

A New Trend is Sprouting: Sprouted Grains 101

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Nutrition & Product Innovation



Discussion Points

Sprouting and what changes occur

- Germination
- Enhanced bioavailability
- Anti-nutritional factors

Food industry use of sprouted grains

- Growing in popularity
- functional attributes and commercial uses

Commercialization and marketing of sprouted grains

- Challenges
- Effective ways to market

Sprouting (*positive processing*)

Traditional method of food preparation, finding a modern day resurgence as a superfood trend

A sprouted grain is a germinated seed...

awakened from it's dormant state



Germination



Initiated by proper conditions of temperature, moisture, and light

Activates enzymes and a cascade of chemical reactions within the seed

The amount of time the seed is subject to these conditions will determine whether a visible sprout will emerge

Length of sprouting time has direct impact on the nutritional attributes of a seed

Effects of sprouting

- “Digestion” of the seed is initiated, resulting in structural breakdown of macronutrients (ex: protein to amino acids)
- Reduced anti-nutrients (phytic acid, tannins and lectins)
- Increased bioavailability of micronutrients phosphorus, iron, zinc, calcium, magnesium, manganese, potassium and folic acid
- Increased antioxidants (vitamins E and C)
- Increased protein (essential amino acids increase)
- Increased fiber content



Sprouted Grains



Phytic acid was reduced by 45% in sorghum after 48 hour of germination

Phytic acid was reduced by 27% in brown rice after 48 hours of germination

Sprouting of pearl millet for 24 hours reduced phytic acid by more than 50%

Total phenolics content in brown rice flour increased by 28.8% (48 hours of germination)

Germination for 24 hours increased total free amino acids by 4.5-fold in finger millet

Omega 6 fatty acids increased in sprouted brown rice after 3 days of sprouting (from 17% to 22%) and GABA more than doubled

Omega 3 fatty acid were shown to increase significantly in sprouted wheat

The wheat was sprouted for 9 days and the study does not indicate on which day the fatty acid profile began to shift

A Closer Look at Phytic Acid (Phytate)

Think of phytic acid as a nutrient storage locker requiring a key to open

- Often referred to as an anti-nutrient
- A storage form of phosphorus that tightly binds essential micronutrients needed to fuel the propagation of the seed
- Phytate and the nutrients bound to it cannot be absorbed in the digestive tract without enzymatic degradation by phytase
- Once these micronutrients are unlocked from the phytic acid structure, they become available for digestion

Sources of Phytase

- **Endogenous plant phytase**
- **Microbial phytase** (fungal and bacterial)
- **Phytase generated by the mucosa of the small intestine**
 - Endogenous phytase activity of humans and animals is insignificant in contrast to plant and microbial phytase
 - very low phytase activity occurs in small intestine and has limited ability to degrade phytate
- **Gut-associated microflora phytase**

Phytic Acid: Potential Therapeutic Uses

Apart from being an antinutrient, dietary phytate exhibits beneficial health effects

- Antioxidant properties
- Anti-cancer agent (through a variety of mechanisms)
- Promotion of DNA repair
- limits site-specific DNA damage
- Anti-proliferative effect on tumor cells
- Inhibits cancer progression
- Has the ability to chelate and inactivate pro-oxidant metals
- negative correlation exists between phytate intake and blood glucose response

Lectins

- Carbohydrate binding proteins abundant in grains and legumes
- Many different lectins with different functions
- Part of the plants defense system (to deter from being eaten)
- May also have evolved as a way to keep seeds intact as they pass through an animals digestive tract
- Resistant to human digestion
- Antimicrobial effects
- Antiviral therapies warrant further exploration for potential medicinal uses
- Production of anti-tumor therapies based on lectins may also have a significant utility in therapeutic industry

FOOD FOR THOUGHT:

How might lectins positively or negatively impact the microbiome? Control unfavorable microbial populations?

Food Industry & Commercial Use

Trending: Consumer demand is growing and awareness increasing

One Degree Organic Foods and Silver Hills “have seen a surge in interest in the last 3-5 years with a sales increase of more than double for sprouted products in the last 3 years”

Darren Mahaffy, Vice-President, Marketing
One Degree Organic Foods

As consumers become more concerned about the processing their foods endure before they make it to the table, expanding on processing techniques helps provide reassurance; sprouted foods are on trend.

