

How your bakery can benefit from **sprouted grains**

WHITEPAPER





FOREWORD

As we all strive to create the holy grail of baking, namely tasty, healthy and fresh baked goods, we thought we'd take a deep dive as to why sprouted grains are such an interesting and exciting development for our industry.

The facts speak for themselves! The number of sprouted grain product launches has exploded over the last 10 years, with a yearly growth rate of +23% new product launches containing sprouted grains¹. What is happening, and why has there been such a tremendous growth of products with this ingredient?

**“The holy grail of baking;
fresh, tasty and healthy
baked goods.”**

First of all, we investigate what sprouted grains are and why they are more and more popular. We look at why they are perceived to be both healthy and more digestible, and what consumers think of products with sprouted grains. And finally, we dig into the science of sprouted grains and see what claims can and can't be made.

Our goal by the end of this white paper is to help you understand the different aspects of sprouted grains, and to encourage you to include them in your next baking innovation and forthcoming product launches.

1: Number of product launches (2008 - 2018 containing sprouted grains based on a search of Mintel market data (www.mintel.com) using the terms “sprouted”, “sprout”, “germinated”, and “freshly sprouted”, including all food categories, countries, positionings, flavours, and ingredients and excluding Brussels sprout powder, Brussels sprout juice, and Brussels sprouts.



WHAT IS SPROUTING?

This is when a grain kernel begins to transform from a seed into a small plant. This occurs when the seed of a wheat plant or other grain is placed in an environment at just the right temperature and moisture conditions. Although a sprouted grain is the start of a new plant, the process is stopped just in time. But what makes it so special? By sprouting, the grain has, in effect, transformed itself from a source of dormant starch into a living vegetable, and this offers added nutritional benefits, as it now has more available nutrients than unsprouted grains, and it tastes better too.

a sprouted grain



The fact is, sprouted grains are considered wholegrains as well. The international cereals and grain association, AACC International, confirmed this in the statement they made in 2008: *“Malted or sprouted grains containing all of the original bran, germ, and endosperm shall be considered wholegrains as long as sprout growth does not exceed kernel length and nutrient values have not diminished. These grains should be labelled as malted or sprouted wholegrain.”* Grains are the seeds of certain plants, largely cereal grasses. Like all seeds, grain kernels are a marvel of nature, containing the potential to become a new plant. A wholegrain contains all three of its original edible parts in their original proportions: the outer bran layers – rich in fibre and B vitamins, the nutrient-packed germ – the embryo that will become the new plant, and the starchy endosperm - containing enough nutrients to feed the embryo².

²: N. De Brier, E. Lemmens, A. Moroni, P. Hierbaut, and J. Pagand, Impact of Cereal Seed Sprouting on its Nutritional and Technological Properties: A Critical Review



HOW THE SPROUTING PROCESS WORKS

There are three primary phases in the controlled sprouting process. Normally, after phase 3 the sprouting process is completed and the enzymes need to be inhibited in order to prevent the sprouted grain turning into a plant. A heat treatment is often used to kill the active enzymes.



In **phase 1** the grains are **selected** and **soaked** to reach a moisture content of around 45%.



In **phase 2**, the endogenous grain metabolism that is necessary to mobilize storage materials (i.e. starch and protein) is **activated**. At the end of the second phase the radicle emerges and becomes visible.



During **phase 3**, the seedling begins to **grow**, and the seed takes up more water. At this point, active enzymes **transform** different constituents during sprouting, and vitamins and minerals are made available for the embryo.



To deliver the most tasty and juicy sprouted grains, Puratos developed a unique fourth step; a **natural fermentation** after the sprouting phase. Discover the benefits of Puratos' sprouted grains on page 8.



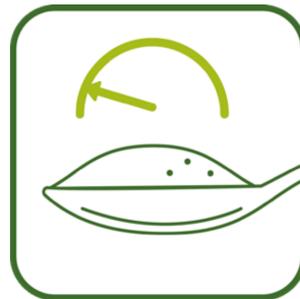


“Sprouted grains are considered wholegrains as well.”

