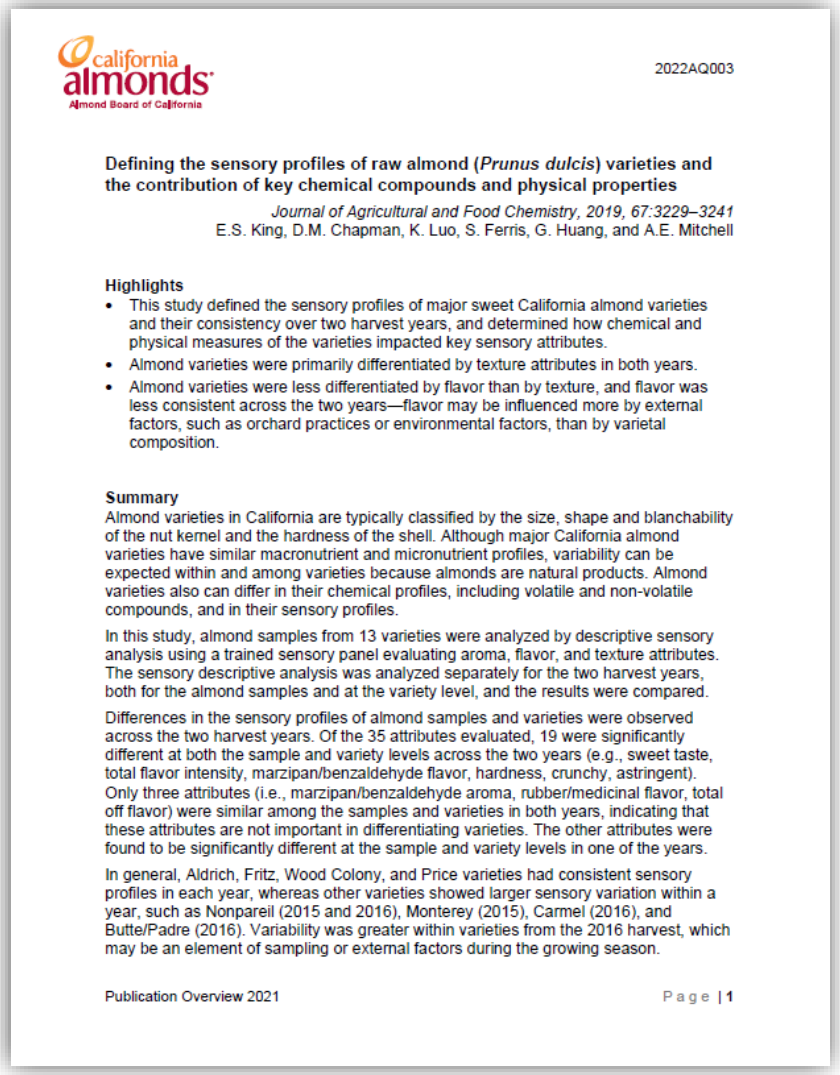
ALMOND SENSORY

Profile Paper Summary



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2022AQ003

Defining the sensory profiles of raw almond (*Prunus dulcis*) varieties and the contribution of key chemical compounds and physical properties

Journal of Agricultural and Food Chemistry, 2019, 67:3229–3241
E.S. King, D.M. Chapman, K. Luo, S. Ferris, G. Huang, and A.E. Mitchell

Highlights

- This study defined the sensory profiles of major sweet California almond varieties and their consistency over two harvest years, and determined how chemical and physical measures of the varieties impacted key sensory attributes.
- Almond varieties were primarily differentiated by texture attributes in both years.
- Almond varieties were less differentiated by flavor than by texture, and flavor was less consistent across the two years—flavor may be influenced more by external factors, such as orchard practices or environmental factors, than by varietal composition.

Summary

Almond varieties in California are typically classified by the size, shape and blanchability of the nut kernel and the hardness of the shell. Although major California almond varieties have similar macronutrient and micronutrient profiles, variability can be expected within and among varieties because almonds are natural products. Almond varieties also can differ in their chemical profiles, including volatile and non-volatile compounds, and in their sensory profiles.

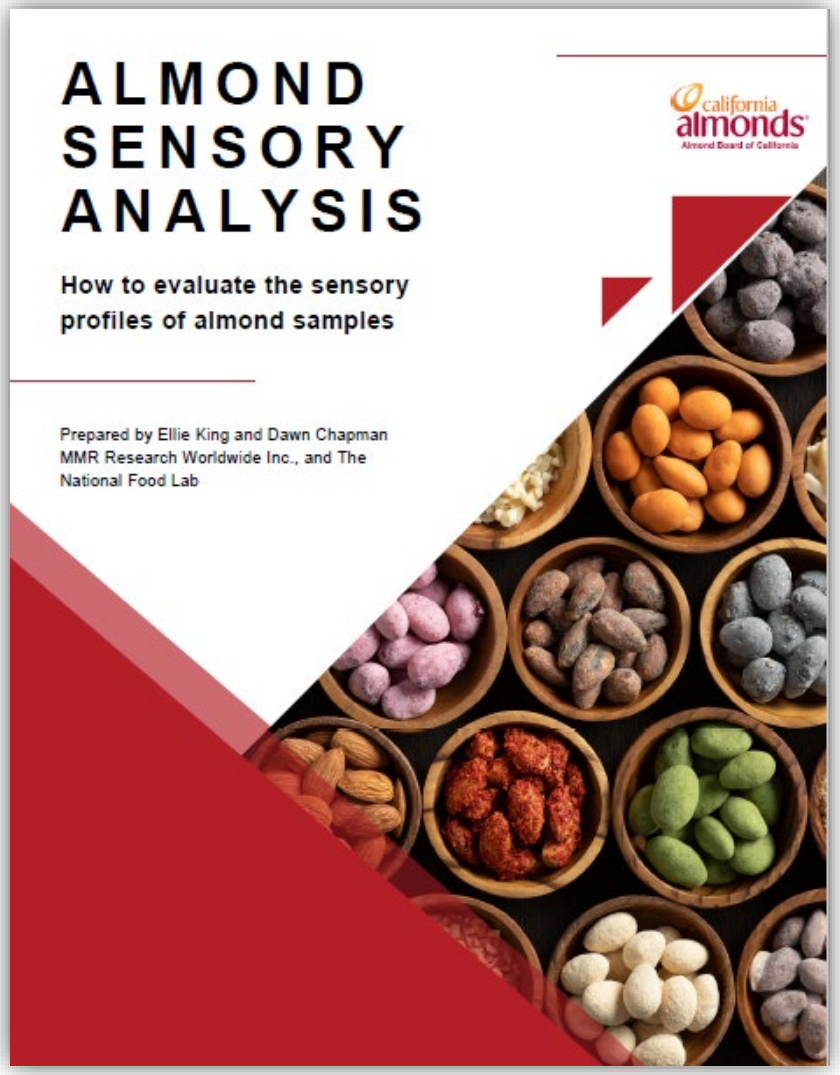
In this study, almond samples from 13 varieties were analyzed by descriptive sensory analysis using a trained sensory panel evaluating aroma, flavor, and texture attributes. The sensory descriptive analysis was analyzed separately for the two harvest years, both for the almond samples and at the variety level, and the results were compared.