Food Ingredients First, Top 10: On Product Innovation



From Starbucks and Panera to Kashi we are seeing more and more companies offering products with sprouted ingredients

SPINS sales data showing growth in brands with sprouted offering like Simple Mills

Diverse Culinary Uses

- **Depth of flavor profile** (nutty, earthy)
- **Milled into flour** and used in bakery items
- Some sprouted grains are **ready-to-eat** (buckwheat and amaranth) and can be used as salad and yogurt toppings, in granola, cereals, etc.
- Put into commercial products- granola bars, cookies, cereals and other prepared foods in their whole (crunchy) form



Functional Attributes



- Enhanced nutritional profile
- Customized cook time- longer sprouting times result in ***significantly reduced cooking time*** (allows for blending of grains that otherwise cannot be cooked together)
- Degradation of gluten (gliadin) peptides
- Potential increase in shelf life (anecdotal/theoretical)
- Bread made with germinated brown rice flour (rice sprouted for 48 hours) showed 1.5 times higher total phenolic content, increased antioxidant activity and is **recommended for better protection against oxidation**

Industrial Production

Standardize manufacturing of sprouted grains to maximize nutritional and functional attributes

EX: Sprouting methods that do not submerge the seed in water may be favorable for retaining phytochemical attributes and reducing micronutrient loss (polyphenols are water soluble and can be lost with soaking water)

Pathogenic control:

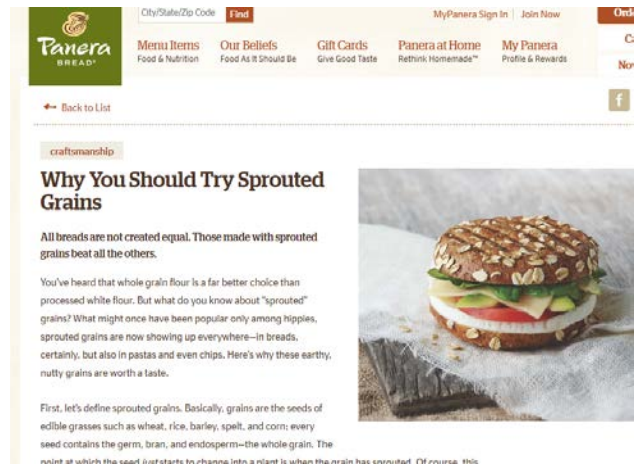
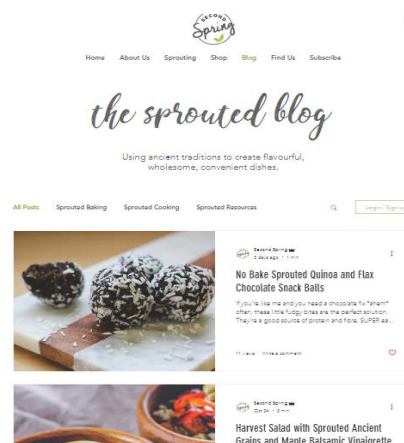
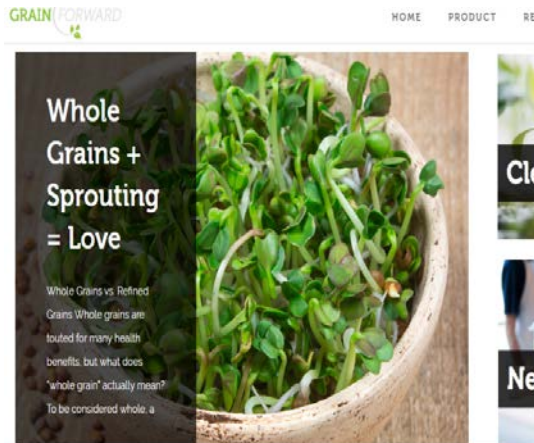
- Testing for contamination prior to germination
- Manufacturers have options for ways to organically sanitize ready-to-eat sprouted ingredients, without compromising nutritional integrity
- Most sprouted grains are not eaten raw and will be cooked in one form or another before consumption

Commercialization & Marketing of Sprouted Grains

Blog posts, newsletters and videos
Formats for more in-depth conversations with consumers are proving to be most effective in the marketing of sprouted grains

Consumer education is key!

Digestive ease
Enhanced nutritional attributes
Convenience



November 2018
#WholeGrains2018



Bringing it Together

Sprouting is a form of positive processing that has the ability to enhance the nutritional profile of grains and offers functional attributes like reduced cooking time

Additional research is needed to hone in on **most effective (standardized) manufacturing practices** and ideal sprout times to effectively capture functional attributes

Consumers are becoming more aware of sprouted ingredients and we are seeing **sales growth and increased market presence in this category**



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Thank you!

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