DIFFERENTIATING FLAVOUR PROFILE

One of the beneficial characteristics of sprouted grains is their unique flavour profile. Due to the activation of endogenous amylolytic enzymes, complex starch molecules are transformed into simple oligosaccharides and sugars. This transformation adds natural sweetness to products when sprouted grains are used, which could also help manufacturers reduce levels of added sugar in products.

“Sprouted grains add natural sweetness to baked goods, helping bakers reducing levels of added sugars.”



The hypothesis that the flavour of bread made with sprouted grains would be preferred over bread made without sprouted grains was tested by Puratos in 2016 using a panel of 122 consumers. The panellists received a 50% whole meal bread with 25% added grains that were either unsprouted (control) or sprouted. The study found that 58% of respondents liked at least one of the two breads, with 75% preferring the bread prepared with sprouted grains.

HEALTHY HALO

Sprouted grains are very much in line with what today’s consumers are looking for, i.e. ingredients that are perceived as natural, nutritious, and healthy. This positive perception was demonstrated in a large-scale consumer study (N > 24,500)³, that asked consumers, “Do you think the following ingredients will have a positive or negative impact on your health?” More than two-thirds (70%) of the participants responded that sprouted grains would have a positive impact on their health, while only 4% thought they might have adverse effects; 18% of the responses were neutral, and 8% of participants indicated they were not familiar with sprouted grains.



“70% of consumers think sprouted grains have a positive impact on their health.”

This “healthy halo” that surrounds sprouted grains is a result of the many reports in the media attributing specific nutritional properties to sprouted grains and of the positive images associated with the concept of a grain giving life to a new plant. However, it is important to understand to what extent the perceived benefits of sprouted grains are true or not.

3: Conducted by Canadean (now GlobalData)

SPROUTING DEFINITION

A critical point in this booming trend is that, up until now, there is not a legal definition about what sprouting grains are and when the term ‘sprouted’ can be legally used. This lack of clarity makes it possible to call virtually everything ‘sprouted’. Different working groups and associations (ex. Whole Grain Council (USA) and Health Grain Forum (EU) are doing their best to make draft proposals for a clear and legally binding definition. Such a legal definition would be beneficial for millers and sprout producers alike, as they could then be sure they are following standardized methods for safe and correct sprouting.



“By sprouting, the grain has transformed itself from a source of dormant starch into a living vegetable.”

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IT HAS BEEN REPORTED THAT THE SPROUTING OF GRAINS CAUSES MANY CHANGES, INCLUDING:

- Turning complex molecules into simpler and easier to digest ones
- Increasing the level of vitamin C
- Increasing the number of antioxidants
- Increasing the amount of soluble fibre while decreasing the insolubles
- Increasing the levels of folates while decreasing the level of gluten.

It will help manufacturers to write clear specs for purchasing sprouted grains thereby helping them better incorporate sprouted grains into their products. It would also prevent consumers being misled, so at last they could trust the meaning of ‘sprouted’ on a food package ⁴.

The Whole Grain Council conducted interviews with 28 different companies and the results showed that each interpreted sprouting slightly differently. In fact, sprouting can be seen as the grey zone between a seed/grain and a new plant, but it’s rather difficult to define clear borders between the different phases.

“A hurdle making it difficult to create a binding definition of ‘sprouted’ is the fact that the process of sprouting is different for every grain and seed, meaning that enzymes react in a different way, at different times, during sprouting.”

For some producers the grain is already ‘sprouted’ after phase I - the soaking step. While other producers continue until phase II, when a rootlet is visible or when a sprout is visibly present. A minority of the producers actually continue to the end of phase III where the active enzymes transform the grain into different constituents. Another review paper compared different available articles related to sprouting. It shows that the sprouting process is not standardized and the whole sprouting production time can differ from 6 hours and 8 days. It shouldn’t therefore be a surprise that different production processes also lead to different results in nutritional changes and can lead to conflicting conclusions regarding the benefits of sprouted grains, particularly as all the different processes (reviewed) claim to be ‘sprouted’.

