

THE ALMOND FERMENTATION LAB



ALMOND FERMENTS 1x1 FOR INDUSTRY & FOODSERVICE PROFESSIONALS

Why Fermenting Almonds - Now?

Plant-based has moved from niche to mainstream. A growing population of vegans, vegetarians and flexitarians is seeking plant-based foods that truly deliver on taste and nutrition— not compromise on either. For the next wave, products must taste good, have great mouth feel, be natural and nutritious. Simply being “plant based” is no longer enough.

Fermentation offers proven pathway forward. For centuries, fermented foods have been dietary staples across cultures. These traditions exist because fermentation works: it creates deeper flavor, better texture, improved digestibility, and enhanced nutritional value. Beyond taste, fermented foods are recognized for their role in gut health, delivering beneficial microbes and supporting digestive wellness—a concern that increasingly drives consumer choice.

Almonds add

- A strong nutritional profile (good unsaturated fats, plant protein, fiber, key micronutrients like vitamin E and magnesium)
- A familiar, trusted flavor with broad consumer acceptance
- A natural fit for premium, “better for you” concepts

This handout summarizes Berlin-based fermentation expert Edible Alchemy’s exploratory work on fermented almond prototypes and offers a practical guide for using fermentation with almonds in a professional context.



Fermentation Fundamentals - With Almonds as a Base

What is fermentation in food?

Fermentation is the controlled growth of desirable microorganisms (bacteria, yeasts, molds) that transform food.



In practice, this means

- Creating new taste
 - Acidity, umami, aromatic complexity
- Creating new texture
 - From liquid to curd, from paste to sliceable cake
- Converting sugars → acids, gas and flavor compounds
- Modifying proteins and fats, changing mouthfeel and adding taste
- Relying on microbial processes rather than additives - microbes do the work

For almond-based products, fermentation mainly brings

- Tanginess & complexity
- Structure & viscosity, forming curd-like gels, pastes and spreads
- Perceived naturalness, as “fermented” signals crafted, traditional processes
- Functional benefits: almonds act as a prebiotic (food for beneficial gut microbes), and when fermented, the fermented almond products act as a probiotic, supporting digestive health.



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Main fermentation types relevant to almonds

Lactic fermentation on almond bases

- For cheese-style ferments and some spreads
- Uses lactic acid-producing bacteria (e.g. commercial lactic cultures)
- Typical effects:
 - Gentle acidity and “fresh cheese”-like flavors
 - Thickening/curding of a blended almond base into spoonable or spreadable textures

Koji/miso-style fermentation with almond flour

For almond miso, then:

- Turned into spreads and dips, or
- Used as a flavor base/umami component
- Uses koji mold (*Aspergillus oryzae*) to break down almond proteins and starches
- Typical effects:
 - Strong umami and savory depth
 - Complex, layered flavor that can stand alone or enrich other products

Tempeh-style fermentation with almonds (and beans or grains)

- Produces a solid, sliceable cake with almond pieces in a white mycelium matrix
- Uses *Rhizopus* mold (tempeh spores) to bind and lightly ferment the mix
- Typical effects:
 - Firm, sliceable or cubeable structure
 - Mild fermented notes and visible almond pieces for texture and appearance

Sourdough-style fermentation with almond components

- For sourdough breads and crackers with almond flour or pieces
- Uses mixed sourdough cultures (lactic bacteria + wild/added yeasts)
- Typical effects:
 - Improved crumb structure and crust
 - Enhanced flavor complexity, with almonds adding nuttiness and nutrition

Basic safety & control

Fermentation is about favoring the right microbes.

Key levers

- Substrate quality
 - Sufficient fermentable carbohydrates in the overall recipe
- Time & temperature
 - Within ranges that support the desired microbes and limit others
- Hygiene & process discipline
 - Clean equipment, consistent procedures, clear rules for when product is discarded

In professional settings, fermented almond processes should

- Have documented time/temperature/salt (where relevant)
- Be integrated into existing food safety systems (e.g. HACCP)
- Use appropriate lab testing when moving from small test batches to pilots

Almonds as a Fermentation Base

Why almonds work well

Composition

- Unsaturated fats → creamy textures, rich mouthfeel
- Plant protein → supports structure and a credible nutrition story
- Fiber and micronutrients → nutrient-dense base
- Carbohydrates → can support fermentation, often complemented by the overall recipe
- Emulsifying properties → when added to spreads, dips, cheeses and miso-based products, almonds act as a natural thickening and creamy agent, creating smooth, luxurious textures without additional stabilizers