Differences in the sensory profiles of almond samples and varieties were observed across the two harvest years. Of the 35 attributes evaluated, 19 were significantly different at both the sample and variety levels across the two years (e.g., sweet taste, total flavor intensity, marzipan/benzaldehyde flavor, hardness, crunchy, astringent). Only three attributes (i.e., marzipan/benzaldehyde aroma, rubber/medicinal flavor, total off flavor) were similar among the samples and varieties in both years, indicating that these attributes are not important in differentiating varieties. The other attributes were found to be significantly different at the sample and variety levels in one of the years.

In general, Aldrich, Fritz, Wood Colony, and Price varieties had consistent sensory profiles in each year, whereas other varieties showed larger sensory variation within a year, such as Nonpareil (2015 and 2016), Monterey (2015), Carmel (2016), and Butte/Padre (2016). Variability was greater within varieties from the 2016 harvest, which may be an element of sampling or external factors during the growing season.

Publication Overview 2021 Page | 1

Sensory Evaluation Protocol

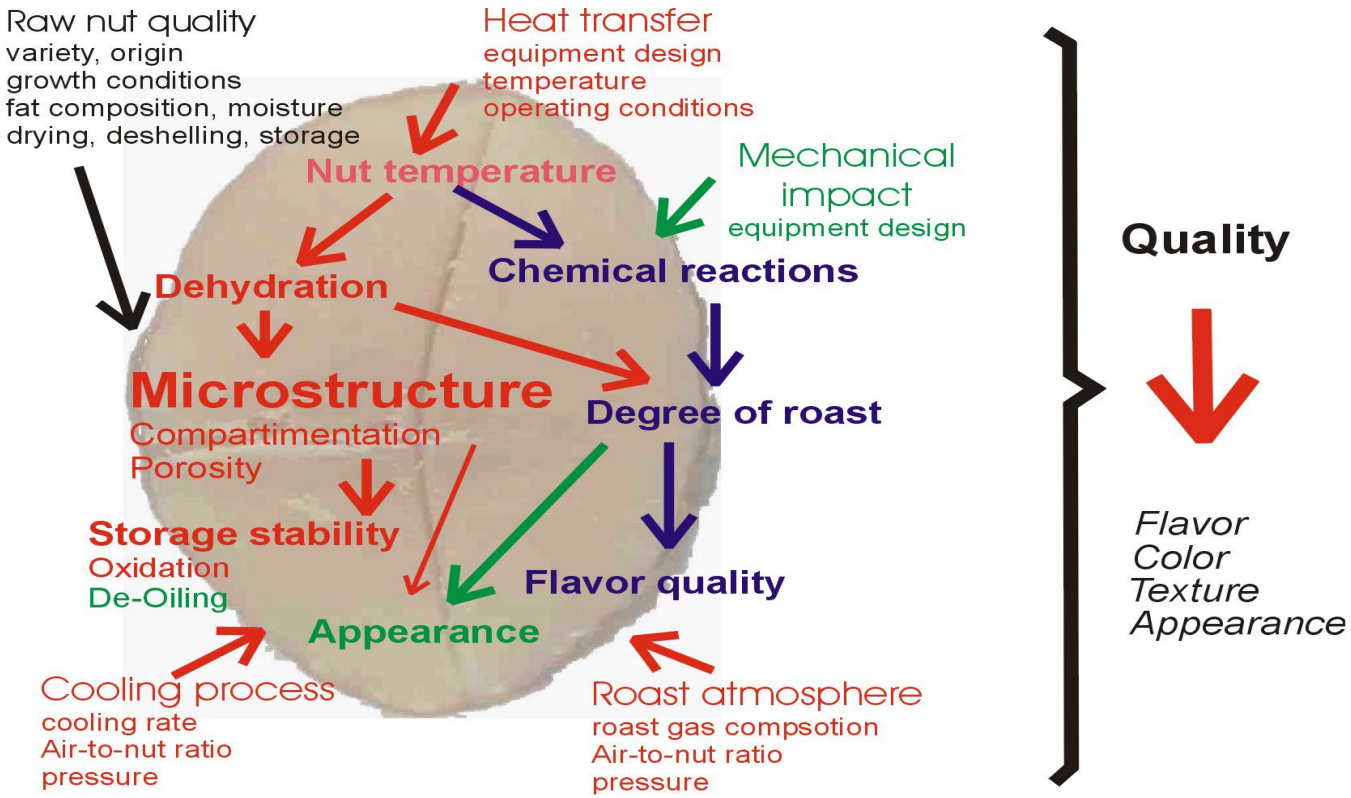


ALMOND ROASTING – Audio PowerPoint

Roasting Process, Flavor and Sensory Properties, Roasting Optimization

Objectives:
- Dehydration
- Develop desired flavor, texture, color

Impact Factors:
- Quality of infeed
- Roasting parameters
- Roasting equipment
- Heating means, distribution, speed
- Cooling timing and speed