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⁴ : Multiple Criteria for a sprouted Whole Grain, Phase I Summary report (2017)



THE SCIENCE BEHIND

NUTRIENT CONTENT

While it is generally believed that sprouted grains contain higher levels of vitamins and minerals than unsprouted grains, the results are mixed. So while several scientific studies report an increase in the levels of some vitamins and minerals with sprouting, a roughly equal number of studies report no impact or even reduced levels of some vitamins and minerals.

However the results observed for two vitamins, B9 and E, indicate that there is a significant increase in these vitamins when testing sprouted grains in comparison to normal grains, but it naturally depends on the type of grain and the sprouting process used. It may therefore one day be possible to make the claim that sprouted grains have increased levels of vitamins.

The reality is while it may prove difficult to make the claim “increased vitamins”, other nutritional claims, such as “source of [vitamins/minerals]” or “rich in [vitamins/minerals]”, are ways of highlighting a particular nutrient for which the requirements are easier to meet. For instance, a multigrain bread developed by Puratos that contains more than 10% sprouted grains (based on total dry ingredients), is allowed to make the claim to be a “source of copper, zinc, magnesium and phosphorus”.

BIOAVAILABILITY OF MICRONUTRIENTS

Wholegrains, seeds, and pulses contain significant amounts of phytates that can form complexes with vitamins and minerals, making them unavailable for absorption by the body. Phytates, for example, show particularly strong affinities for minerals such as potassium, iron, magnesium, calcium, zinc, copper, and manganese.

During sprouting, a portion of these naturally occurring complexes in grains, seeds, and pulses are degraded, thereby increasing the bioavailability of the micronutrients. One study (Larsson et al.) found that the consumption of malted oat porridge, which contained 77% less phytate compared with its unmalted counterpart, doubled the amount of zinc absorbed by healthy humans.

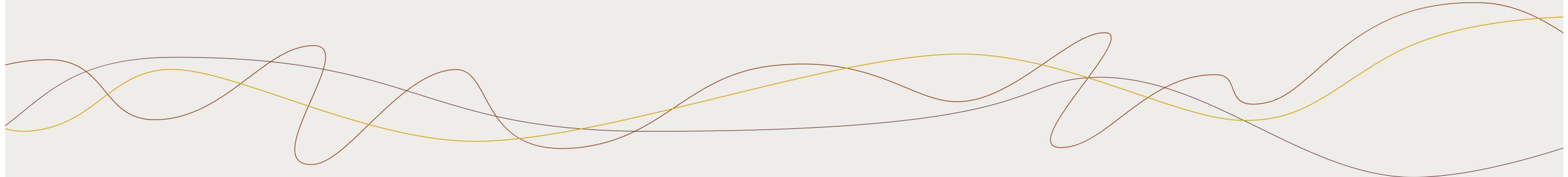
DIGESTIBILITY

Sprouted grains are also reportedly “easier to digest.” Digestion is “the process by which food is converted into substances that can be absorbed and assimilated by the body, especially that accomplished in the alimentary canal by mechanical and enzymatic breakdown of foods into simpler chemical compounds.” It therefore seems logical that foods in which the complex molecules have been entirely or partially broken down should be easier

to digest.

During germination, numerous enzymes are released, resulting in the degradation of complex molecules such as proteins and carbohydrates into smaller molecules. For example, during sprouting, starch stored in the endosperm is hydrolyzed by amylases yielding oligosaccharides and small sugars. Jood and Kapoor have observed a 30% reduction of starch and a 400% increase in sugars (2.9 mg to 11 g per 100 g of flour in millet) after 1 day of germination.

