



SEPTEMBER | OCTOBER 2015

almond **FACTS**

News, Views & Industry Insights



South Africa

**Almond
Breeze
Expands to
South Africa**

**Explore
Power
of Social
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***Nut*Thins*
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Cover Photo:

The global reach of *Almond Breeze* extends to another continent with the addition of South Africa.



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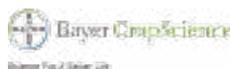
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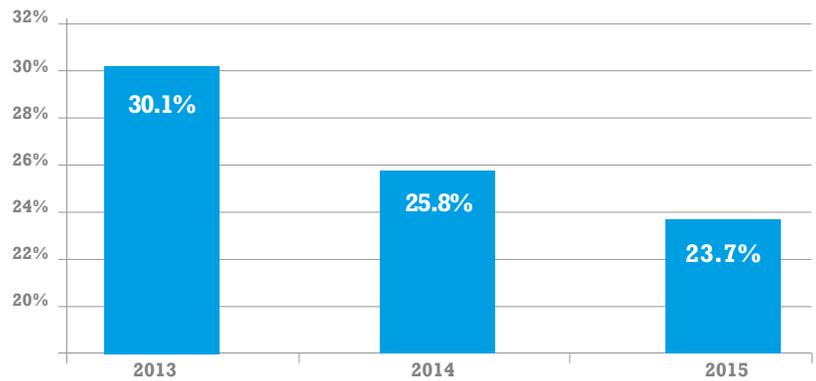
– Anonymous

For Blue Diamond, business as usual is dramatically changing. We are dedicated to value-added almond product development, business expansions to meet demand and leading grower returns. With several years of success, we are establishing ourselves as the almond handler of choice. Our growers have always valued the power of the Blue Diamond brand and they are just beginning to realize the full potential of our coop and brand.

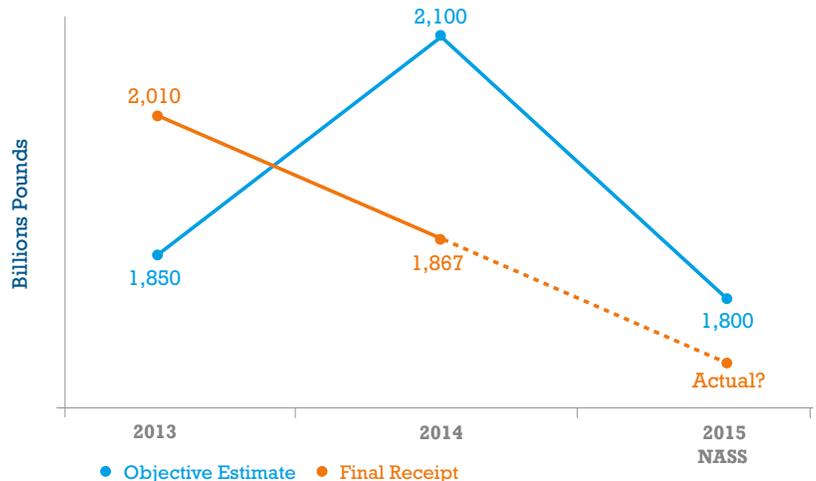
Innovation is key to our success and sets us apart from other almond handlers. Our Almond Innovation Center is continually working on groundbreaking almond product ideas, experimenting with new categories for almond ingredient products and offering their expertise to our valued customers to spur research and development collaboration. These partnerships provide new avenues for Blue Diamond's almonds, growing the market to the benefit of our grower-owners.

This winter, a strong El Niño is predicted. This is welcome news after a year where the natural and media climates seemed to have teamed together against the almond industry. However welcome the rain will be, we cannot return to our pre-drought state of comfort. We must remain vigilant in our water conservation efforts and we must continue to be an honest and reliable source of information for our state legislators, regulators and the media. Our carefully cultivated relationships with these audiences have turned the conversation from one of blame to one of teamwork – every Californian against the drought, not against one another.

August Industry Commitments by Crop Year



California Almond Crop



Our recent history has been defined by drought driven reductions in almond yields, almond supply shortages and prices rising to new record high levels.

The 2015 crop will again be lower than last year or industry demand. In July, the National Agricultural Statistic Service (NASS) predicted a crop of 1.8 billion pounds. We expect the 2015 crop will deliver between 1.7 and 1.75 billion pounds, less than 94 percent of the 2014 supply. With the benefit of harvest data, the Nonpareil crop is likely 10 percent off of last year's 713 million pounds.

Lower market commitments for the 2015 crop were consistent with recent pricing history. Many handlers were reluctant to offer early, recalling the multi-year trend of prices climbing throughout crop years. Last year, in particular, prices spiked dramatically during a disappointing harvest. The winning almond market strategy has been to sell later.

This year is different. Even with the 2015 crop falling short of the NASS Objective Estimate, market prices declined moderately. While California sellers offered sparingly, even more buyers were reluctant to make early 2015 crop purchases at prices equal to the peak prices paid for late 2014 crop. The market is finding a new pricing equilibrium at levels above similar timing to last year, but below the summer peak.

Market direction in the months ahead will be determined by almond supply, global demand and whether California's winter snow and rain has a positive impact on the ongoing drought. *Blue Diamond's* value-added business model will make sure that the cooperative's available handle will be put to the highest and best use, ensuring another year of strong returns for our growers. Our emphasis on innovation will see us through this drought and will remain a winning strategy for *Blue Diamond Growers* for the foreseeable future.

Blue Diamond 2014 Crop Returns

For the second year in a row, our crop performance represents the highest per pound payment in our history and the greatest total dollar amount ever paid to our growers. Once again, I believe you will find that this payment surpasses the value paid by most other handlers in the industry.

In spite of tight supplies, demand for *Blue Diamond's* products remains strong. The success of our efforts has been rewarded with unprecedented growth in the number of new growers and acreage committed to *Blue Diamond* this year. We appreciate this vote of confidence and look forward to maximizing the returns of each grower who entrusts *Blue Diamond* with their almonds.

Variety	Overall Average	Average of High Quality	Maximum with All Premiums
Nonpareil/Sonora/Independence Inshell	\$4.23	\$4.25	\$4.26
Nonpareil/Supareil Meats	\$4.16	\$4.18	\$4.20
Sonora/Independence Meats	\$4.10	\$4.14	\$4.16
Carmel	\$3.98	\$3.99	\$4.01
Monterey	\$3.94	\$3.95	\$3.97
California/Price/Fritz/Wood Colony	\$3.87	\$3.88	\$3.90
Butte/Padre	\$3.84	\$3.85	\$3.86
Mission/Neplus	\$3.78	\$3.79	\$3.81
Peerless Inshell	\$1.35	N/A	\$1.37

Note: The above rates do not include Volume Premiums, Domestic Production Activities Deduction and IC-DISC advantages.