ALMOND SHELF LIFE – Audio PowerPoint

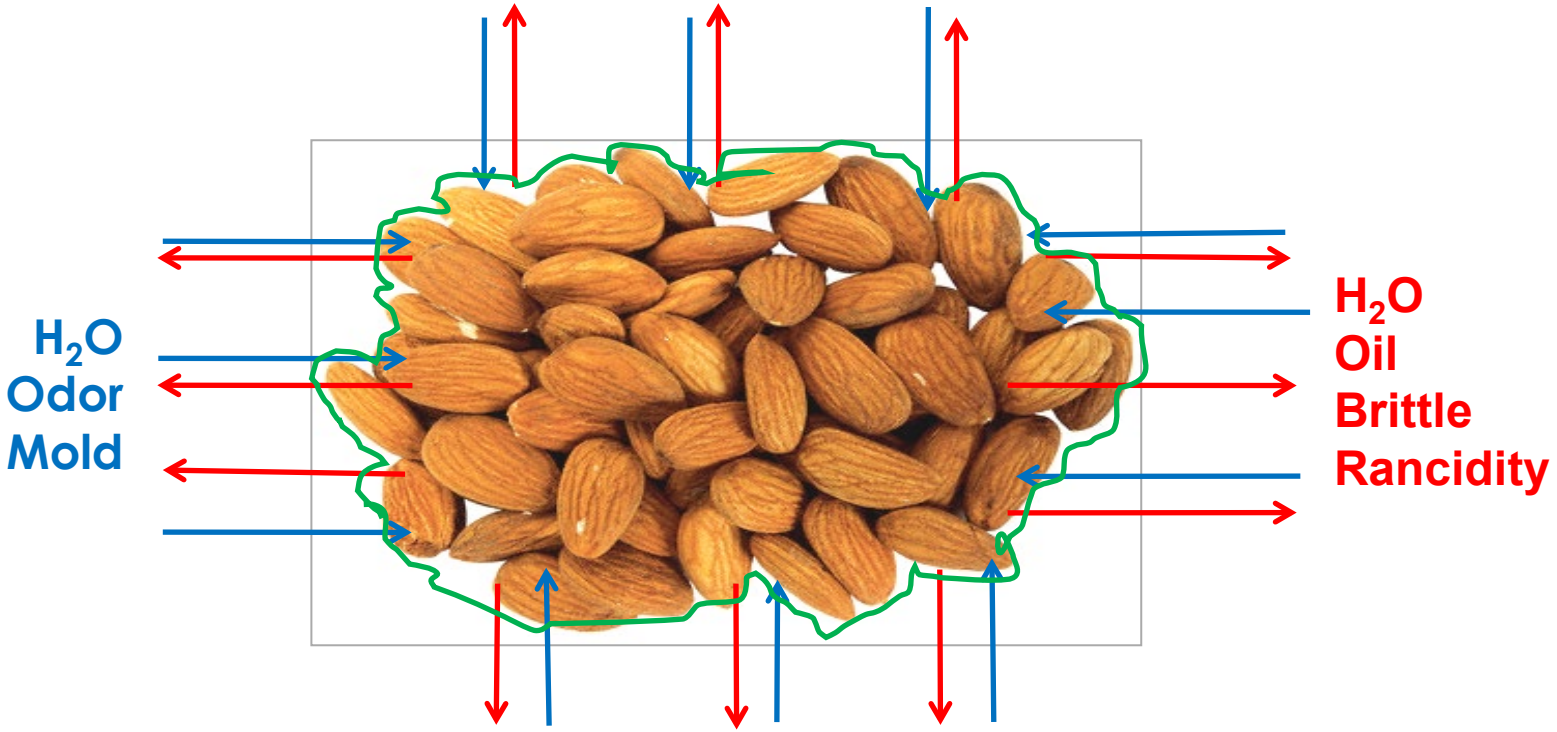
Includes: Almond Property, Quality Change Over Storage, Shelf-life Determination, Recommendations

Almond Properties Changes with Environmental Conditions

Temperature, humidity, packaging, processing conditions affect quality (oil migration, water migration, flavor fading, etc.)

Environment: Temperature ↓↑

Humidity ↑↓



- Store under cool and dry conditions (<15°C/59°F and <60% relative humidity)
- Maintain almond moisture at 3 to 5.5% for optimal stability
- Use packages with good barrier properties against water and air transmission, and prevent infestation, to maximize shelf life when affordable and feasible
- Avoid exposure to light and adjacent materials with extraneous odors

ALMOND SHELF LIFE

READING SLIDES

ALMOND QUALITY PRESERVATION AND SHELF LIFE

How do storage conditions affect almond shelf life potential?

What is the projected shelf life of almonds under different storage and packaging conditions?

This slidedoc summarizes the latest learnings obtained from research projects funded by the Almond Board of California

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Guangwei Huang
Associate Director
Food Research and Technology

Quality deterioration begins with increased moisture

At moisture >8% (RH >75%):

- Stimulates biological activities and texture changes; accelerates lipid oxidation, enzymatic activities, and non-enzymatic browning
- Mold growth may be visible in less than 3 weeks

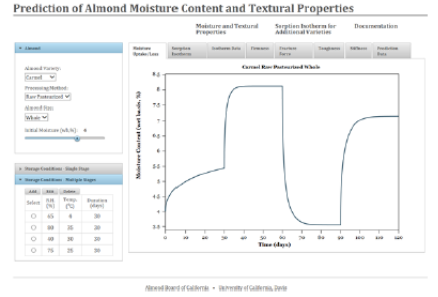
At moisture 6–8% (RH 65–75%):

- Texture deterioration; lipid oxidation; enzymatic and non-enzymatic browning occur but at a slower rate than at RH >75%
- Soggy texture is apparent; quality changes vary with temperature

Almond moisture levels increase at elevated humidity, leading to texture deterioration and release of free fatty acids that initiate oil oxidation, resulting in rancidity development. High temperatures accelerate textural and chemical changes.

