Sprouted Grains...Alive

Ardent Mills LLC
David Sheluga PhD
Director of Consumer Insights

Buzz over Sprouted in December 2014

The New Quinoa? Sprouted Grain About to Go Mainstream (PRWEB) December 23, 2014

"Sprouted grain is about to hit the consumer mainstream, like quinoa did last year."

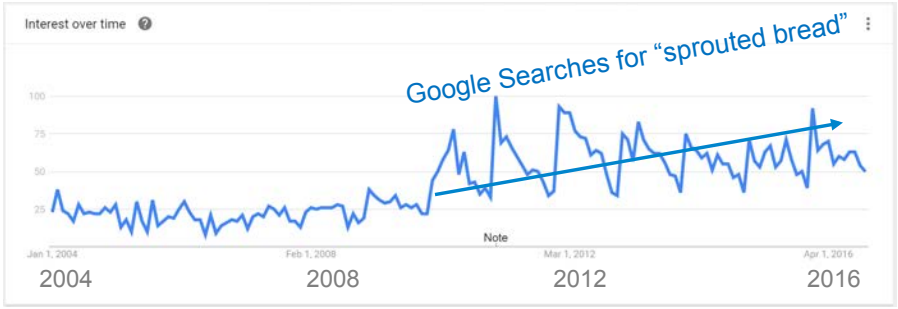
DECEMBER 31, 2014 FNI TEAM

Americas: Bakeries are retailing sprouted grain products in the US

Panera to introduce sprouted-grain baked goods

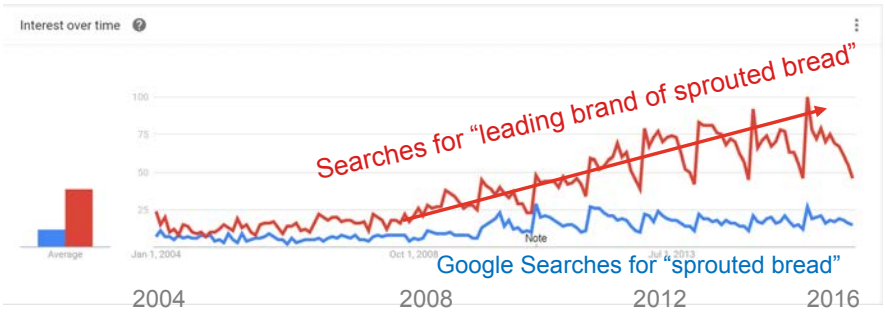
MOVE IS PART OF A BROADER PUSH BY NATIONAL RESTAURANT CHAINS TO SEEK ALTERNATIVES TO WHITE FLOUR.

Slight rise in interest in sprouted bread over time



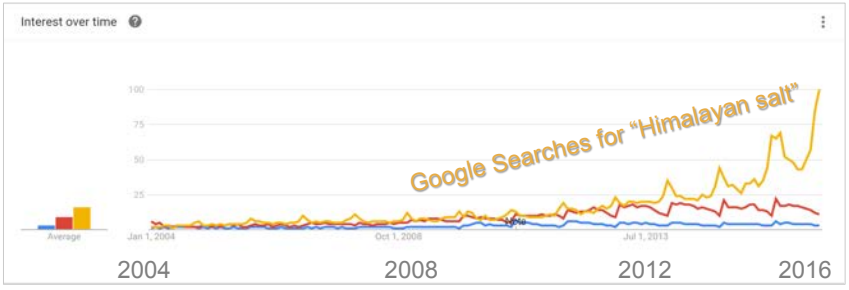
Source: Google Trends December 2016

Leading sprouted bread brand has much higher interest



Source: Google Trends December 2016

Himalayan salt much higher interest than sprouted bread



Source: Google Trends December 2016

Sprouted info limited on internet by December 2016

5 Reasons to Eat Sprouted Grains - Eligible Magazine
www.eligiblemagazine.com/2015/04/10/**5-reasons-to-eat-sprouted-grains**/
Apr 10, 2015 - As a society that loves **grain**-based foods, you're probably feeling overwhelmed and confused with the misleading information that's out there.