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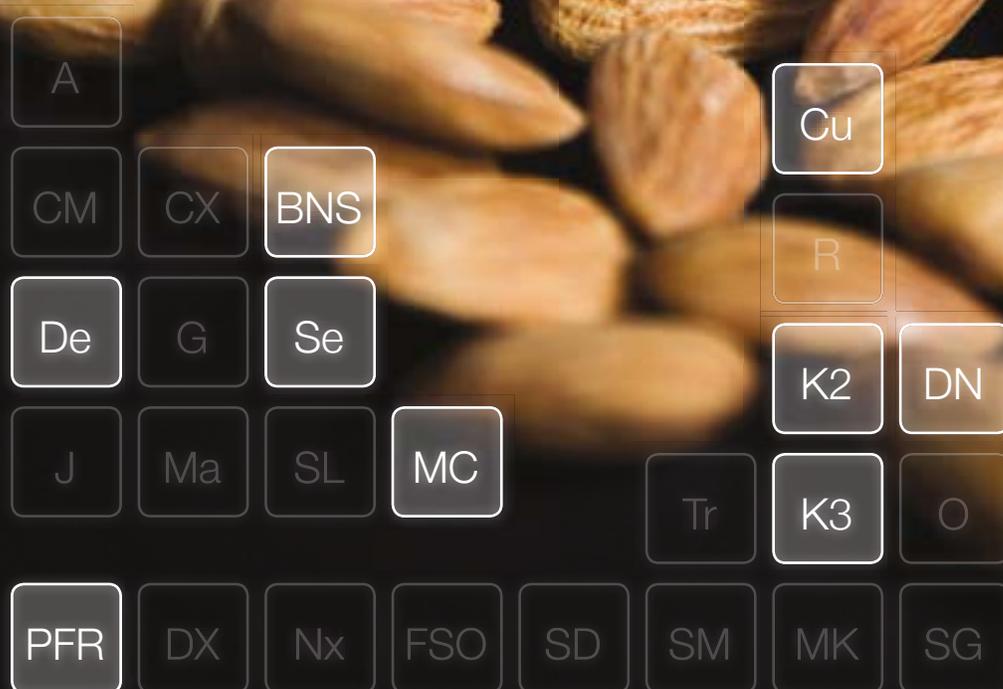
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- Soil diseases
- Mites
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- Peach twig borer
- Ants

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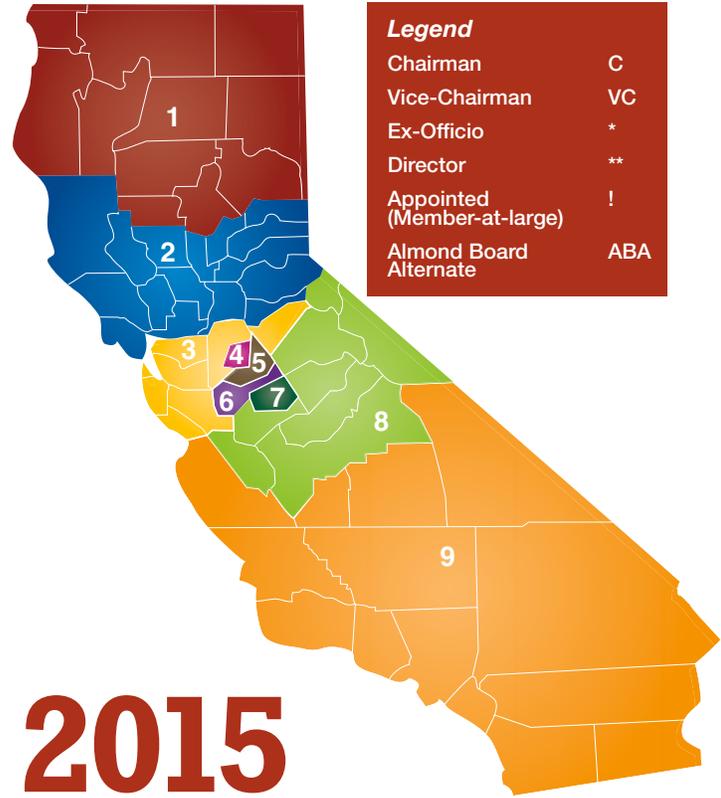
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UC DAVIS STUDY: ALMONDS HAVE CARBON NEUTRAL POTENTIAL

BY MALLORIE HAYES

A recent study conducted by the University of California, Davis suggests that almonds have additional benefits besides their nutritional value. California almonds, according to the study, have the potential to become carbon-neutral or even carbon-negative with continued environmental efforts by the industry.

The study was funded in part by the Almond Board of California and the California Department of Food and Agriculture. It examined the 25-year lifecycle of an almond orchard—from land preparation to the “productive life” and to removal—and found that a kilogram of almonds produces less than a kilogram of carbon dioxide emissions.

“We asked the question, ‘what are the energy inputs and emission outputs when producing almonds?’” said Dr. Gabriele Ludwig, Director of Sustainability and Environmental Affairs at the Almond Board of California.

The research concluded that almond trees naturally sequester a substantial amount of carbon and by employing full-use practices of the nut, hull, shell and orchard biomass, the crop can reach its full sustainability potential in regards to greenhouse gas (GHG). Practices including using almond shells for livestock bedding and alternative energy, and hulls for livestock feed are ways to ensure complete use of the crop.

In addition to improving utilization of orchard biomass, finding ways to improve nitrogen and irrigation uses will also help in the quest to achieve carbon-neutral or -negative status.

Carbon-neutrality occurs when the amount of CO₂ emitted by an almond is the same amount sequestered and removed by the crop, while carbon-negative is a reduction of GHG

emissions by removing or sequestering CO₂ that would otherwise be released into the atmosphere.

The idea of recycling and conserving is anything but new to California almond growers. Research from the California Almond Sustainability Program showed that 74 percent of surveyed almond orchards already recycle orchard prunings. And in the past 10 years, growers have invested more than \$3 billion into irrigation, resulting in zero water wasted, improved irrigation systems and a decreased carbon footprint.

Continuing conservation efforts and sustainable practices will reduce GHG emissions further and allow for the achievement of a carbon-neutral or carbon-negative footprint.

“When you implement sustainable nitrogen and water practices, you are not only improving GHG emissions, but water quality, air quality, energy efficiency and using your resources as effectively as possible,” said Ludwig.

To read the study in its entirety, visit the Journal of Industrial Ecology website:

Part I of study: <http://onlinelibrary.wiley.com/doi/10.1111/jiec.12332/abstract>

Part II of study: <http://onlinelibrary.wiley.com/doi/10.1111/jiec.12333/abstract>

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Blue Diamond Products Take the Stage at State Fair

Blue Diamond Growers made quite the appearance at this year's California State Fair. Products were displayed throughout the Counties Exhibit Program, which attracts more than 750,000 visitors a year. The three-dimensional exhibits featuring *Blue Diamond* almonds included San Joaquin, Sacramento, Colusa and Stanislaus Counties. From *Nut*Thins* to bulk brown almonds, the cooperative's products were on display for everyone to see.