- An online model is available to predict the effects of environmental RH on almond moisture content and the impact on texture

Almond (almonds.com)



6 Sources: Taitano et al. (2012), J. Food Proc. Eng. 35: 840-850; Taitano & Singh (2012), Int. J. Food Studies 1(1): 61-75; Lin et al. (2012), J. Food Sci. 77(6): 583-593.

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EXTENDED STORAGE OF STOCKPILING

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Technical Bulletin:

Stockpiling for Extended Storage of Inhull Almonds

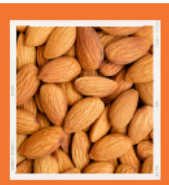
Stockpiling at both the farm and huller/sheller is a common and essential practice that allows the almond industry to process large volumes of inhull almonds harvested in a short period. When stockpiling is properly managed, it can be a practical step for storage of volume that is unable to be hulled and/or shelled immediately after harvest. However, stockpiling product with excessive moisture levels, due either to harvesting immature or "green" product, or due to weather events during the harvest can lead to product loss due to mold growth or aflatoxin contamination, quality degradation and infestation. The key to successful stockpile management is to control moisture content and insects, which requires commitment and close coordination among growers and hullers/shellers. The growers need to deliver well-dried nuts, while the hullers/shellers must effectively manage the stockpiles to prevent insect activities and to protect the dried nuts from condensation, rainfall, and water runoff.

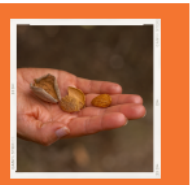
Critical Moisture Levels for Almond Harvest and Stockpiling

Excessive moisture levels in harvested almonds will adversely impact kernel stability and food safety. Testing the moisture content of the kernels and/or hulls is an important tool for assessing dryness and is key to safe stockpiling. The following tables show various levels of moisture found in almond kernels or hulls that have the same wetness condition.

- An **average** moisture content of 6%, or 12% for kernels, or hulls, respectively, is recommended for stable long-term stockpile storage.

Kernels	Hulls
Less than 6%	Less than 12%





- An **average** moisture content range of 6-9%, or 12-17% for kernels, or hulls, respectively, is marginal. Extended storage for nuts within this range will lead to quality deterioration or development of concealed damage, a quality degradation that is revealed by discoloration at roasting or blanching. The higher the moisture content, the faster the deterioration. At this range, inhull nuts need to be processed promptly to allow the kernels to be dried.

Kernels	Hulls
6-9%	12-17%

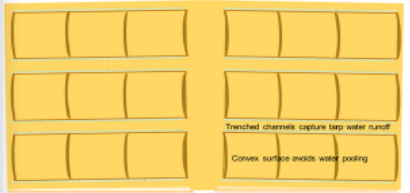
- An **average** moisture content of greater than 9%, or 17% for kernels, or hulls, respectively, will result in substantial damage if the nuts are not promptly dried. Nuts at this moisture level, are not suitable for stockpiling.

Kernels	Hulls
Greater than 9%	Greater than 17%

- A moisture content of 11%, or 22% for kernels, inhull nuts, or hulls, respectively, **even among a small portion of nuts** in a lot is dangerous. At this moisture level aflatoxin-producing molds will grow rapidly and aflatoxin contamination will occur. Due to little or no air circulation in a stockpile, any high-moisture nuts will create a wet spot or pocket that can promote mold growth. A lot with even a small quantity of nuts at this moisture level shouldn't be picked up and delivered for stockpiling. Almonds with these moisture levels should be allowed to dry within the orchard or on open ground, or sent to drying facilities immediately upon harvest if picked up and removed from the orchard.

Kernels	Hulls
Greater than 11%	Greater than 22%

Make trenches or drainage channels along both sides of each zone to capture rainfall runoffs from the stockpile tarp and channel it away from the stockpiles.



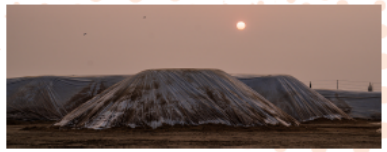
Receiving Dried Almonds

- Work closely with growers to assess moisture levels and variations of almond nuts in orchards.
- Schedule trailer pickup when an average moisture of the nuts across an orchard or lot is below the safe level.
- Take several samples from various locations of each truckload to make a composite sample for moisture verification.
- For the truckloads without pre-pickup moisture testing, the composite sample may be divided into 3 subsamples for moisture testing.
- Select or pick up some wet nuts with wet hull appearance spotted from a truckload to measure moisture.
- Select stockpiling strategy based on verified moisture levels from the two sets of samples.

Making Stockpiles

- Try to further separate debris and dust from the field-runs at trailer offloading.
- Place well-dried nuts with an average kernel moisture content of <6% in those prepared north/south oriented zones to form stockpiles with a long trapezoid shape.
- Smooth or even the tops of stockpiles to eliminate and reduce the number of valleys.
- Cover the stockpile with white-on-black tarp or similar type of reusable thick tarp. White tarps may be an alternative, while clear tarps trap heat, causing large temperature fluctuations and condensation, should be avoided if it's for extended stockpiling.

- Place or introduce sufficient amounts of fumigants following label instructions and seal the surrounding tarp onto the ground with soils or socks of sand.



Monitoring and Managing Stockpiles

- Keep records of nut moisture contents of the truckloads making up each stockpile.
- Track the inventory of all stockpiles with moisture levels, locations, identified concerns, etc. to decide processing priorities.
- Check insect activities to verify fumigation efficacy one week after initial fumigation.
- Uncover tarp for quick aeration if any condensation is observed from the initial stockpiling.
- Re-cover stockpile and seal the tarp.
- Check for evidence of condensation and pest activities periodically, once weekly or biweekly. Some commercially available sensor technologies could be useful tools for routine monitoring of insect activities and humidity (condensation) inside a stockpile.
- Refumigate the stockpile if there is evidence of infestation.
- For a stockpile of well-dried nuts with the right tarp, condensation shouldn't be a concern. However, if condensation or high humidity (>58% rH, equivalent to a kernel moisture level of >6%) spots or zones are noticed, a quick aeration should be done.

