

RESEARCHERS PILOT NEW INGREDIENT APPLICATIONS FOR ALMOND HULLS

Almonds have been the top nut in global new product development since 2006, due in part to their over 14 versatile ingredient forms like almond butter, almond milk and almond protein powder. All of these ingredients are processed from whole almonds, which are known for their well-rounded nutrient profile offering six grams of plant-based protein, four grams of filling dietary fiber, 13 grams of good unsaturated fats and just one gram of saturated fat per one-ounce serving.

But almonds are just one of four valuable products grown in the orchard: the whole almond kernels we eat grow in a fuzzy outer hull, protected by a shell, on a tree. A new research partnership between the Almond Board of California and Mattson, a food and beverage innovation firm, is exploring how consumers may one day also eat almond hulls for nutritional and sustainability benefits.

California almond growers, who provide 80 percent of the world's almonds, currently take a zero-waste approach to their agricultural coproducts. Almond hulls are traditionally used in animal feed, and research has shown adding up to 15 percent of ground hulls into poultry diets can provide protection against Salmonella infection without affecting egg production. They can also be used as a growing medium for mushroom cultivation to replace traditional peat moss, a non-renewable resource that's often imported to the U.S.

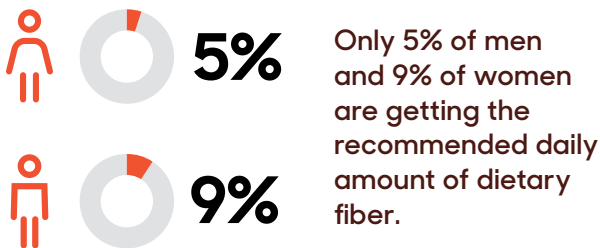
Mattson's proof-of-concept research has found that almond hulls bring nutritional value in the form of fiber, minerals and antioxidants in phytochemicals, while offering a unique flavor profile. Almond hulls taste mildly bitter with desirable fruity and vanilla notes, and may have promising uses for human consumption as a value-add ingredient in bakery products, coffee and nutritional bars.



BOOSTING FIBER IN NUTRITION BARS AND BAKED GOODS

A [study](#) analyzing data from more than 14,600 U.S. adults who participated in the National Health and Nutrition Examination Survey between 2013–2018 found that only 5% of men and 9% of women are getting the recommended daily amount of dietary fiber. As manufacturers seek clean-label ingredient solutions to dietary needs, almond hull flour may be used to achieve fiber claims.

Mattson found that almond hull flour performs well in performance nutrition bars, adding more fiber and antioxidants compared to traditional bars on the market. In Mattson’s almond hull nutrition bar prototype, the almond hull flour more than doubled the fiber content and halved the total carbohydrates compared to popular protein bars. In bread, Mattson achieved a “good source of fiber” claim without additional fiber-boosting ingredients by substituting a percentage (5.2%) of almond hull flour for all purpose flour.



REDUCING COSTS AND IMPROVING SUSTAINABILITY STORIES IN COFFEE

With ongoing production and climate challenges, [the cost of coffee beans](#) is squeezing manufacturer margins. Mattson’s research found that almond hull flour may have promising use as a bulking agent in traditional ground coffee, replacing up to 10–20% of beans. The hulls’ natural bitterness complements coffee’s flavor profile, adding complexity and creating a perception of improved, smoother flavor quality compared to pre-ground coffee. With further research, manufacturers could consider incorporating ground and roasted almond hulls to reduce sourcing costs and play a key role in agricultural upcycling.

ADDITIONAL BEVERAGE INDUSTRY USES IN BEER AND TEA



As with coffee, the bitterness and fruity characteristics of almond hulls may be used as a hops substitute or amendment in brewing beer. Mattson posits that like hops, almond hulls are high in polyphenols that could provide natural antioxidants. In tea, almond hulls’ may be roasted and ground to leverage their bitter, floral notes—but further research is underway to explore these promising avenues.

As upcycled food gains popularity and consumers seek convenient ways to eat more fiber, almond hulls have the potential to help manufacturers generate more value and contribute to a circular economy. With further adoption and demand from suppliers and manufacturers, almond hull flour could be a promising new ingredient bringing new nutritional, cost and sustainability benefits in a variety of categories like bakery, bars, beverages and more.



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