As agricultural hubs for the Central Valley, the Sacramento, San Joaquin, Colusa and Stanislaus exhibits displayed many of the products grown and produced in these regions, including *Blue Diamond Almonds*.



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Blue Diamond Almonds Earn Approval from a Nut Expert

A valued *Blue Diamond* customer shared a picture of his furry friend eating *Whole Natural Blue Diamond Almonds*. “She will not eat anything but almonds!” the customer said.



Recipe of the Month: Pumpkin Spice Waffles



Tip

Too rushed in the morning? Freeze the waffles ahead of time. Then pop in the toaster until hot and crispy.

Pumpkin Spice Waffles

Prep time: 10 minutes
Cook time: 2 to 3 minutes



- 1 c. Blue Diamond® Original or Vanilla Unsweetened Almond Breeze®
- 2/3 c. canned pumpkin
- 1/2 c. brown sugar
- 2 Tbsp. melted buttery spread or butter
- 2 eggs
- 2 c. complete honey wheat pancake mix
- 1-1/2 tsp. pumpkin pie spice

PUMPKIN AGAVE DRIZZLE:

- 1/4 c. light agave nectar
- 2 Tbsp. canned pumpkin
- 1/4 tsp. pumpkin pie spice

Whisk together Almond Breeze, pumpkin, brown sugar, buttery spread and eggs in a medium bowl. Stir in pancake mix and pumpkin pie spice. Fill waffle iron about 2/3 full for each waffle and cook for 2 to 3 minutes. Whisk together all Pumpkin Agave Drizzle ingredients in a small bowl. Serve over waffles in place of syrup.

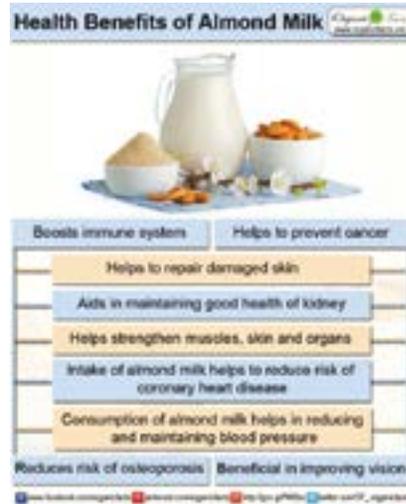


Nut*Thins Receive Celebrity Praise



Britney Spears tells Women’s Health that *Nut Thins* are her healthy snack of choice.

OrganicFacts.net Publishes Infographics on Almond Health Benefits



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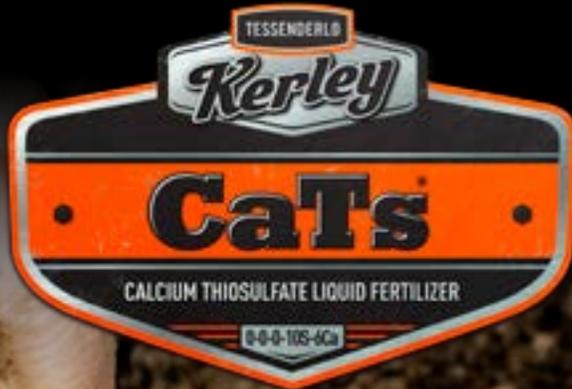
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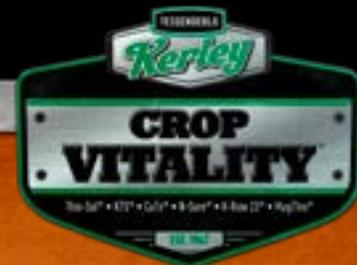
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Almond Breeze “Spooks the Herd” in New Australian Campaign

Competition in Australia between dairy and non-dairy alternatives is strong and the success that *Almond Breeze* has experienced in the market has attracted the attention of two very curious dairy advocates – Bess and Daisy, dairy cows naturally wary of up and coming *Almond Breeze*. The cows have spotted a farmer planting almond trees beyond their pasture and ask this all-important question – “Is it better than milk?”

The campaign, launched in Sydney, Australia in the first week of August, is meant to be “cheeky and disruptive, thereby piquing the interest of milk users, and getting them into *Almond Breeze*,” said Brendan Binder, *Blue Diamond’s Almond Breeze* Business Director. Television advertising ran the entire month of August and into the first week of September, supported by digital and bus advertising.

Inspiration for the campaign came from the 1990s British sitcom “Keeping Up Appearances.” Bess and Daisy are based on two of the show’s main female characters, Mrs. Hyacinth Bucket and her friend Elisabeth. “The gossiping know-it-all alpha female embodied by Mrs. Bucket inspired the subtle stylization of the cows’ face designs, as well as the eye and mouth expressions of Daisy,” according to James Roberts, Managing Director of Red Hammer, the Australian advertising agency brought in to bring the campaign to life. “The nervous darting eyes of Elisabeth were also translated into the cow-equivalent.”

The commercial also features a close-up of an almond blossom turning into a mature almond. “We had to take some artistic license with the growth of the almond bud. It had to bloom from bud, to flower, to final seed, all in a matter of six seconds,” Roberts said. Much research went in to determining the different stages of growth to get the animation just right.

“We are maximizing the value of our new campaign by completely overhauling our online presence,” Binder said. The Australian *Almond Breeze* homepage, www.almondbreeze.com.au, has a brand new look featuring the cows front and center. It also



highlights *Almond Breeze* recipes, offers a link to the 10-Day *Almond Breeze* challenge and offers information on each of the cooperative’s products available in that country.

The redesign is also evident on Facebook where exciting recipes, healthy lifestyle posts and fun contests encourage *Almond Breeze* fans to interact with the brand.

“Australian consumers love our product and we’re enjoying finding new and creative ways to bring in new consumers to the *Almond Breeze* community!” Binder said.

Almond Breeze Adds South Africa to Expansion Portfolio

A strategic partnership with Good Hope International Beverages (GHIB) in Cape Town, South Africa has opened up an entirely new continent to *Blue Diamond's Almond Breeze*. GHIB is the first South African producer of almondmilk. As a licensee, GHIB will locally produce and distribute three flavors of *Almond Breeze* — 1-liter and 250-milliliter sized *Original* and *Unsweetened Original*, and 1-liter packages of *Barista Blend*.

GHIB is the largest producer of the highest quality natural food and beverage products in South Africa. It's own brands are currently marketed and distributed consistently in more than 40 countries around the globe, affording *Blue Diamond* a significant reach for its expanding product lines.