FOOD SAFETY RESOURCES

TIM BIRMINGHAM

1. UNPASTERUIZED – RAW PRODUCT
2. 4 LOG PASTERUIZATION CRITERIA
3. HCN FACT SHEET
4. AFLATOXIN RESOURCES

Unpasteurized – Raw Product

Why "Salmonella Free" COA's do not make sense

- Still lack of understanding around raw agricultural commodities and microorganisms
  - Presence of pathogens to be expected at low levels in raw agricultural commodities
- Customer requests for "*Salmonella* Free" COA's
  - Costly
  - Are not sufficient to ensure 100% pathogen free
- Testing of incoming raw agricultural commodities
  - Creates challenges if/when positive is detected

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2022

UNPASTEURIZED - RAW PRODUCT

Raw agricultural commodities such as nuts can be contaminated by microbial pathogens such as *Salmonella* which are found in the environment and can be transmitted through the soil, water or other means. This has been confirmed through survey work demonstrating a low level prevalence of pathogens such as *Salmonella* in different raw agricultural commodities including almonds.

Given the low level pathogen prevalence found in raw products, testing of raw (unpasteurized) almonds for the presence of *Salmonella* or other pathogens is not recommended and provides no benefit to food safety. Low level pathogen prevalence should be expected. Rather than relying on a negative pathogen Certificate of Analysis (COA), an appropriate pathogen reduction step should be applied by the almond supplier, a custom processor, or the end user manufacturer.

California almond shipments which have not be subjected to a pasteurization treatment are clearly labeled as "Unpasteurized." Almonds labeled as such have not been subjected to a process for microbial reduction. **If almonds are not pasteurized prior to purchase, the Almond Board of California recommends an appropriate pathogen reduction treatment be applied prior to introduction into retail/consumer channels.** This can include validated processes such as blanching, steam/moist heat, roasting, or fumigation.

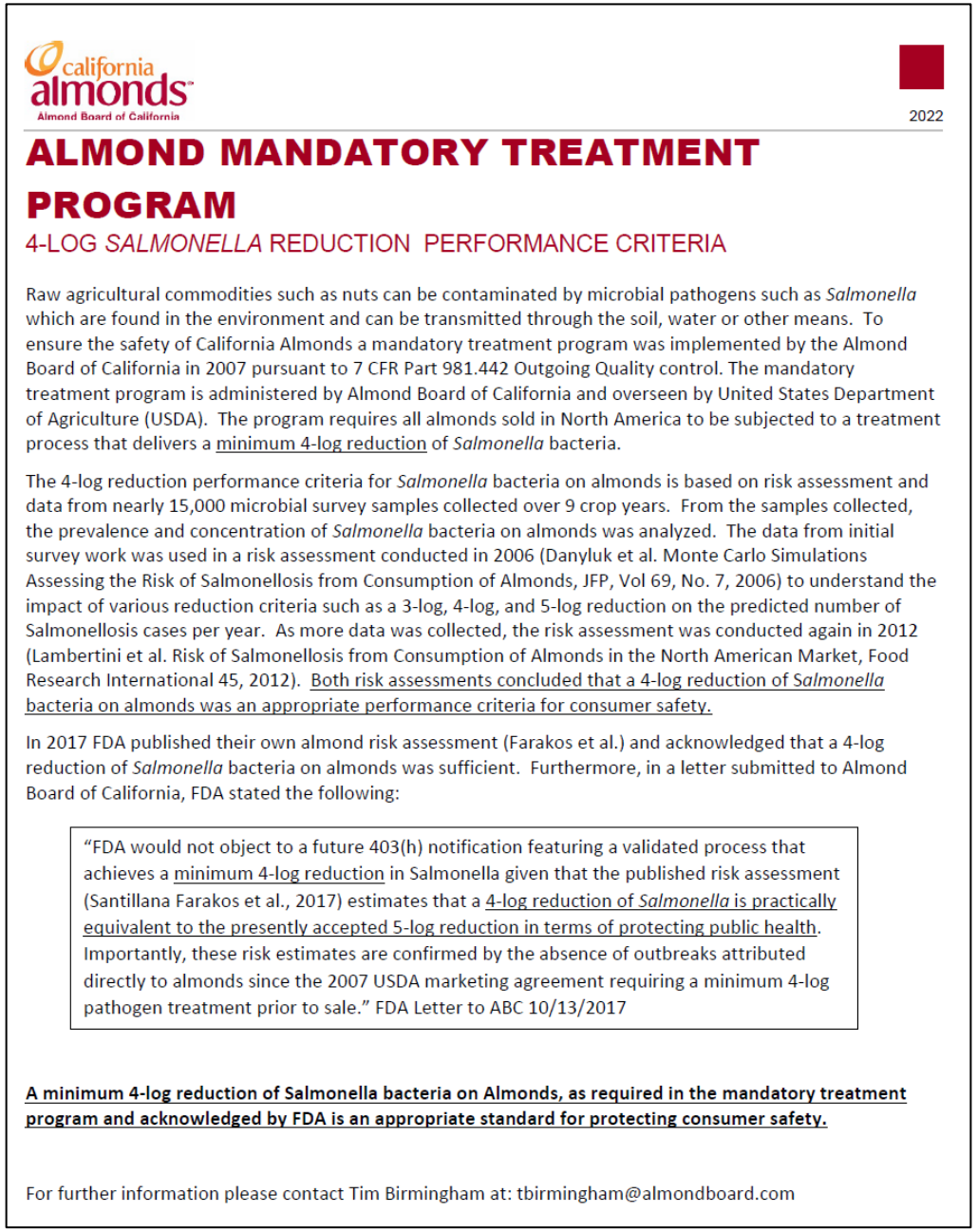
In addition, hygienic practices to manage possible post-process contamination are essential. After pasteurization additional precautions must be taken to minimize the potential for post-process contamination between raw and treated product. Additional safety measures should be applied during subsequent manufacturing and packaging to avoid cross contamination from other foods or processing lines.