The fact is that even though there is strong evidence that sprouting can improve the nutritional profile of grains, claims relating to the bioavailability of vitamins and minerals and ease of digestion of sprouted products have not been approved by either the European Commission or the United States. This limits the opportunities for communicating directly about the nutritional benefits of products containing sprouted grains. It is possible, however, to highlight the use of sprouted grains in a product through the product name or via front-of-pack claim, and take advantage of the “healthy halo” that surrounds sprouted grains. E.g. “made with sprouted grains” or “contains X% of sprouted grains”.



CONCLUSION

European and American food manufacturers are currently not allowed to communicate any of the potential benefits of sprouted grains, and this mainly for the following two reasons: 1. There is currently no legal definition as to what they are, and 2. The production process has not yet been standardized.

While this results in conflicting scientific results regarding the health benefits, it is still possible to highlight other benefits that are as relevant to consumers as their nutritional benefits, like improved taste. And it is still useful to make and highlight the ingredient claim “contains sprouted grains,” and take full advantage of the “healthy halo” that surrounds sprouted grains.



PURATOS SPROUTGRAIN



SPROUTING THROUGH THE EYES OF PURATOS

At Puratos we strongly believe in the benefits of sprouted grains. As sprouting is a natural process, we choose to perform this process with only 3 ingredients: grains/seeds, water and air. We perform the sprouting process by going through all 3 stages of sprouting: soaking, germination and growing. It's only in this way can we guarantee to offer proper sprouted grains with visible rootlets, but also with visible acrospires. In fact, we believe that this way of sprouting has the best chance of delivering beneficial nutritional changes.



To make our process even more unique Puratos uses a unique fourth step in the sprouting process. The sprouted grains go through a natural, spontaneous fermentation process. **This fermentation further boosts the flavour of the grains and helps complex flavour molecules develop. No additional micro-organisms are needed to start the fermentation**, because micro-organisms are already naturally present on the grains. It's only by using high quality grains and working under controlled conditions that we can assure the food safety of this spontaneous fermentation process. The full process takes around 8 days, depending on the type of grain used.

ADDING SPROUTED GRAINS TO YOUR BAKED GOODS

Puratos Sprouted Grains are versatile, convenient (ready-to-use and easy-to-use) and offer real differentiation. Sprouted grains are a great and easy way to reinvent your current bread category, as quite literally any kind of bakery product can be made with sprouted grains, such as brioches, toast breads, rustic loaves, and even viennoiserie.