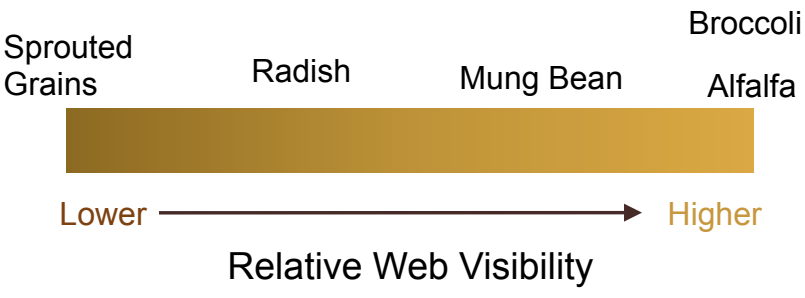
10 Reasons To Eat Sprouts | Care2 Healthy Living
www.care2.com/greenliving/10-**reasons-to-eat**-sprouts.html
Here are 10 **reasons to eat** more sprouts: ... During **sprouting**, minerals bind to protein in the seed, **grain**, nut, or bean, making ..... Siyus Copetallus**5** months ago.

Should You Be Eating Sprouted Grains? | Men's Fitness
www.mensfitness.com/nutrition/what-to-**eat**/should-you-be-**eating-sprouted-grains**
But what exactly are **sprouted grains**, and should you make the switch? ... You Be **Eating Sprouted Grains**? Is **sprouted grain** bread the next big thing or is what you're **eating** healthy enough? ... The **5** Foods To Avoid If You Want A Six Pack ...

Health Benefits and Risks of Sprouted Grains | Shape Magazine
www.shape.com/healthy-**eating**/diet-tips/ask-diet-doctor-benefits-**sprouted-grains**
Q: What are the benefits to **eating sprouted** foods like nuts, beans, and **grains**? ... **5** Nov. we must do daily exercise, if we want healthy life. Science Says It IS ...
You visited this page.

Eat Sprouted Grains For Greater Muscle Growth | Muscle & Fitness
www.muscleandfitness.com › Nutrition › Healthy Recipes
Sprouting your **grains** unlocks their full potential and yours. ... **5** Good Reasons to Eat Your Carbs; 7 Super Simple Snacks and Meals to Make this Season ...

Sprouted vegetables have more web coverage than sprouted grains



Source: Custom web analysis by First Sight Group, Spring 2015

Conclusion so far…

- Consumer interest and curiosity is low
- Consumer knowledge is low
- So….. Why the burst of interest among food developers and ingredient suppliers in 2014-2015?

Sprouted interest tied to enlightened eating

<u>Emotional drivers</u>:

1. New Beginnings
2. Belonging
3. Purity

Source: Custom web analysis by First Sight Group, Spring 2015

Desire for the Garden of Eden among enlightened eaters

Source: Custom web analysis by First Sight Group, Spring 2015

Sprouted means Resilience

Sprouted means ….

Spirituality

Purity

Leading sprouted bread brand leverages spiritual themes

- Dove of peace graphic
- Sunrise graphic
- Bible verse references
- "*25 years to become an overnight sensation*"

- Other bread brands leverage purity or spiritual words or symbols too.

Retail sales doing well

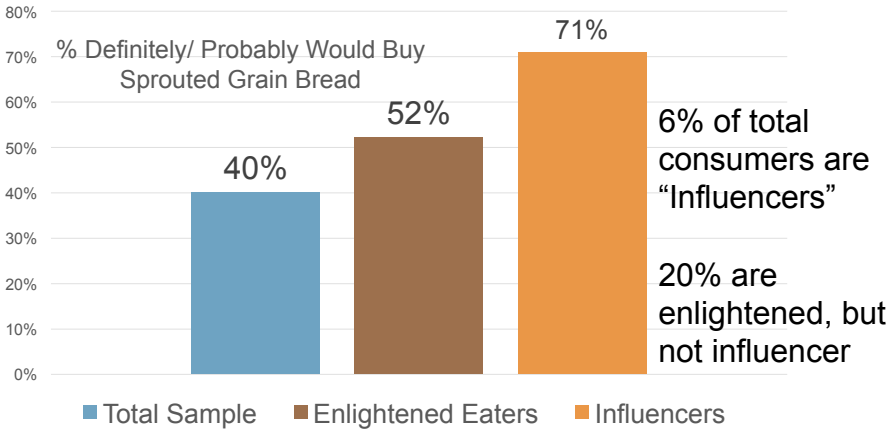
- $114 million in retail sales of grain-related products making a "sprouted" claim

- 75% of sales are bread.