Additional information be found at: http://www.almonds.com/processors/processing-safe-product/pasteurization

4 Log Pasteurization Criteria

Why 4 log vs. 5 log reduction standard

- 4-log standard for almond mandatory treatment program
  - Risk assessment basis
  - Low *Salmonella* prevalence and concentration
- 2017 FDA Risk Assessment
  - Acknowledged that 4-log was sufficient for food safety
- 10/13/2017 FDA Letter to ABC
  - Acknowledged that a 4-log reduction is practically equivalent to a 5-log reduction in terms of public health
  - Would not object to 4-log reduction submissions



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2022

ALMOND MANDATORY TREATMENT PROGRAM

4-LOG *SALMONELLA* REDUCTION PERFORMANCE CRITERIA

Raw agricultural commodities such as nuts can be contaminated by microbial pathogens such as *Salmonella* which are found in the environment and can be transmitted through the soil, water or other means. To ensure the safety of California Almonds a mandatory treatment program was implemented by the Almond Board of California in 2007 pursuant to 7 CFR Part 981.442 Outgoing Quality control. The mandatory treatment program is administered by Almond Board of California and overseen by United States Department of Agriculture (USDA). The program requires all almonds sold in North America to be subjected to a treatment process that delivers a minimum 4-log reduction of *Salmonella* bacteria.

The 4-log reduction performance criteria for *Salmonella* bacteria on almonds is based on risk assessment and data from nearly 15,000 microbial survey samples collected over 9 crop years. From the samples collected, the prevalence and concentration of *Salmonella* bacteria on almonds was analyzed. The data from initial survey work was used in a risk assessment conducted in 2006 (Danyluk et al. Monte Carlo Simulations Assessing the Risk of Salmonellosis from Consumption of Almonds, JFP, Vol 69, No. 7, 2006) to understand the impact of various reduction criteria such as a 3-log, 4-log, and 5-log reduction on the predicted number of Salmonellosis cases per year. As more data was collected, the risk assessment was conducted again in 2012 (Lambertini et al. Risk of Salmonellosis from Consumption of Almonds in the North American Market, Food Research International 45, 2012). Both risk assessments concluded that a 4-log reduction of *Salmonella* bacteria on almonds was an appropriate performance criteria for consumer safety.

In 2017 FDA published their own almond risk assessment (Farakos et al.) and acknowledged that a 4-log reduction of *Salmonella* bacteria on almonds was sufficient. Furthermore, in a letter submitted to Almond Board of California, FDA stated the following:

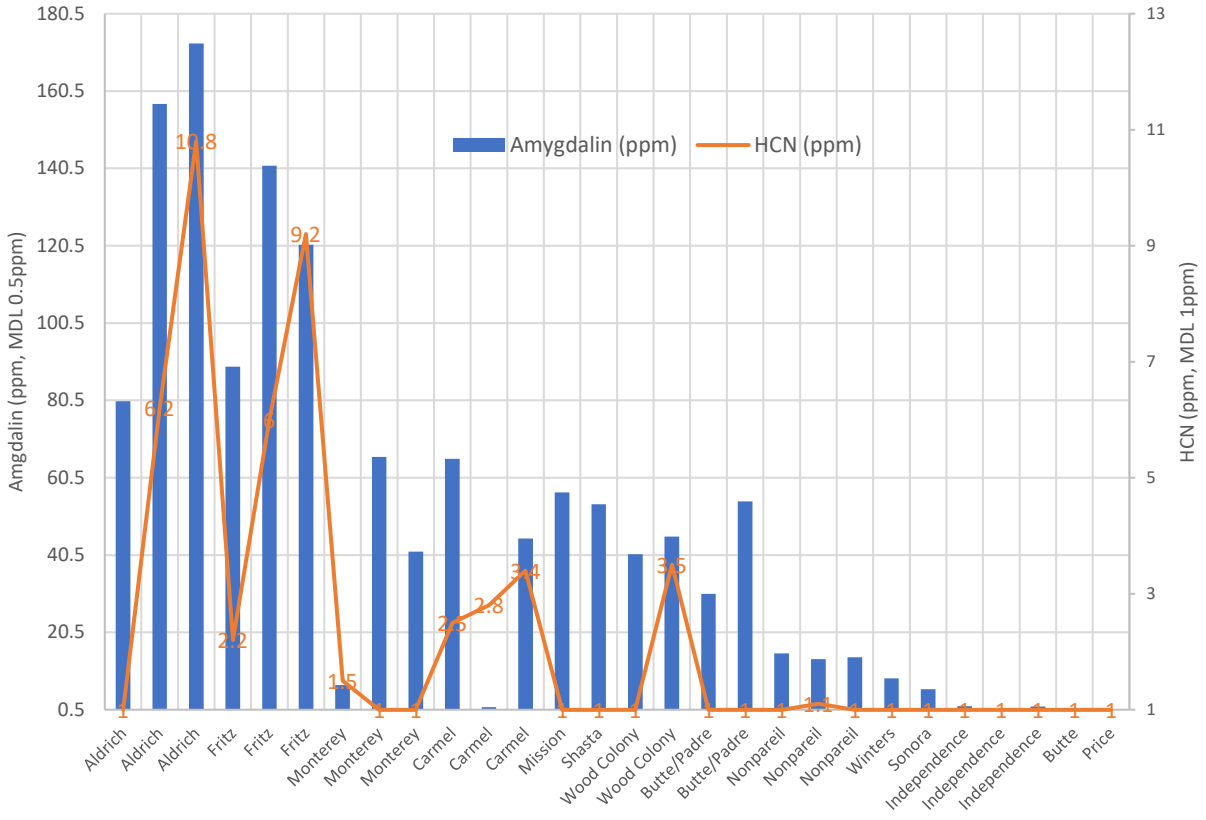
> "FDA would not object to a future 403(h) notification featuring a validated process that achieves a minimum 4-log reduction in Salmonella given that the published risk assessment (Santillana Farakos et al., 2017) estimates that a 4-log reduction of *Salmonella* is practically equivalent to the presently accepted 5-log reduction in terms of protecting public health. Importantly, these risk estimates are confirmed by the absence of outbreaks attributed directly to almonds since the 2007 USDA marketing agreement requiring a minimum 4-log pathogen treatment prior to sale." FDA Letter to ABC 10/13/2017

A minimum 4-log reduction of Salmonella bacteria on Almonds, as required in the mandatory treatment program and acknowledged by FDA is an appropriate standard for protecting consumer safety.

