

# Q&A Almonds

with  
GUANGWEI  
HUANG



## Understanding almond shelf life

When it comes to nuts, almonds are marvels of longevity. According to **Guangwei Huang**, principal scientist at the Almond Board of California (ABC), raw almonds can live a palatable life of up to two years if stored at ideal conditions. What are those optimal conditions, and what can be done to maximize them for almond longevity? We sat down with Huang to discuss what impacts almonds' lifespan.

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To start, why is it important to understand almond shelf life?

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**HUANG**

Manufacturers and processors need to pay attention to almond shelf life because they need to maintain the integrity of their product and its reputation with consumers. Consumers can use their own taste buds to tell if an almond is at the end of its life—because it can go rancid. That can cause some to lose confidence in the product. So we want almond users to pay attention to shelf life preservation so they'll always have the best-quality almonds to present to consumers.

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What threatens almond shelf life?

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**HUANG**

Oxidation is the major concern. Like all nuts, almonds are high in oil, and any food containing high levels of oil can be vulnerable to lipid oxidation, especially when exposed to high temperatures or a high-oxygen environment. Lipid oxidation starts with the release of fatty acids, and later, if the free fatty acids become exposed to oxygen or free radicals, they oxidize and generate intermediary compounds that gradually break down into volatile compounds, like aldehydes, that produce rancid notes.

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What conditions hasten oxidation?

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**HUANG**

It's important to remember that the almond is a living kernel—a seed. So it interacts with its environment. High humidity, for example, accelerates the release of fatty acids. High temperatures accelerate it even more. So both high temperatures and high humidity work together to increase the release of free fatty acids that become oxidized if exposed to oxygen.



How can we counteract these factors?

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#### HUANG

If the almond's moisture content stays below 6 percent—ideally between 3.5 and 5.5 percent—almonds can remain stable and have a long shelf life of up to two years. But for that to happen, it's important to maintain a storage environment that's between 50 and 60 percent relative humidity. As I mentioned, temperature can also impact both fatty-acid release and oxidation. One study we conducted found that storage temperatures below 59°F can protect almonds. And ideally, sealed plastic bags or tightly sealed storage containers serve as decent water and air barriers.



What role does packaging play in shelf life?

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#### HUANG

Packaging is especially important with roasted almonds, because high roasting temperatures initiate some lipid oxidation. So packaging that provides a better oxygen barrier— particularly nitrogen flushing or vacuum packaging—keeps oxygen away and slows down oxidation. Packaging also prevents or slows down product water absorption from humid environments to further extend shelf life.



You've described actions we can take to optimize almonds' quality life. But what "built-in features" help almonds protect themselves?

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#### HUANG

First, almonds are low in moisture—around 3 to 6 percent. Second, almonds' lipids are primarily monounsaturated and more stable than the polyunsaturated fats in walnuts or pecans. At the same time, almonds are high in vitamin E, which is a natural antioxidant that defends against oxidation. Almond skins contains another group of antioxidants called polyphenols, which also protect against oxidation. And most importantly, almonds have a strong cellular structure that protects oil droplets in a honeycomb-type network. So, almonds' built-in protections that give them a naturally long shelf life include their low moisture, proper fatty-acid profile, vitamin E, skin polyphenols and a protective cellular structure.



ABC funds extensive almond research and the Board has invested \$6.5 million in studying almond quality and safety since 2001. What are the latest findings you've uncovered?

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#### HUANG

We just completed two shelf life studies, one at the University of Georgia and one in China. We looked at raw and roasted nonpareil almonds under different storage and packaging conditions to understand how different combinations of humidity, temperature and packaging affect shelf life. Every two months we took samples for analytical testing and consumer-panel evaluations, and we found that consumer rejection is driven more by texture changes. So if humidity and temperatures increase, the almonds' crunchy texture deteriorates, and that plays a greater role in consumers' responses than the chemical changes associated with rancidity. We found that packaging can extend shelf life by four to 18 months, depending on the conditions. And, we're continuing to fund research on almond quality and safety – visit [www.almonds.com/food-professionals](http://www.almonds.com/food-professionals) to learn more, or contact [foodprofessionals@almonds.com](mailto:foodprofessionals@almonds.com).