With this launch in Africa, *Almond Breeze* is now available on almost every continent! Similar to other international launches, South Africa is targeting households' health managers – those who make healthy food purchasing decisions – and health-savvy women between 16 and 54 years old. “These individuals tend to be drawn to great tasting new products with attributes that promise to improve health and wellness,” Brendan Binder, *Almond Breeze* Business Director for *Blue Diamond Growers*.

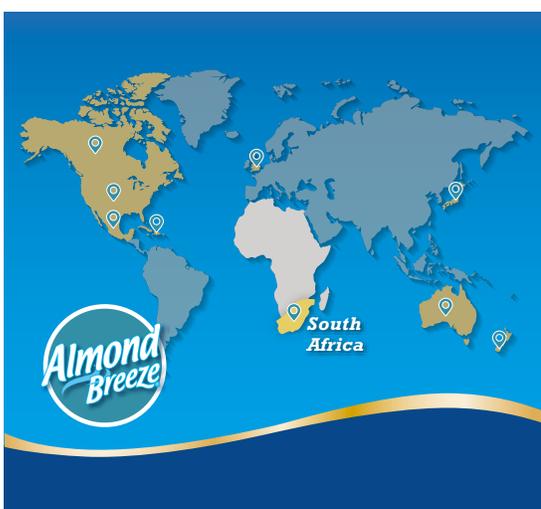
The official launch took place at the Good Food and Wine show in Johannesburg at the end of July and reception has been quite positive. On the retail front, the region's three major retailers now carry the *Original* and *Unsweetened* items. A multi-tiered marketing program consisting of public relations outreach, digital advertising, social media and in-store marketing is supporting the launch, generating quite a buzz around the products. In just the first month, media coverage led to 19 different stories online and on the radio, leading to more than 250,000 impressions!

“For those on the fence about our product, we're offering in-store ‘wet demos’ where consumers can directly sample our *Almond Breeze* during peak shopping times,” Binder said. “These, coupled with our banner advertising in grocery aisles and free-standing shelf units in cereal and milk aisles are sure to catch consumers' attention.”



The foodservice attention toward *Barista Blend* has also been impressive with a major coffee chain set to feature the item on their menu in September. Marketing in the foodservice space required a more business-to-business approach to gain distribution. The product's healthful qualities compared to milk and other non-dairy alternatives come out on top, with *Almond Breeze* posting 30 percent fewer calories than skim milk and regular soy milk among other health attributes. “Most importantly, we want our foodservice customers to know that our *Barista Blend's* flavor complements the world's finest coffees in terms of taste and provides the consistency necessary for frothing, key to visual appeal,” Binder explained.

A wide range of marketing materials will enforce the *Barista Blend* launch – from cup sleeves and coasters, to branded apparel, flyers, posters and banners. For devoted *Barista Blend* cappuccino drinkers, coupons and loyalty cards will reinforce purchase behavior. “We hope these items will help cement *Barista Blend* almondmilk as the ‘new coffee fix’ in South Africa!” said Binder.





Almond Flour Shines at Food Technology Conference

The Institute of Food Technologists (IFT) is one of the country's leading food industry trade associations and as such, draws quite a crowd at its annual meetings. This year, more than 23,000 registrants attended the meeting to see the hottest food trends, sample the latest food products and learn the most important developments in the science of food. Blue Diamond Growers was there, ready to showcase its diverse product line and to highlight its newest ingredient product – almond flour!

As Almond Facts has previously reported, *Blue Diamond's* almond flour is the finest granulation almond flour available in the marketplace. This made it a hot commodity at the food show, where the main audience is product developers and research and development staff from other consumer packaged goods companies who are searching for the perfect ingredients to incorporate into their food products.

“The IFT annual meeting is the premier show in North America where we can showcase the depth of our product line,” said Bill Morecraft, *Blue Diamond's* General Manager of Global Ingredients. “It is



⤴ Global Ingredient representatives man the cooperative's exhibit. From left, Sales Director Richard Holmes, Product Marketing Manager Angie Raimondi, Regional Sales Manager Richard Andonian and Marketing Coordinator Stephanie Ganiban.

the one venue where we can stand out to the trade and reinforce our position as the leading supplier of value-added almond ingredients.”

The exciting exhibit booth *Blue Diamond* designed for the show focused on the various avenues where almonds are sold as ingredients – bakery, confectionary and healthy eating – in a style that resembled storefront windows filled with delicious almond treats. With a central location inside the main exhibit hall, it made for the perfect venue to meet with customers and industry allies. Visitors to the booth were surrounded by imagery and real examples of the versatility of almonds as an ingredient.

Most creative of the treats on display was an almond house, featured in the bakery section. With candied Jordan almonds, blanched whole almonds and natural slices making up the walls and bordering the windows, and whole natural almonds for the roof, this was truly an imaginative way to showcase all that almonds can do!

“We always aim to stand out when we exhibit at food shows,” Morecraft said. “Our intent was to have an outdoor ‘street scene’ type of feel and I think it helped bring more visitors in to learn about our diverse almond offerings at *Blue Diamond*.”



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Irresistible *Nut*Thins* Star in National Print Campaign

Blue Diamond has launched a brand new print advertising campaign to increase awareness of its already-popular gluten-free cracker brand, *Nut*Thins*. The print campaign reflects people's personal passion for *Nut*Thins* and leads the audience to understand why *Nut*Thins* are so irresistible. The cooperative knows why – it's because they are made with the goodness of *Blue Diamond Almonds*!

"If there's one thing we know, it's this: people that eat *Nut*Thins* don't just like them, they LOVE them," said Snack Group Marketing Manager Maya Erwin. By reading a few tweets on the *Nut*Thins* Twitter page, one can see why.

- "I am seriously addicted to @NutThins!! It's difficult not to consume an entire box in one sitting," said Twitter user Jaszy McAllister.
- "Literally just ate this entire box of @NutThins within five minutes of being home from buying said *Nut Thins*," said Jillean Alexander, another Twitter user.
- Romi Dames tweeted, "One box of *Nut Thins* is the serving size, right?"

The campaign leverages these consumer insights and forces the viewer to come to one conclusion on why this cracker is so loved – "It Must Be the Almonds!" The tag "It Must Be the Almonds" will be featured wherever

possible, on other media outlets and in social spaces. The advertisement will be featured in large, national-reach publications and across top-selling categories including epicurean, lifestyle and health magazines. Samples of the publications that will run the advertisement through the end of 2015 and throughout 2016 include Food Network Magazine, Rachael Ray, People, Parents, Cooking Light and Weightwatchers.

"There is no other gluten-free cracker in the market that can say it's made with the goodness of almonds, and then unequivocally pay it off with the delicious taste and crunch that *Nut*Thins* provides," said John O'Shaughnessy, *Blue Diamond's* General Manager of North American Consumer Foods.