For further information please contact Tim Birmingham at: tbirmingham@almondboard.com

HCN Factsheet

Low Levels of HCN in CA Almonds



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Hydrogen Cyanide (HCN) and Amygdalin in California Almonds
March 2022

Background

The primary source of cyanide in foods is cyanogenic glycosides, which occur naturally in various plants. Cyanide is released from hydrolysis of cyanogenic compounds by action of β-glucosidase enzymes present in plant materials; these enzymes are activated when the plant materials are chewed, crushed or ground. Cyanogenic glycosides are found in cassava and sorghum, which are important staple foods for some parts of the world. Other food sources of cyanogenic glycosides include bamboo shoots, flaxseeds, seeds of stone fruits such as apricot and peach, seeds of peas and beans such as lima beans, and soybean hulls. A common cyanogenic glycoside, amygdalin, is found in the seeds (kernels) of many plants of the *Rosaceae* family, especially in the genus *Prunus*, including almonds (only bitter almonds contain significant amounts) and stone fruits such as apricots, cherries, nectarines, peaches and plums.

All almond trees g
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orchard. A "swee
amounts of amyg
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The Almond Boa
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- Amygdali
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The complete hy
samples or seeds
can release 0.06
g/mole; 27.03÷45
of ~215 ppm from
derived is about 1
(EU) Food Safety
to 35 ppm).

Table 1. Amygdalin and HCN Levels in CA Almond Samples (2020 Crop)

	Amygdalin (ppm)*		Cyanide (ppm)**		
Variety (#)	Average	Range	Calculated	Average	Range
Aldrich (4)	135.4	80.3--172.8	8.1	5.7	<1--10.8
Fritz (4)	122.5	89.2--141.2	7.4	6.0	2.2--9.2
Mission (2)	78.6	56.7--100.4	4.7	1.8	<1--3.3
Butte Padre (3)	57.6	30.5--87.9	3.5	1.3	<1--2.1
Wood Colony (3)	54.8	40.7--78.4	3.3	2.1	<1--3.5
Carmel (4)	43.2	1.2--65.4	2.3	2.5	<1--3.4
Monterey (4)	37.6	6.9--65.9	2.6	1.2	<1--1.5
Shasta (2)	27.9	2.2--53.6	1.7	0.8	<0.4--<1
Nonpareil (4)	13.4	10.6--15.1	0.7	1.1	<1--1.2
Sonora (2)	12.0	5.8--18.2	0.8	1.1	<1--1.3
Winters (2)	5.3	1.9--8.6	0.3	0.8	<0.4--<1
Butte (2)	4.7	0.9--8.4	0.3	0.8	0.5--<1
Independence (4)	1.7	0.8--3.1	0.1	1.0	<1--<1
Price (2)	1.0	<0.5--1.4	0.1	0.8	0.5--<1

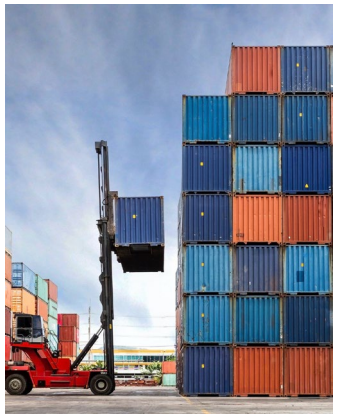
* Results from Lab 1 Laboratories

** Combined HCN results from Lab 1 and Lab 2

Aflatoxin Resources

Controlling Aflatoxin Across The Supply Chain

- Prevention and Control at Orchard
- Proper Stockpile Management
- Removal and Mitigation Post Harvest
- Moisture during Storage and Distribution
  - Inhibitory factors for Mold Growth and Aflatoxin Development



Aflatoxin – Inhibited by Low Moisture During Storage / Transit

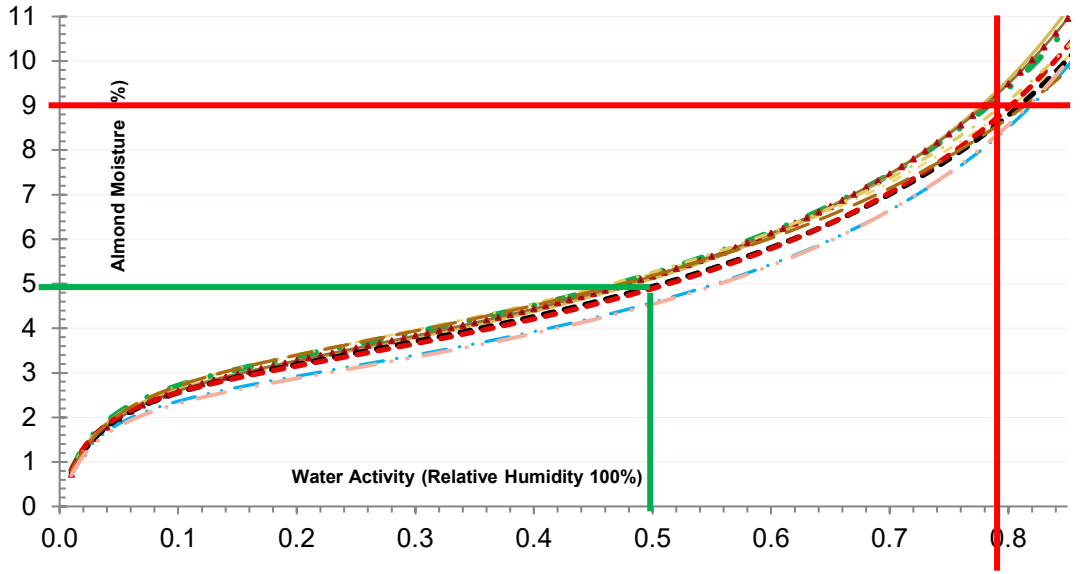
Moisture Control

- No aflatoxigenic mold growth and toxin generation
  - Beyond marginal temperature (10℃/50℉ and 43℃/109℉) regardless of aw
  - Below aw of 0.82, regardless of temperature
- Toxin production only in the range of 0.86 – 0.99 aw
  - Optimal aw of >0.98
  - Optimal temperature of 25-30 ℃ (77-86 ℉)

Minimum aw required for growth of *A. flavus*: >0.80 aw (Gibson et al.)