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Flavor & perception

- Clean, familiar almond flavor
- Works well with savory, cheesy and umami directions when fermented
- Strong associations with “natural,” “healthy,” and “premium”
- Neutral canvas: Almonds’ clean, mild flavor allows fermentation cultures to develop distinctive tastes without competing notes

Fermented almond products can combine

- Culinary appeal (fermented, crafted, flavorful)
- Nutritional appeal (good fats, protein, nutrient-rich base)



Almond formats that matter for fermentation

With 14 forms, almonds offer a variety of bases to be fermented. The following are especially promising:

- Whole almonds
 - Soaked, blanched, blended to a smooth base best for cheese-style ferments and creamy spreads
 - Left whole for tempeh-style products
- Almond flour
 - Fine particles for doughs and batters
 - Best for sourdough breads and crackers, textural additions
- Defatted almond flour
 - Lower fat, higher protein and fiber
 - Ideal for almond miso and umami pastes
- Almond spreads/pastes
 - Ready-made smooth carriers for further fermentation or flavoring
 - Useful as quick bases and to adjust texture

From Goals to Prototypes – Practical Routes with Fermented Almonds

Edible Alchemy’s almond-centered prototype routes

These routes and prototypes come from Edible Alchemy’s exploratory work and can be adapted for industry and foodservice use.

Prototype A – Cheese-Style Almond Ferments

- What it is: Soft, spreadable fermented almond product, positioned as a fresh, cheese-style alternative.
- Taste profile: creamy, gently tangy, subtle cheese-like richness
- Base: Soaked (optionally sprouted/blanched) whole almonds, blended smooth.
- Fermentation: Lactic starter culture / “fermentation pill” to create gentle acidity and curd-like texture.

- High-level process: Soak → blanch → blend → lactic ferment → optionally ripen and season.
- Target & uses: Mild acidity, creamy spreadable texture; can be further dried for a firmer or “parmesan-style” product. Spreadable cheeses, fillings (pasta, sandwiches, canapés), premium toppings in foodservice.

Prototype B – Almond Miso “Umami Paste” & Miso-Based Spreads/Dips

- What it is: Miso-style ferment based on defatted almond flour, koji and salt; used as a concentrated paste and as a base for spreads/dips.
- Taste profile: rich umami depth with savory complexity
- Base: Defatted almond flour + koji + salt.
- High-level process: Mix almond flour + koji + salt → ferment warm for days/weeks → mature → use as paste or in blended spreads.
- Target & uses: Concentrated umami paste:
 - As a flavor booster/partial salt replacer.
 - As a base for ready-to-eat spreads and dips.
 - Almond miso spreads/dips, flavor and umami booster in sauces and soups, partial salt replacement in dressings and marinades.



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Prototype C - Tempeh-Style Almond Protein

- What it is: Tempeh-style, sliceable fermented product with visible almond pieces.
- Taste profile: firm and nutty with earthy, mild fermented notes
- Base: Almond pieces + partner ingredient (e.g. bean or grain) + tempeh culture.
- High-level process: Hydrate almond pieces (+ partner ingredient) → inoculate with tempeh spores → incubate warm to form a firm cake → slice/cube.
- Target & uses: Firm cake, sliceable or cubeable; pieces that can be marinated, fried, baked. Protein elements in bowls and salads, sandwich fillings, hot dishes (“fermented almond protein” concepts).

Where Fermented Almonds Fit in Practice

For manufacturers / brands

- Plant-based cheeses and spreads using fermented almond bases
- Chilled sauces and dips with “almond miso” or “fermented almond” as a key differentiator
- Flavor bases/B2B ingredients, e.g. almond miso pastes for soups, sauces and ready meals

For foodservice / chefs

- House fermented almond spreads, butters and toppings
- Signature fermented components in sauces, glazes and garnishes
- Menu storytelling around almond-based ferments as crafted, premium and nutritionally credible

Practical considerations

- Fermentation adds time, space and process steps – plan for basic control of temperature and hygiene
- Terms like “fermented almond” and “almond miso” may need a short explanation on menus or packaging
- Clear positioning as culinary, crafted and nutritious helps set expectations

Contacts & Collaboration

These concepts are starting points, not finished SKUs. They are intended to spark R&D discussions and inspire further development with industry and foodservice partners.

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For almond category insights, technical information and partner matchmaking
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Edible Alchemy is a Berlin-based fermentation studio working at the intersection of craft, education and product development.
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