Environmental Benefits

Shur-Crop's Icelandic Kelp combines with metallic free radicals in the soil to form polymers that tenaciously hold water in the soil up to one thousand times its own dry weight. Shur-Crop's cold water Kelp feeds beneficial aerobic microbes that stimulates healthier deep root growth, holding moisture in a larger root zone, and minimize the leaching of nitrogen into the ground water.

Shur-Crop Remediate Nematodes on James Tanioka Farms (209) 769-5627. Field and Lab tested for over 20 years. By: Ron Barnes UC Davis Master Degree Agronomy, CEO and 29 year owner of Monarch Laboratory Inc., Chico, CA.

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population on social media, a grower can reach many and shape the way people see not only California agriculture but agriculture as a whole.

The Digital Truth Squad

In the beginning of 2015, the media painted almonds as the villain of the drought. To combat the misperceptions and misinformation surrounding the crop, the Almond Board of California started an ongoing effort, uniting almond growers, processors and allied industry members alike. This effort is the Digital Truth Team, through which the ABC hopes to reconcile and correct any false or incorrect information on circulating traditional or social media. The board is asking members to join the conversation surrounding agriculture through social media by sharing posts, pictures or comments.

The goal of the Digital Truth Team is to change the way people view almonds in regards to the drought and also paint a positive picture for the industry in the future.

Carissa Sauer, ABC's Manager, Industry Communications, believes social media offers a platform for a real-life look into the world of almonds. She explained the Digital Truth Team fosters connections through shared values between the almond industry and those who enjoy almonds, subsequently calming concerns and building trusts.

Social Media at the Annual Meeting

Blue Diamond will be providing more information, tools and techniques for making the most of social media at this year's annual meeting, November 18. In addition to the regular cultural seminars, a digital and social media seminar will help growers to understand and utilize the new media as a tool for sharing their story and creating a brand to benefit their business.



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**Agricultural
Council of California**
EMILY ROONEY, President

Ag Council Achieves Improvements to CalRecycle Composting Regulation

Since last fall, Ag Council staff and other agricultural groups have worked with the California Department of Resources Recycling and Recovery (CalRecycle) to address issues within a proposed regulation that could have required some farmers and agricultural companies to comply with certain composting regulations, even if composting was not part of their business. CalRecycle originally cast too wide a net by regulating the methods agriculture has developed for the disposal or reuse of some of our byproducts, simply because agricultural byproducts are organic matter.

On August 31, the Department Director Scott Smithline approved the final draft of the proposed regulation called the Composting Material, Transfer/Processing Regulation (also known as the composting regulation).

The composting regulation now includes several changes requested by the agricultural community. Ag Council considers the changes recently made to the proposed regulation a positive improvement given where the regulation began. The regulation was overly broad, and Ag Council worked on behalf of *Blue Diamond* and our members to lessen the regulatory burden, provide greater flexibility, and obtain exclusions where possible. Highlighted below are three key areas where Ag Council and our agricultural partners worked to improve the regulation.

Licensed Feed Manufacturers Exclusion

CalRecycle was initially proposing to regulate piles of dried nut hulls and shells as compost due to the wrong determination that stored animal feed fit the regulatory definition of a “compostable material” without regard to the actual use of that product. The proposed regulation now clearly says that “licensed” animal feed

manufacturers are excluded from the compost regulation. For example, if a facility is licensed by CDFA’s Feed Inspection Program, then that facility is excluded from additional oversight.

Definition of “Agricultural Material”

Changes to this definition were needed because CalRecycle was originally planning on regulating typical farming practices under the new composting regulation. Comments to CalRecycle from Ag Council and others resulted in an amendment to the definition to include material produced during nut hulling, shelling and processing. This change is key because the specific inclusion of our byproducts in the new definition allows a huller, sheller or processor to return similar amounts of sticks, leaves or organic matter derived from an orchard back to orchards for spreading without the additional regulation.

Definition of “Agricultural By-Product Material”

At first, CalRecycle was proposing a very complicated regulatory process for the land applications of agricultural processing byproducts that was unrealistic. We were concerned that some farmers and ranchers might want to apply compostable materials more than once a year in varying amounts that fit their operational needs for soil fertility and weed suppression. To alleviate concerns regarding duplicative and unnecessary regulations, Ag Council and others were successful in making sure that organic matter, leaves, stems, nut hulls and shells were included in the agricultural byproduct definition. This inclusion will allow more flexibility for growers and processors that do not participate in the feed regulation.

Given the improvements, Ag Council staff attended an August 18 public meeting and expressed appreciation to CalRecycle staff for addressing specific agricultural issues within the regulation. In addition, Ag Council relayed concerns over the future unknown impact that this regulation may have on emerging technologies and practices within our industry. CalRecycle staff is preparing

the final rule and the regulation is anticipated to become final in the coming months.

We thank you for the opportunity to represent Blue Diamond Growers. For further information about our legislative and regulatory activity, please go to www.agcouncil.org and click on the In the Know newsletter section or call ph. (916) 443-4887.

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The Bee Box

CHRISTI HEINTZ
& TARA McCALL

The numbers have been released for the ninth annual national survey of honey bee colony losses for 2014-2015 reported by the Bee Informed Partnership. While over-wintering losses were down a bit to 23.1 percent from last year's 23.7 percent, summer colony losses increased to 27.4 percent from the previous year's 19.8 percent. Over-wintering honey bee losses do not bode well for almond growers, however, the new summer colony loss figures are interesting and disappointing. Commercial beekeepers lost more colonies over the summer, compared to winter. The survey was fairly robust, representing nearly 15 percent of the nation's 2.74 million colonies. The bottom line? Combined summer and winter losses are over 42 percent.

"Such high colony losses in the summer and year-round remain very troubling. If beekeepers are going to meet the growing demand for pollination services, researchers need to find better answers to the host of stresses that lead to both winter and summer colony losses," said Jeff Pettis, senior entomologist at USDA's Agricultural Research Service Bee Research Laboratory in Beltsville, MD.

PAm - Blue Diamond Growers Partnership

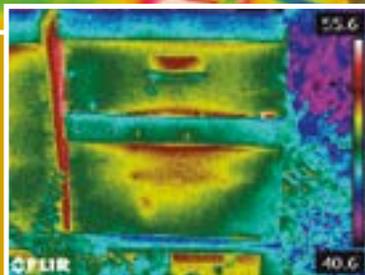
At Project Apis m. (PAm) we are doing everything we can to prevent these losses and insure almond growers have strong healthy colonies for pollinating their orchard investment. Since its inception in 2006, PAm has infused over \$4 million into bee research and honey bee programs. We have brought new technologies to honey bee health research, discovered new pathogens, developed comprehensive Best Management Practices programs, initiated the 'Seeds for Bees' project to plant honey bee forage and supported Tech Transfer Teams. We are the recipients of numerous grants, including corporate grants and state and federal grants. PAm is the largest non-governmental, non-profit bee research funding organization in the USA.