Minimum aw required for aflatoxin production by *A. flavus*: >0.90 aw (Gallo et al.)

Almond Moisture Isotherm Curve; Dr. Ted Labuza, University of Minnesota



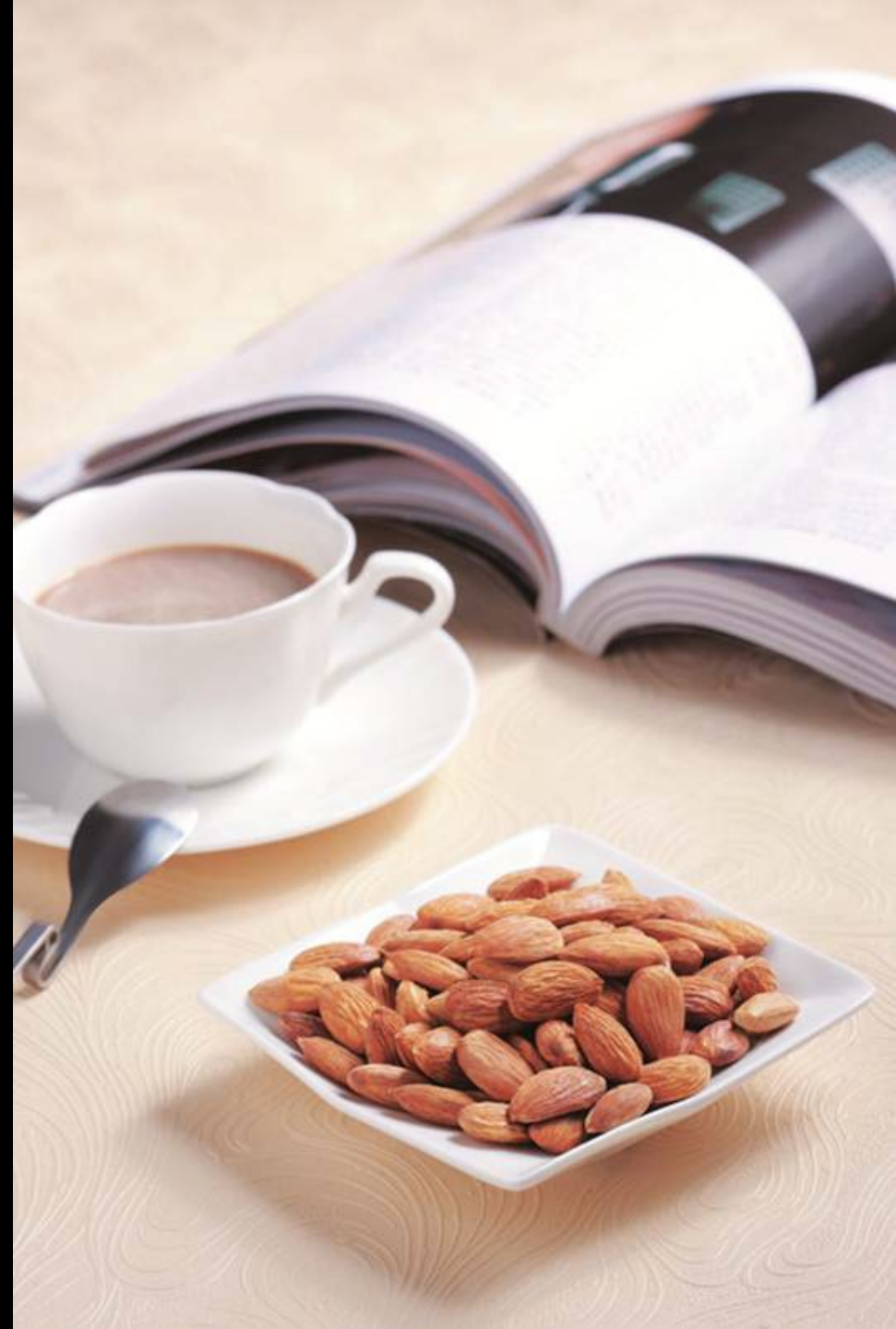
Almonds are always shipped at <5% moisture – typically 3-4% moisture

REDESIGN ALMONDS.COM

Miranda Thomas

1. REMOVE OUTDATED RESOURCES AND CONTENT
2. IMPROVE ACCESSIBILITY AND OUTREACH
3. INCORPORATE INVENTORY CATEGORIZATION
4. SEPARATE CONTENT VS. DOWNLOADABLE RESOURCES

IMPLEMENTED BY EARLY 2023



AQFS RESOURCES

PHASE IV – NEXT STEPS

1. BUILD OUT VISION OF A CENTRALIZED EDUCATION PORTAL.
2. DEVELOP TRAINING CERTIFICATION PROGRAM WITH INDUSTRY COMMUNICATIONS.
3. TRAINING WEBINARS.
4. CONTINUE TO ADDRESS NEEDS FROM THE INDUSTRY IN REAL TIME AS ISSUES ARISE.

Future Resources

Have a Request?
Email: mthomas@almondboard.com

Almond Quality

- Almond quality grading video
- Almond sensory audio presentation
- Varietal characterization visuals

Food Safety

- Aflatoxin mitigation technical bulletin
- HCN testing exemption statement
- Smoke taint factsheet

QUESTIONS AND COMMENTS

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THANK YOU
THE ALMOND CONFERENCE
50
YEARS