Concept test to assess purchase interest

Source: Ardent Mills Concept Test June 2015

Strong purchase appeal among enlightened eaters



6% of total consumers are "Influencers"

20% are enlightened, but not influencer

Source: Ardent Mills Concept Test June 2015

Reasons were vague

Among enlightened eaters who said "Definitely Would Buy"..

"Sounds good"

"Sounds healthy"

"Looks delicious"

"Seems good for you"

Only 3 people mentioned the word "sprouted" in their reasons

Sprouted Grains… alive

- Promise of new beginnings
- Shows resilience after tough times
- Purity of springtime water, air, sunshine
- Suggests spiritualism

Strongest appeal is among enlightened eaters

Sprouted Grains… Alive and Well

Ardent Mills LLC
Sumana Bell PhD
Principal Scientist

The motivation

Nutrition

Digestive advantage:	Sprouted grains > whole grains	Energy Satiety Reduced risk for CVD Anti-inflammatory Minerals (bone health) Prebiotics (gut health)
Carbs and gluten levels:	Less carb, low gluten and 3x soluble fiber	
Low phytic acid:	Increased bioavailability of minerals	
Antioxidants:	More polyphenols	
Cholesterol levels:	"Healthy levels" of cholesterol.	
Blood sugar assistance:	"Quite gentle" to the body's blood sugar	
Increased vitamins:	Folate, niacin	
Essential amino acid:	Lysine	

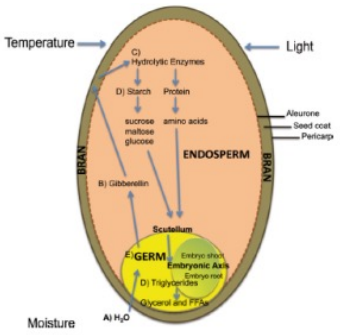
Functional (wheat)

Taste	Sweeter
Dough formulations	Less gluten, more water

Sprouting 101

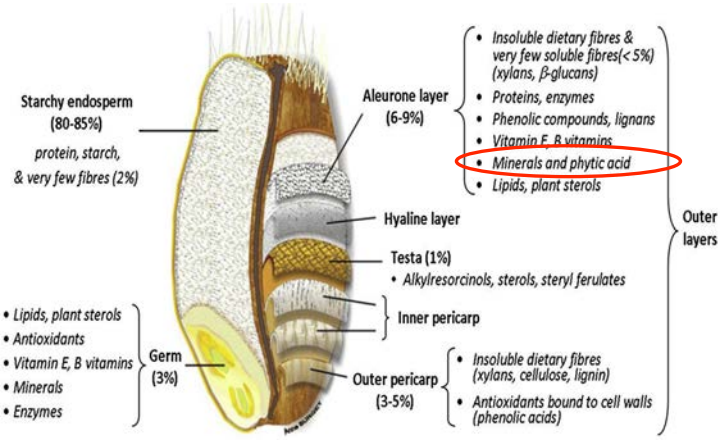
- ➢ The trigger - heat, moisture, light
- ✓ Gibberellin is synthesized; moves from embryo to aleurone layer, triggers formation of enzymes
  - ➢ Amylolytic enzymes ---- starch into sugars
  - ➢ Proteolytic " ---- proteins into amino acids
  - ➢ Cytolytic " ---- breakdown of cell walls
- ✓ Conversion of mass into shoots / rootlets

Relative amounts of nutrients rise as starch and protein break down



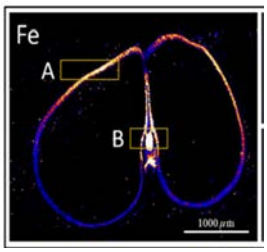
Nelson et al. (2013). Can. J. Physiol. Pharmacol. 91:429-441

The nutrients and the anti-nutrients in wheat



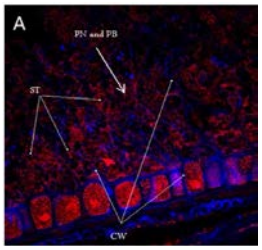
The packing of nutrients in wheat

The minerals (Ca, Fe, Na, K, Mg, P, Cu, Mn, Zn)