Blue Diamond Growers, via the BeeCause We Care program, is a major contributor to honey bee health. *Blue Diamond's* funding entrusted to PAm in 2014 targeted in-field diagnostics to assess bee strength and bee health. These studies include a study to determine the efficacy of using Infra-Red (IR) technology to assess honey bee colony strength and two studies involving the assessment of viruses in honey bees. The project proposals were covered in depth in the November/December 2014 issue of *Almond Facts* "Bee Box," and we'd like to share their exciting updates!

THE BEE BOX



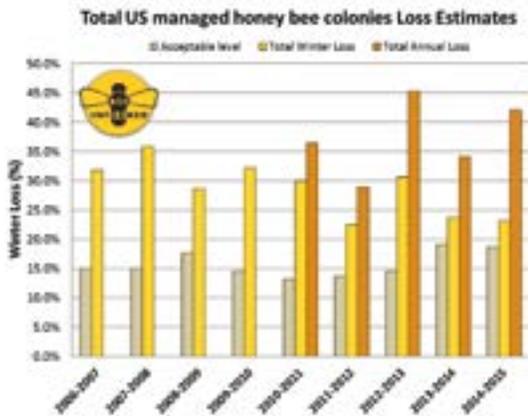
⤴ The most recent data on honey bee colony losses shows continued winter losses plus an increase in summer honey bee losses.



⤴ Infra-Red image of a 14-frame colony.

Infra-Red Technology to Assess Honey Bee Colony Strength

IR imaging offers the possibility of reducing the labor needed to grade a considerable number of colonies since a single person can rapidly assess a large number of hives. Robert Seccomb and Dr. Jerry Bromenshenk, Bee Alert Technology, Inc., and their team are processing over 3,000 IR images of honey bee colonies taken in January, 2015, and are assessing the thermal images for accuracy of showing and sizing the colony cluster. Enhancements are being made to the IR camera and software to better adapt the technology to almond grower and beekeeping operations. The research results intend to lead to an affordable and easy-to-use means to reduce the time and cost of grading honey bee colonies rented for almond pollination. You will have the opportunity to see the FLIR Thermal Camera at the PAm trade show booth at both the California State Beekeepers Association Conference in November and the Almond Industry Conference in December.



⬆ The most recent data on honey bee colony losses shows continued winter losses plus an increase in summer honey bee losses.

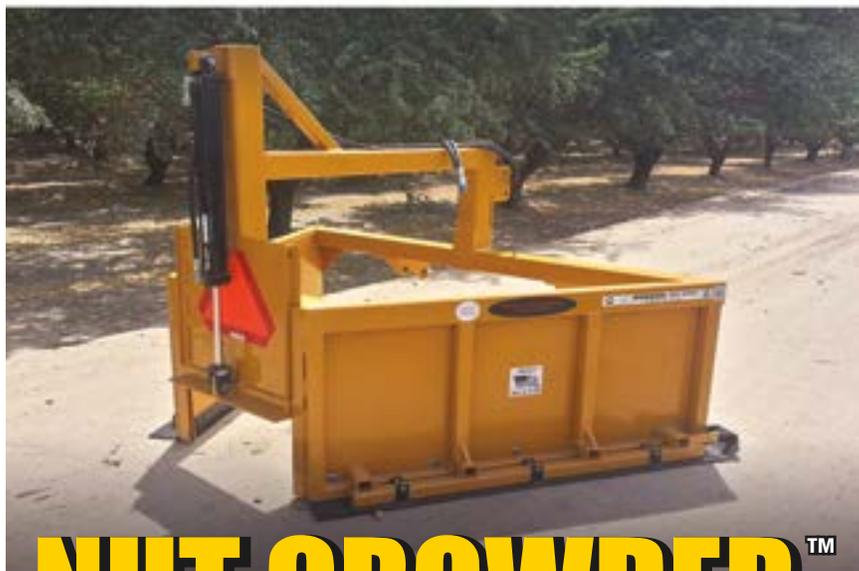
Diagnostic Tools to Understand the Role of Viruses on Honey Bee Health

Viruses in honey bees can have a significant impact on overall honey bee health. Viruses that can easily and quickly be detected could possibly be mitigated or isolated by the beekeeper to maintain the integrity of the colony, neighboring colonies and perhaps an entire apiary. Dr. Michelle Flenniken, Montana State University, and her team of scientists have developed a universal Lake Sinai Virus primer set to detect this common class of viruses. In the meantime, they have discovered two more viruses in the Lake Sinai family. They will have antibodies made by early 2016, which will be a significant step toward in-field diagnostics.

Mechanical Devices vs. a Molecular Approach for Virus Detection in Honey Bees

This study is comparing instrument-based vs. molecular-based methods of virus detection. Dr. Brian Johnson, University of California, Davis, and his researchers have acquired more than 50 samples for the two different virus detection methods, and an independent evaluator is looking at correlations between the two methods of virus detection. Testers evaluated 32 samples for the six most common viruses. While the comparison of

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the two approaches is underway, what they have observed right now is that most of the bees tested positive for ALL six of the most common viruses □ an indication that our bees are very ill! Funding these diagnostics projects will contribute significantly to our ability to evaluate the strength of colonies in the almond orchard.

PAm Commits to Varroa Research

Christi Heintz, PAm's executive director, announced at the North American Beekeeping Conference to an audience of several hundred participants that there will be NO anniversary party for the Varroa mite in September 2017. If still in the U.S. by that date, the Varroa mite will have been in this



⤴ Dr. Elina Niño, extension apiculturist UC Davis, is studying biocontrols for Varroa management.