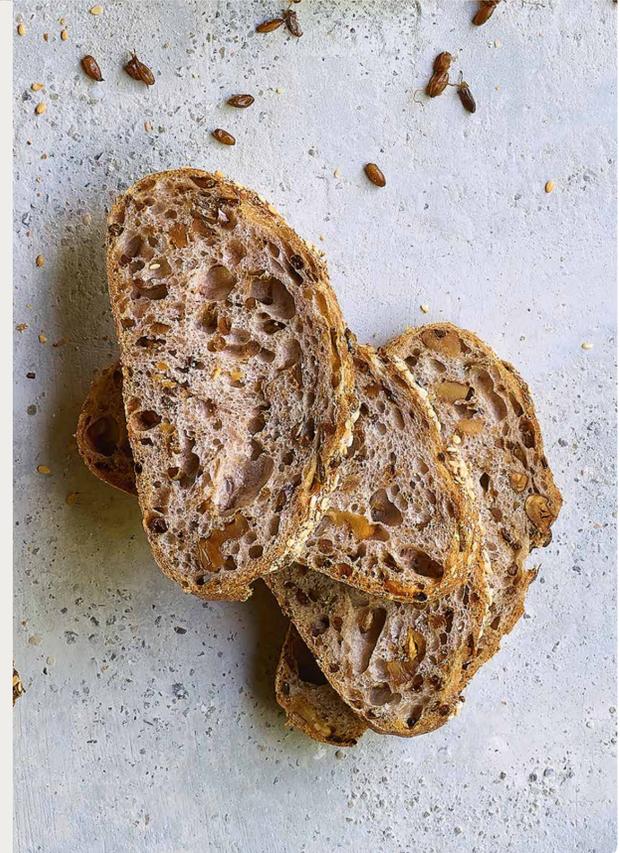
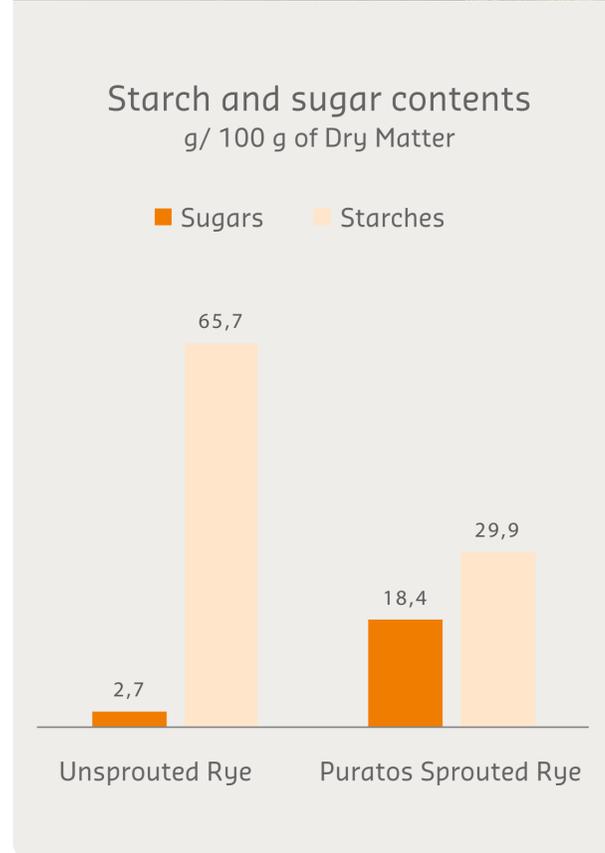
DIFFERENTIATION



