

Impact of almond form and moisture content on texture attributes and acceptability

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Highlights

- Moisture content of almonds affects important texture properties
- Almond crunchiness does not increase at moisture levels below 4% but decreases significantly at >6% moisture
- Consumer ratings for “texture liking” were highly linked to ratings for almond crispness, crunchiness and persistence of crunch
- Almond producers can use this information to provide customers with almonds having texture properties important to consumers

Summary

Texture—particularly crispness and crunchiness—is the most obvious sensory attribute of almonds. The sounds produced by a food during chewing are important for crispness and crunchiness. Sensory crispness and crunchiness can be related to the moisture level in a food.

This study examined how sensory texture in various almond forms is influenced by the moisture content and how that impacts consumer liking. The almond forms evaluated included whole (natural, blanched, and dry roasted), sliced, and slivered. Two types of sensory studies—descriptive analysis and consumer liking—were performed. Table 1 presents definitions used in the study for the key almond texture attributes. Some of the major study findings are provided below, but see publication for more detailed results and statistical analyses.

Descriptive analysis results: Dry roasted almonds were generally harder and more crisp and crunchy than natural almonds, which were, in turn, more hard, crisp, and crunchy than blanched almonds. Crispness, number of pieces, hardness, crunchiness, persistence of crunch, and particulate mass decreased with increasing moisture content. Compared with the whole almonds, sliced and slivered almonds had less hardness, less crunchiness, less cohesiveness, and less tooth packing. Compared with slivered almonds, sliced almonds were less hard, broke into fewer pieces, and had less moistness and cohesiveness of mass.

Consumer liking results: Dry roasted almonds with low (~2%) or normal (~3%) moisture contents were the best liked whole almond forms. Almonds with high (6–8%) moisture contents received significantly lower liking ratings than almonds with low or normal levels. For all almonds tested, consumer texture liking ratings were highly positively correlated with the attributes crispness, crunchiness, and persistence of crunch.

Methodology: Before evaluation, some almonds were dried or humidified to obtain samples containing low or high levels of moisture; “normal” moisture almonds were as obtained from the processor. In the descriptive analysis study, 5 forms of Monterey almonds were evaluated by a trained sensory panel of

thirteen individuals: natural whole, dry roasted natural whole, blanched whole, blanched slivered, and natural sliced. 13 panelists evaluated almond texture attributes of 20 different samples. Texture attributes were similar to those described in the original almond lexicon (Civille et al., 2010, J. Sensory Studies 25:146–162), with some modifications. In the consumer liking study, whole almonds (natural, blanched, and dry roasted at 4 moisture levels) were evaluated. A panel of 113 consumers, ages 18 years or older, rated samples for liking (overall liking, texture liking, and flavor liking) and for texture attributes (hardness, crispness, crunchiness, and toothpack).

Table 1. Selected almond texture attributes, definitions, and reference examples*

Attribute	Definition	Reference examples (20-point scale value)
First bite		
Hardness (to split/crack)	Action: Using the molars, bite through the sample Perceive: Force required to bite into and crack sample	
Crispness	Action: Using the molars, bite through the sample Perceive: Amount of high pitched sound	Celery = 18, Saltine cracker = 10
Hardness (to grind pieces)	Action: Using the molars, bite through the cracked sample after the first chew Perceive: Amount of work taken to create smaller pieces	
Chewdown		
Cohesiveness	Action: Chew using your molars Perceive: The degree to which the mass holds together	Pure Protein bar = 15, Zone Perfect bar = 3
Crunchiness	Action: Chew using your molars Perceive: Amount of low pitched sound	Almond (Trader Joe's raw) = 7
Persistence of crunch	Action: Chew using your molars Perceive: The number of chews that the sample still has a crunchy sound	
Residual		
Toothpack	Action: Swallow or expectorate the sample Perceive: The amount of product left in the teeth crevices after sample has left the mouth	Zone Perfect bar = 12

* Adapted from Vickers et al., 2014.