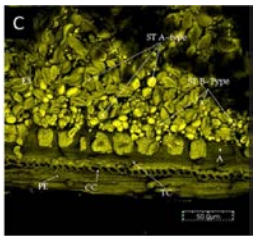


De Brier et al. , 2016. Plant, Cell and Environment

Red stain = protein



Yellow stain = starch



Faltermeier et al. (2015) Europ Food Res Technol, 241 239-252

Dry

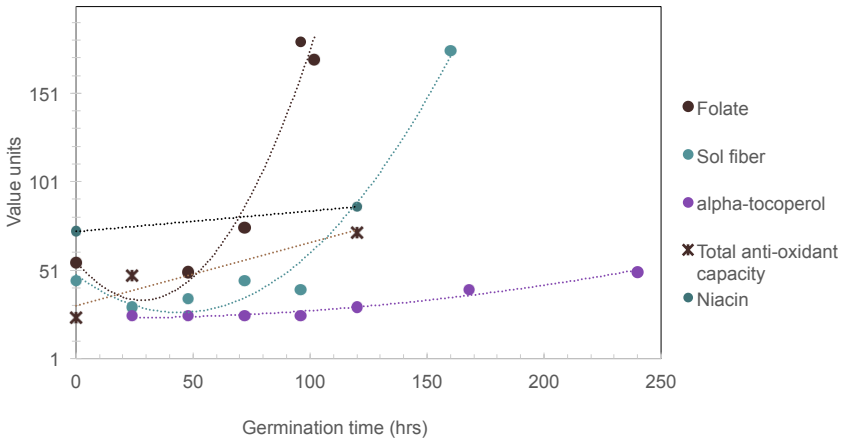
8 hrs soaking

24 hrs germination

57 hrs germ

77 hrs germ

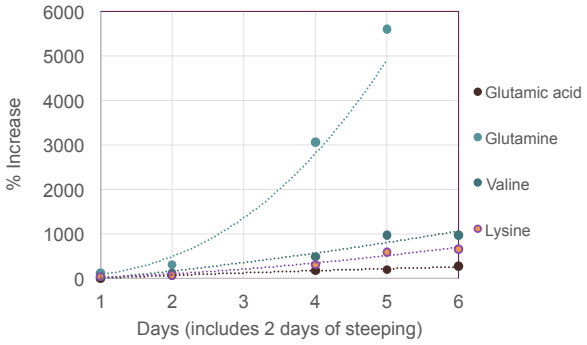
The time scale of change in nutrient amounts



Chavan & Kadam, Crit rev Fd Sci and Nutri (1989) 28(5) 401- 437; Zilic et al., (2014) Int J.Food Sci and Tech. 49 1040-1047
Sozturk et al., 2011, Chem Nat compd, 47(6) 876-879; Koehler et al., 2007 J agric food chem, 55, 478 -4683
Lorenz, K. 1980, CRC crit rev Fodd Sci and nutria, Dec. 353 – 385; Faltermeier et al., (2015) Eur Food Res Technol. 214 239-252