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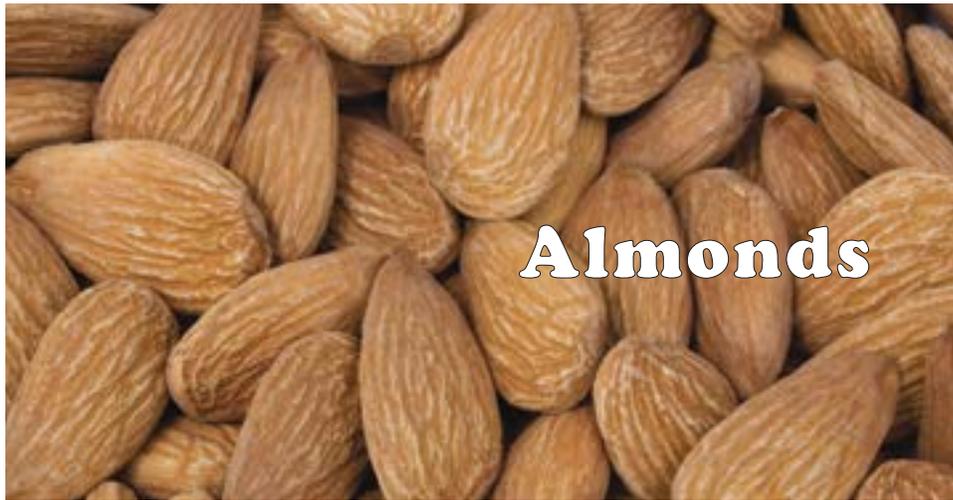
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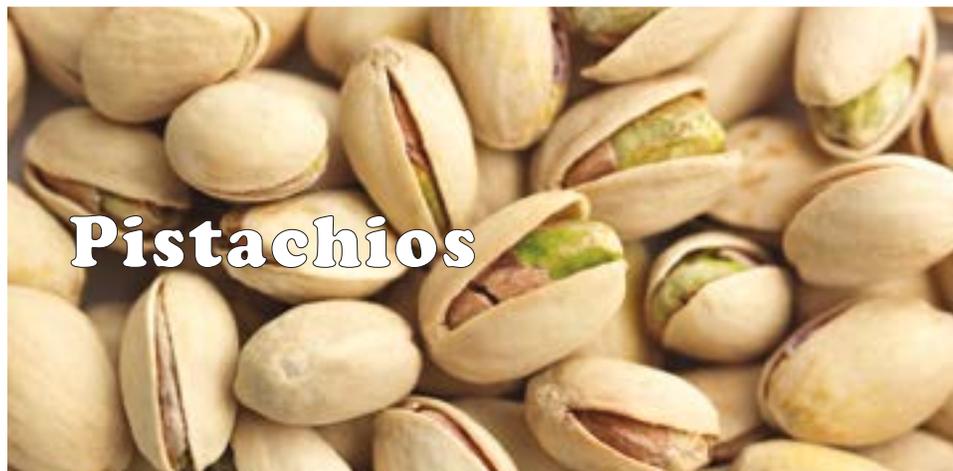
country 30 years. That's 30 years too long! With funding that became available when CoBank and American Ag Credit matched *Blue Diamond's* funding, PAm has embarked on a serious commitment to funding more Varroa research. We want to hinder in every way possible Varroa's ability to enjoy its 30th anniversary in the U.S. in September 2017.

Six new studies were selected. Evidence suggests there are several innovative compounds that warrant attention for Varroa control □ including spider venom, extracts from the seeds of a particular Asian flower, and oil from the seeds of an evergreen tree found in India that is already being used as a biopesticide in farming. One study will look at cost-effective mass production of natural mite predators. Another will identify the DNA markers associated with reducing mite loads via hygienic behaviors. Finally, we will try to prove whether Varroa actually does feed on the hemolymph in bees, a long-time assumption that has never been adequately proven.

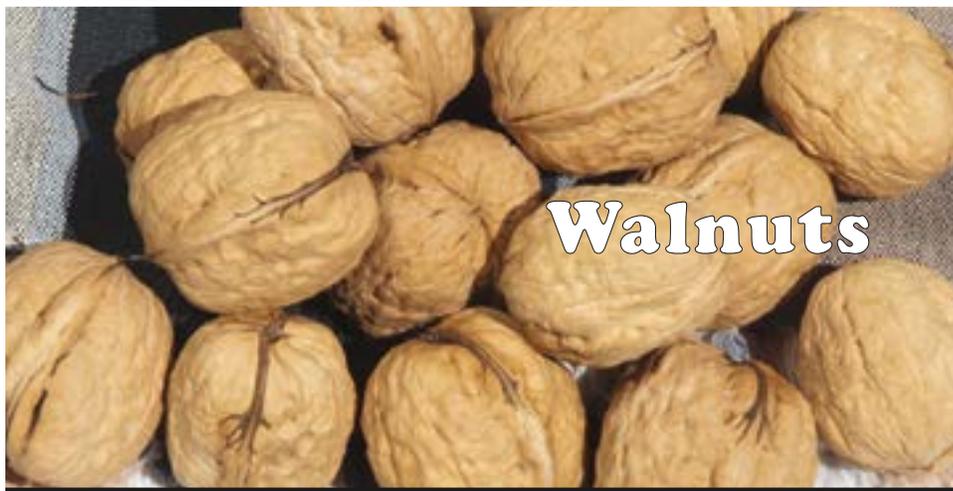
Look for updates on these studies and PAm's complete research program by visiting the Research tab on www.projectapism.org.



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Time To Consider

DAVID DOLL

When planning a new orchard, it is important to consider location, water availability and quality, irrigation system selection, pre-plant soil modification, rootstock, and variety selection. Mistakes made during the planning process will be present throughout the orchard's life. Below are some considerations to keep in mind when selecting a site, rootstock, and variety.

Site Selection and Modification.

Soil type - Soils that have a high water holding content can be problematic when trying to access the orchard in early spring. Furthermore, these soils may also increase the risk of "wet feet" and *Phytophthora* infections. Rocky soils can make orchard operations like harvesting and mowing challenging, but generally can be managed unless it is more rocks than soil. Saline-alkaline soils will have challenges with water infiltration. These soils often require pre-plant leaching or modification to leach salts.

Salinity - Soil salinity should be below 1.5 dS/m as an average of the rooting depth (five feet). To determine the salt levels, soil samples should be collected from each of the differing soil types in the field.. Sample plugs or auger cores of each soil type in 4-5 locations. At each location, sample every 12 in of depth to 60 in. Combine and pool samples at a given depth (e.g. combine and mix 4-5 samples at 12 in depth, 4-5 samples at 24 in depth etc). A composite sample should be pulled for every 20 acres, with a minimum of three samples for smaller fields.

Nematodes - When soil sampling, collect for salinity, set aside some of the soil from the 12-24" depth samples for nematode analysis. Submit the soil to a lab that can test for nematodes. For almond and other stonefruit, nematodes of concern are ring, root lesion, and rootknot. If counts are greater than 50 per liter (or 500 grams) of soil for root lesion and rootknot, or 25 for ring, contact the local UC Cooperative Extension farm advisor for specifics

on pre-plant soil treatment options. Some common species of root lesion nematodes feed primarily on weeds and are of little concern to almond growers. Therefore you must request that the lab identify which species of root lesion is present.

Water source - The source of irrigation should be considered when planting. This includes the quality and quantity. Ideally, water should be less than 1.0 dS/M in EC, with a sodium adsorption ration (SAR) less than 3, chloride under 5 meq/L, and boron under 0.5 mg/l (0.5 ppm). Water pH should be 7.2 or less, and may need to be amended if it is too alkaline. If the SAR is greater than three, gypsum should be used to increase calcium levels. If water contains higher amounts of sodium, chloride, or boron, either an in-season or dormant leaching program should be planned, which will require 15-30 percent more water, depending on the salt concentration. Gallons per minute of a well should be known prior to establishing the irrigation system.

