

Take It Easy: Smart Roasting for Long-Lasting Almond Quality

Almond-roasting Research Update

In the grand ranking of America's favorite nuts, it's hard to find a greater crowd-pleaser than the almond. Time and again, consumers affirm their fondness for almonds, both as a singular snack and as an ingredient in today's most popular foods. In fact, a report by the Boulder, CO-based Sterling-Rice Group identified the almond as the nut consumers consider "most irreplaceable," with 78% of North Americans agreeing that products made with almonds taste better, and fully 81% believing that those products are simply "more interesting."

If almonds make foods more interesting as-is, imagine the excitement they bring when they're roasted, with all the tempting tastes, textures and colors that produces. Unfortunately, the roasting process can be tough on the almond, and when done improperly not only fails to produce the qualities consumers crave but may change the nut in ways they actively dislike. Research from the Almond Board of California (ABC) reminds us that roasting low and slow keeps almonds in stellar shape, and helps them stay that way longer.

Roasting Done Right

Standard dry roasting is a well-established procedure in the almond-processing industry. It operates on a basic convective model, harnessing the flow of hot air—ranging in temperature from 265°F to 320°F—to heat the almond kernel until the desired changes emerge.

Those changes are familiar to anyone who's ever enjoyed roasted almonds, starting with texture. By reducing the moisture level of the natural almond from as high as 6% down to roughly 2.5%, roasting leaves the nuts with the unmistakable crunch that consumers love.

And the interaction of the almond's naturally occurring sugars and amino acids at roasting temperature triggers the Maillard browning reactions that darken the nut to a golden hue and—even more pleasingly—produce the volatile compounds responsible for those irresistible roasted-almond aromas and flavors.

The extent to which these changes occur depends on the time/temperature parameters of the process, as well as on system factors like heat distribution, nut bed depth, throughput rate and air velocity—not to mention the initial moisture content of the almonds themselves. In general, though, processors can achieve a light to medium roast in anywhere from no less than 25 minutes to 55 minutes, depending on the roasting temperature.

Critical Criteria

That's a broad window within which to operate, and practices throughout the industry vary. But savvy almond processors know that no matter how long it takes, a good roast will maintain uniform heat treatment, provide consistent quality and preserve almond integrity.

The problem is, processors can *sometimes* roast so zealously that they make it all but impossible to sustain those critical criteria. As Guangwei Huang, the ABC's principal scientist, explains, "When roasters

are too anxious to achieve a high degree of roasted color and flavor, they may take the almonds to a temperature so high that it endangers them.”

Anatomy of an Almond

To understand why, you first have to understand the anatomy of the almond. Among the intricacies of its cellular microstructure is a honeycomb-like network of globular “sacks” called oleosomes. These oleosomes contain the monounsaturated and polyunsaturated oils that give almonds their heart-healthy benefits. Along with naturally occurring antioxidants, these networks protect the almond oils from the oxygen exposure that will lead to the oxidation.

Keeping these protective networks intact is integral to staving off almond oxidation and rancidity. “Our research,” Huang says, “shows that we can minimize the damage to the almond by manipulating time and temperature parameters to preserve this microstructure and maintain a good shelf life.” The key, he says, is “to roast almonds at the lowest possible temperature for the shortest possible time.”

Low and Slow

In other words, taking an almond to as high as 300°F in a short time may generate too much heat, too soon. That’s because early in the roast, as the almond is heated up, the water in the cellular structure starts to boil,” Huang explains. If the water vaporizes and escapes from the kernel too rapidly during a ‘glass-like’ stage when it’s more fragile, it ruptures the cellular structure and destroys the oleosomes more, leaving the almond’s oils exposed to oxidation.

Far wiser, Huang says, is to roast in a two-stage process that initially drives off moisture by heating the almonds to 265°F to 270°F, where the cellular structure reaches an elastic stage—“possibly below 280°F and certainly below 300°F,” he stresses. That done, the almond is no longer in the vulnerable stage—there’s no longer much water to escape—and it can now handle the higher heat needed to develop a richer roasted character. “Once you get the water level down while preserving the almond integrity,” Huang says, “then you can reach a higher temperature to bring out a desirable flavor, color and texture.”

But Huang still recommends finishing the roast at a moderate temperature, preferably lower than 290°F. Processers “may have a tendency to roast their almonds so high that they get as much roasted note as possible,” he notes, “but we encourage them not to strive for strongest roasted flavor, and rather to reach a moderate flavor that still maintains a longer shelf life.”

Fresher Nut, Better Flavor

The wisdom of this approach is self-evident: Consumers love the toasty qualities of highly roasted almonds, but they won’t love the rancid flavor if its oils have oxidized. “If that happens,” Huang cautions, “you will lose consumers. They won’t give your product a second chance.”

Of course, two-stage roasting isn’t the only strategy for protecting almonds from shelf life degradation. Huang points out that oxidation can start immediately after roasting, so “proper post-treatment handling is also crucial to sustaining almond quality.”

That means cooling the almonds promptly—but gently—to below 85°F, and storing them away from both moisture, which can soften the nut and encourage mold growth, and oxygen and light, which can prompt oxidation. Barrier packaging and storage conditions below 40°F and 65% humidity are best.

And because even the most carefully roasted almonds oxidize with time, Huang suggests using roasted almonds in applications as soon after roasting as possible. He recommends holding almonds no longer than two weeks at ambient condition without proper packaging following roast, the better to ensure a fresher product. “Besides,” he adds, “freshly roasted almonds taste best. The fresher the nut, the better the flavor.”