CONVENIENCE



VERSATILITY

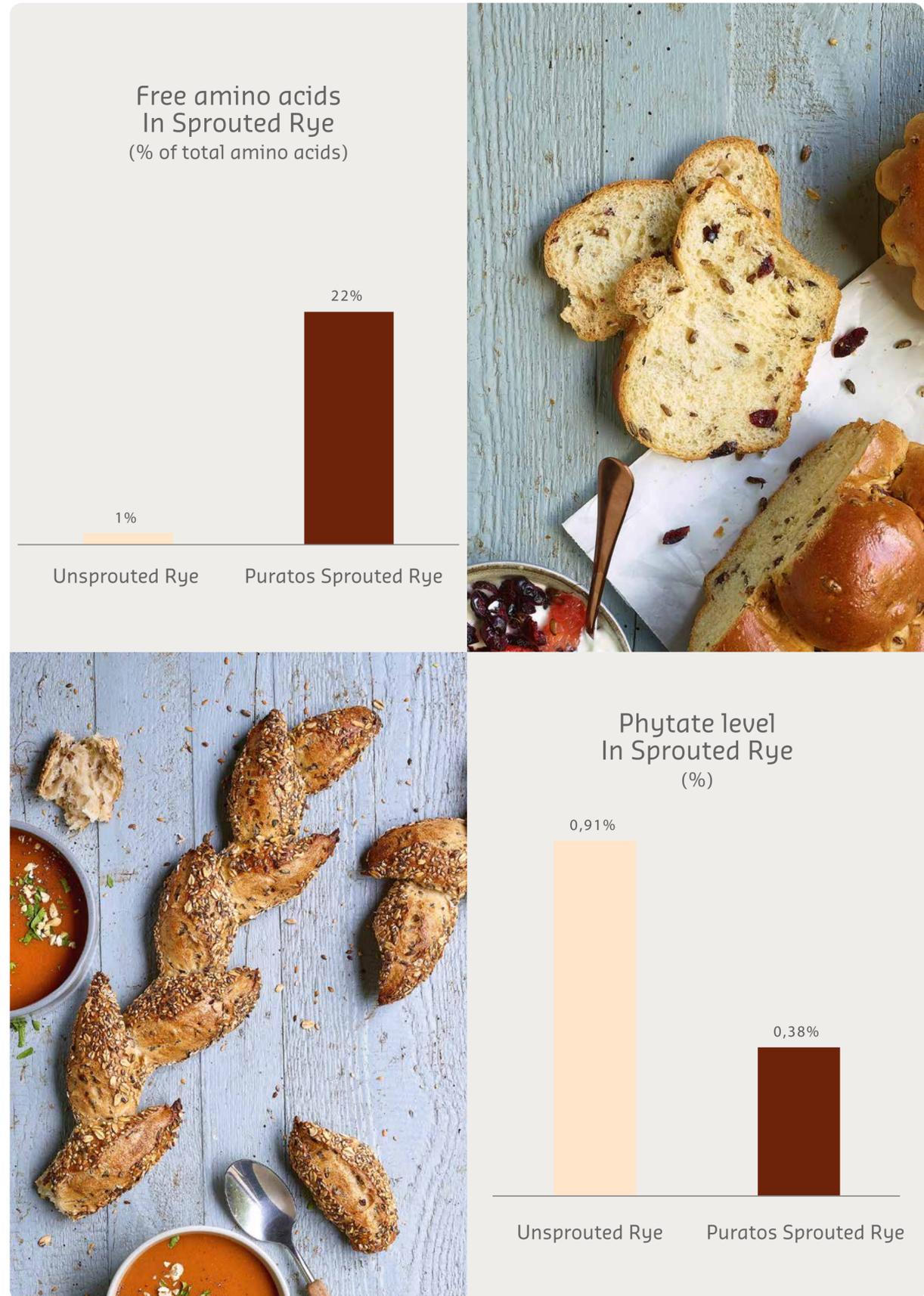


UNIQUE FLAVOUR PROFILE AND TEXTURE

During our three-phase-sprouting process and additional fermentation step, the grains' nutritional composition is transformed. Results show that the starch content is reduced and natural sugars occur. Those natural sugars give a sweet note to the sprouted grains and could be used to create products with reduced added sugar content. In addition, proteins in the grains are pre-digested and free amino acids are formed. Also the level of phytate, the component that bonds strongly with minerals, is decreased after our sprouting process, which could imply that minerals are more freely available and are easier to absorb by the body.

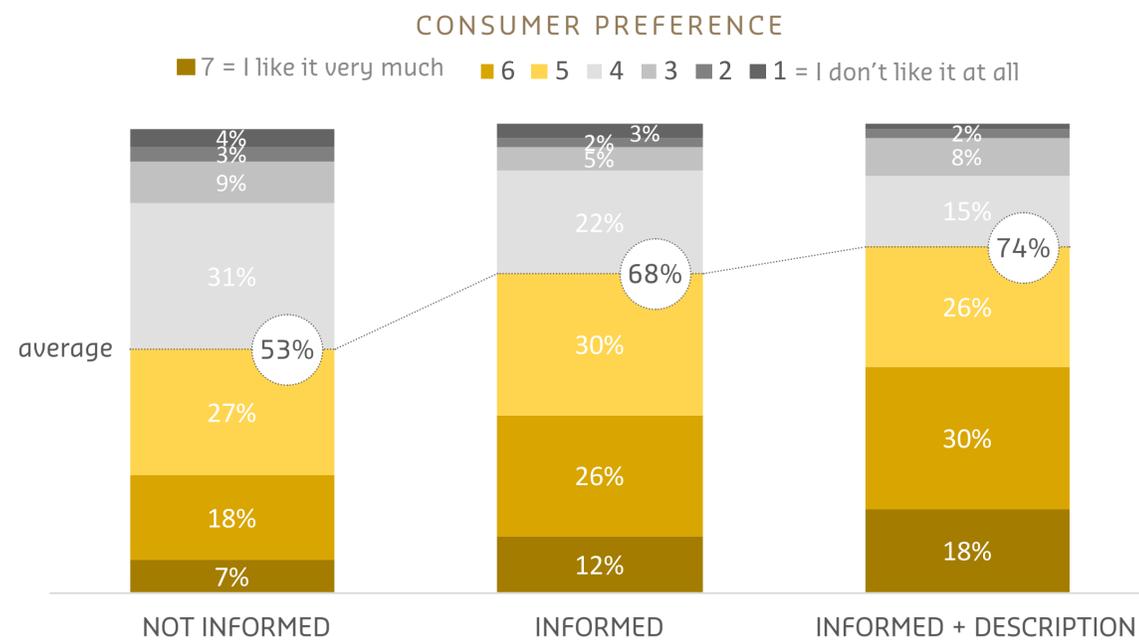
“During our three-phase-sprouting process and additional fermentation step, the grains' nutritional composition is transformed.”