Soil pH - Soil pH over 7.5 will make some micronutrients bind more strongly to soil particles and reduce their availability to be taken up by plant roots. Low pH will also effect micronutrient availability, especially if pH is below 6. If the soil is highly alkaline (or acidic), and amendments can not reduce (or increase) soil pH adequately, poor growth and deficiency will occur. Ideally, the range is between 6.4-7.5, with peach-almond hybrids performing better in alkaline soils. Acidifying agents may help reduce pH in alkaline soils, although the amounts needed to modify the soil are often very high. In acidic soils, lime should be considered to help increase the pH into the desired range.

Soil stratification - Soil layering can create problems with water infiltration. Backhoe pits should be dug to determine if soil layering occurs and if the soil should be modified. Soils with stratifying layering in the top four feet probably require some type of modification. If the soils contain multiple clay lenses, slip-plowing may be the best option, while deep ripping is often sufficient to break up hard-pan layers. If you decide to modify a soil, consult with a local Extension advisor for details on local soil conditions. When modifying soils, the shank length must be 1.5 times greater than the targeted depth of modification.

Water table - If in a high risk area, dig backhoe pits to determine the depth to the water table. If the water

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⤴ A first leaf tree showing severe zinc deficiency due to a high soil pH (>8.5). “Pushing the limits” when planting almond trees often leads to increased operational costs and risk of tree loss.

table is too shallow, this will keep the root system too wet, killing the trees. The wetting front may be several feet higher than the standing water level, and tree roots must be kept out of this soil. The minimal depth to the standing water should be 7’ (wettered front no higher than 5’) and ideally should be 10’. Keep in mind that water tables often fluctuate, and may kill the orchard if the water rises too high. Also of concern is the quality of the groundwater. Sample the water to determine salinity levels. If too high, do not plant. Keep in mind that the water table may only be present in the summer as irrigation water will accumulate on hardpan layers (i.e. a perched water table).

There are many other site specific characteristics that should be considered prior to planting an orchard. A consultant, local farmer, or UC farm advisor should be included in the plans to help determine the suitability of the parcel. This is especially true if there are no orchards in the area.

Rootstock Selection - “The Best Defense.”

We are very fortunate to have a wide diversity of rootstocks available in California. Proper rootstock selection can help mitigate soil problems and provide a better chance of optimal production. When selecting a rootstock, it is important to have the soil, water, and nematode analysis as these factors will determine rootstock selection. Not all rootstocks are offered by all nurseries, so, in some cases, the rootstock of choice may determine the nursery.

Soil and water salinity and pH should be a primary consideration when selecting a rootstock. With soil or water containing high sodium or chloride, field and greenhouse research suggests that peach-almond hybrids (Hansen 536, Brights Hybrid, Cornerstone, etc.), ‘Empyrean-1’, and ‘Viking’ rootstock are more tolerant than Nemaguard, Lovell, and Krymsk-86. In alkaline soils, field observations suggest that peach-almond hybrids are more vigorous, and often show less signs of micronutrient deficiency. Work is still being done in high boron soils, but preliminary data suggest that peach-almond hybrids may be more tolerant.

Ring, root lesion, and rootknot nematodes are the major nematodes of concern in almond orchards. Historically, rootknot nematode was a significant problem until resistant rootstocks were developed. As the name suggests, rootknot nematode causes galls or knots to form on the roots, leading to reduced productivity and low vigor. Many –but not all- modern rootstocks are resistant to rootknot nematode. Rootstocks ‘Lovell,’ ‘Krymsk-86,’ and ‘Paramount,’ or ‘GF677’ are known to be susceptible to this

Continued on next page »

devastating pest. Ring nematodes, which are more common in sandy soils, can cause severe stunting in almond trees as well as predispose the tree to bacterial canker. There is no true resistance to ring nematodes resistance among current rootstocks, but ‘Viking’, ‘Guardian’ and ‘Lovell’ are the most tolerant. Root lesion nematodes are a particularly tiny type of nematode found in all soil types. It causes stunting of trees that impacts vigor and yield. Typically, trees with high inherent vigor are able to “outgrow” the stunting caused by this nematode. Therefore, more vigorous rootstocks (e.g. peach - almond hybrids) tend to be more tolerant of root lesion nematode.

Soils that are prone to saturation may have an increased risk of tree loss due to lack of oxygen (i.e. “wet feet”) or *Phytophthora*. In these soils, plum or plum parentage rootstocks should be considered. Among the plum rootstocks, the most experience has been with ‘Marianna 26-24, which is incompatible with ‘Nonpareil’ and produces a lot of root suckers. Newer peach-plum/plum-almond crosses have been released in recent years. These include ‘Krymsk-86’ and ‘RootPac-R’ and both are compatible with ‘Nonpareil.’ ‘Krymsk-86’ has been planted widely in the Sacramento Valley as it tends to have less blow-over and tolerates saturated soil conditions in the spring. Research has found Krymsk-86 tolerant to *Phytophthora megasperma*, a common soil disease. ‘Krymsk-86’, however, is not resistant to rootknot nematode and is not tolerant to sodium and chloride. ‘RootPac-R’ is a relatively new rootstock in California and research and field observations are still being conducted.

When choosing a rootstock, take into account all of the factors of the future orchard. In many cases, there are multiple issues that may not be covered completely by a single rootstock (e.g. high salts, high nematodes). In these cases, it is important to consider the options and determine which characteristics are manageable with orchard cultural practices, and select the rootstock for the more challenging condition.



⤴ Backhoe pits reveal many things including the potential of a water table and soil stratification. They should be dug in any parcel that is being considered for a future almond planting.

Variety Selection.

Choosing varieties for the orchard can be challenging. Variety selection should take into account disease pressure, bloom and harvest timing, marketability, early fall rain potential, bee availability, and operational timing. For the most part, there are three types of variety systems to be considered: a ‘Nonpareil’ containing orchard, a self-compatible orchard (e.g. ‘Independence’ or ‘Lonestar’), or a hard shell orchard (e.g. ‘Butte’ and ‘Padre’). Each system has its strengths and weaknesses and should be discussed with local farmers, marketers, and UC Farm Advisors.

The decisions that are made in establishing an orchard are critical for establishing a highly productive orchard. If questions arise, seek assistance in order to develop the best development plan. Since it is very difficult to make major changes to the orchard after planting, this is the critical time to do the research and put into action the best development plan for your operation.

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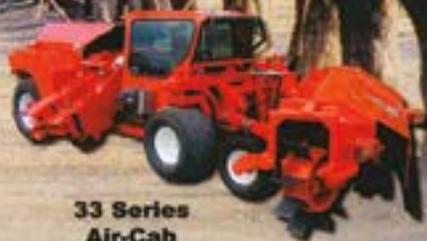
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