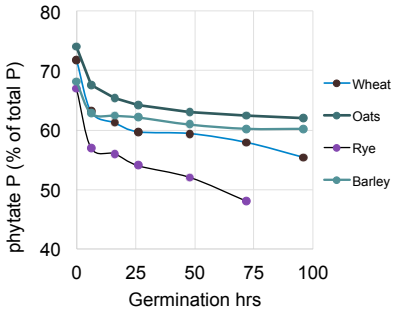
Time scale of change *(cont'd)*

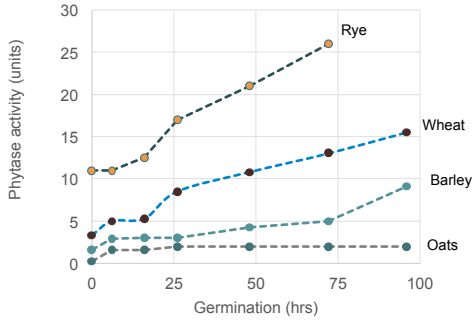
Essential amino acids



Tkachuk, R., (1979), J.Sci. Food Agric 30 53-58

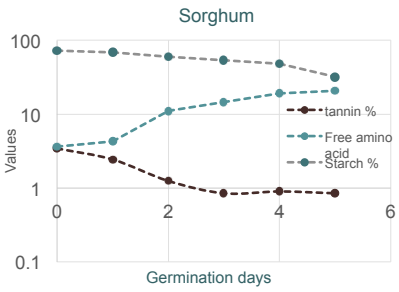
Time scale of change in anti-nutrient

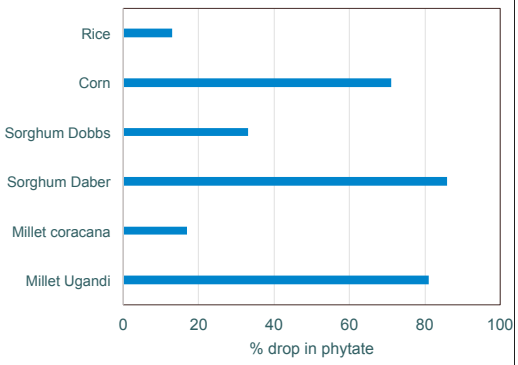




Bartnik & Szafranska, JCS, (1987) 23-28

Long germination is critical for pseudo-cereals also



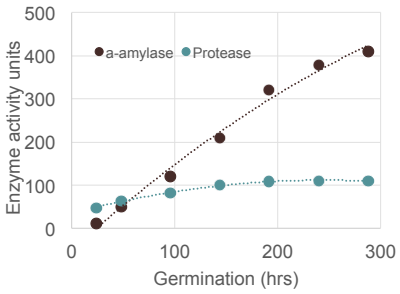


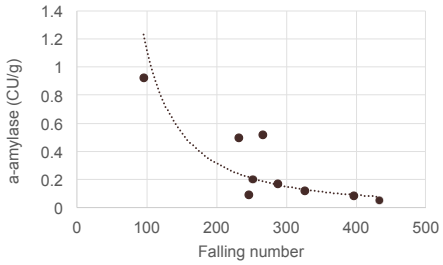
Chavan and Kadam (1989) Crit Rev Food Sci and Nutri, 28(5) 401-435

Omary et al, (2012), cer chem., 89(1) 1-14

Baking with sprouted flours

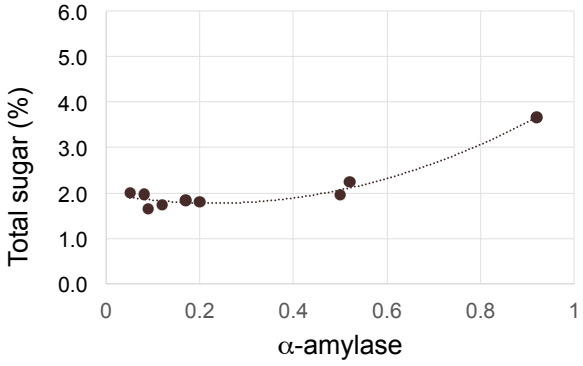
Sprouted flours = low falling numbers





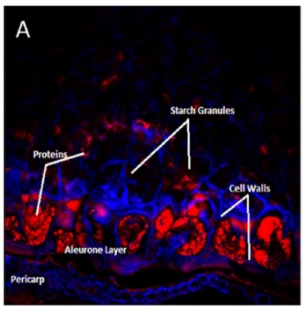
Fleming et al. (1960), cer chem., 37 363-370
Bell, S. unpublished data (2016)

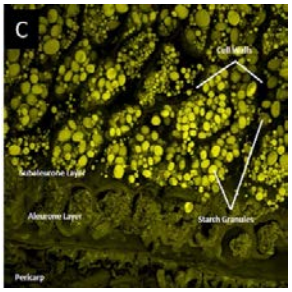
Long germination = more sugars

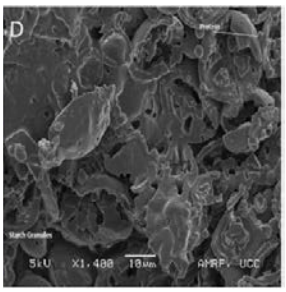


Bell, S. unpublished data 2016

Protein and starch after 6 days of germination







The dilemma with falling number – a range or a number?

FN = time taken by a stirrer to travel a set distance in a heated slurry of flour

- High FN = high viscosity slurry = low breakdown of starch from enzyme activities
- Industry practice = FN > 300 (bread)

Reports

- Moot and Every (1990): Acceptable quality (not sticky crumb): FN range = 150 to 400+
- Rai et al. (2016): High quality breads : LMA wheat flours, FN range= 50 – 120
- Bell (2015 unpublished): Acceptable test bakes with sprouted flours; FN range = 90 – 300

Is it time for Essene bread?

Sprouting gives a spectrum of values and options for innovation!

Thank You!

David.Sheluga@Ardentmills.com

Sumana.Bell@Ardentmills.com