The changes mentioned above also have an impact on the texture of the grains. Our grains are initially not fully dried and still intact. As a result, **when biting into a Puratos Sproutgrain, the grains pop open and an explosion of flavour emerges.** Flavour analysis show that more than 30 different volatile compounds have been identified in Sproutgrain Rye extracts including pyrazines, pyrazoles, pyranones, pyridines, pyrimidines, furans, furanones, phenols, esters, aldehydes, ketones, and alcohols. **These flavour compounds are linked with fruity, malted and caramel notes.** This distinguishes sprouted grain products from their unsprouted counterparts, suggesting that the unique flavour of sprouted grains can be a further benefit to promoting products containing sprouted



PURATOS SPROUTGRAIN RYE LARGELY PREFERRED BY CONSUMERS

We were curious to know what consumers thought about our Sproutgrain Rye bread, in comparison to the best the competition has to offer. So we asked them. Using our Sensobus, 186 people in Belgium were asked to rate the 2 breads in a blind taste test. The Puratos Sproutgrain Rye received a top-3 rating from 53% of the consumers (versus just 43% for the competition's bread). However, when consumers were informed that the Puratos Sproutgrain Rye bread contained sprouted grains, the top-3 rating score went up by 15 points to 68%. And when consumers were given a more detailed description of the sprouted grains, the score went up still further, with 74% of the sample awarding the Puratos bread a top-3 rating score.



CONCLUSION

We can conclude that sprouted grains are booming and have many benefits. Also they are perceived as being healthy by consumers. The coming months and years we can expect more research to be done on the nutritional benefits of sprouting grains, and more clarity on the legal definition and possible claims that can be made.

What is sure is that Puratos' sprouted grains are preferred by consumers. The unique 4th step in our sprouting process provides sprouted grains with a unique sweet flavour profile and great juicy texture. They can be applied to any bakery products and will sublimate them by adding their natural sweetness. If you would like to know more about Puratos' sprouted grains, please contact your local representative.





Puratos Malt

Puratos and Estonian Malt have announced the signature of a joint venture agreement launching 'Puratos Malt'. The JV is the result of six years of close collaboration between the two companies, and combines Estonian Malt's expertise in sprouted and fermented wholegrains with Puratos' business insights and distribution network.

“The joint venture is the result of six years of close collaboration between the two companies”

Commenting on the new JV, Piet Sanders, Puratos Market Director for North & Eastern Europe, said: “This agreement will allow us to respond to our clients' growing interest in sprouted grains, and further builds on our fruitful collaboration with Estonian Malt. Puratos is dedicated to offering a variety of ingredients that inspire customers to make healthier choices, and this joint venture is completely in line with our Health & Well-being commitments.”



Healthy Grains,
Tasty Breads.

www.puratos.com/wholegrains

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