Driving Non-Dairy Innovation with Enzymes

Explore Unlimited Possibilities

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PLANTS UNLIMITED™

BRIDGE2FOOD EUROPE

Plant-Based Drinks: From Trend to a Daily Choice

Market Value (2024)

€2.7 B

Market Growth (2023 - 2024)

+ 6.7%

New Product Launches Growth (last 5 years)

+6%

Key Regions

Western Europe

- A solution for millions who are lactose-intolerant or dairy-sensitive.
- A lower environmental footprint
- Growing interest in flexitarian, vegan, and plant-forward diets.
- Wide range of flavors, and functional benefits.

Introducing
PLANTS UNLIMITED™

Compliant with Organic Labelling Standards

Veramax™ G2

Controls sweetness level of cereal-based non-dairy beverages

PG 500

Aids in protein stability and prevents curdling of plant-based beverages in applications without acidity regulator

Other Amylases

Aids in production of cereal-based non-dairy beverages

Veramax™ G3

Creates natural sweetness in cereal-based non-dairy beverages without increasing sugar content

Cheesemax™ PB

Modifies plant-based proteins to aid in creating cheese with melt and stretch

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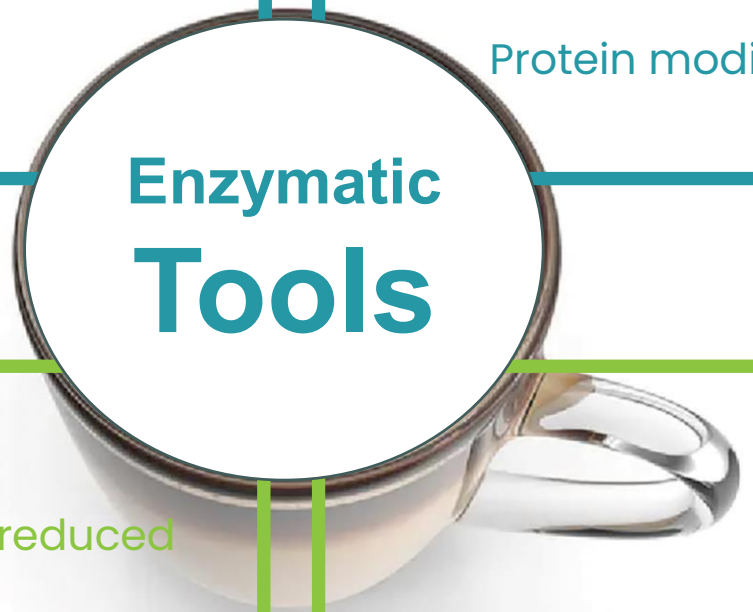
Enzymatic Tools



TASTE

Starch breakdown into simple sugars to control sweetness

FUNCTIONALITY

Protein modification for extraction, foam, and stability

NUTRITION

Improved protein and fiber content, reduced anti-nutrients

SUSTAINABILITY

Cell wall breakdown for better yield and less waste

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Enzymes for Barista-Style Beverages

Curdling in Non-Dairy Beverages

Understanding the issues faced by consumers

Consumers report curdling of plant-based milk, especially when added to coffee and tea.

From rice milk and soy milk to almond, hazelnut and coconut milk, **all of them seemed to curdle**. Source

Every time *I make iced coffee with oat milk, it curdles. What am I doing wrong?* Source

Why does my soy milk **always separate** *when I add it to hot tea? It's ruining my drink.* Source

This almond milk curdled **immediately** *when I added it to my coffee. Very disappointing.* Source

I've been having **trouble getting a good froth** *with soy milk; it often curdles when added to coffee.* Source

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AMANO Amano Enzyme

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No More Curdling of Non-Dairy Beverages in Coffee

ENSURING SMOOTH, STABLE DRINKS EVERY TIME

Solution: PG500 enzyme stabilises plant proteins, preventing separation and delivering a smooth, café-quality experience

Almond Drink

Control PG-500

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Protein-Glutaminase “Amano” 500 (PG-500)

A Unique Protein-Acting Enzyme

Protein Modification by PG-500

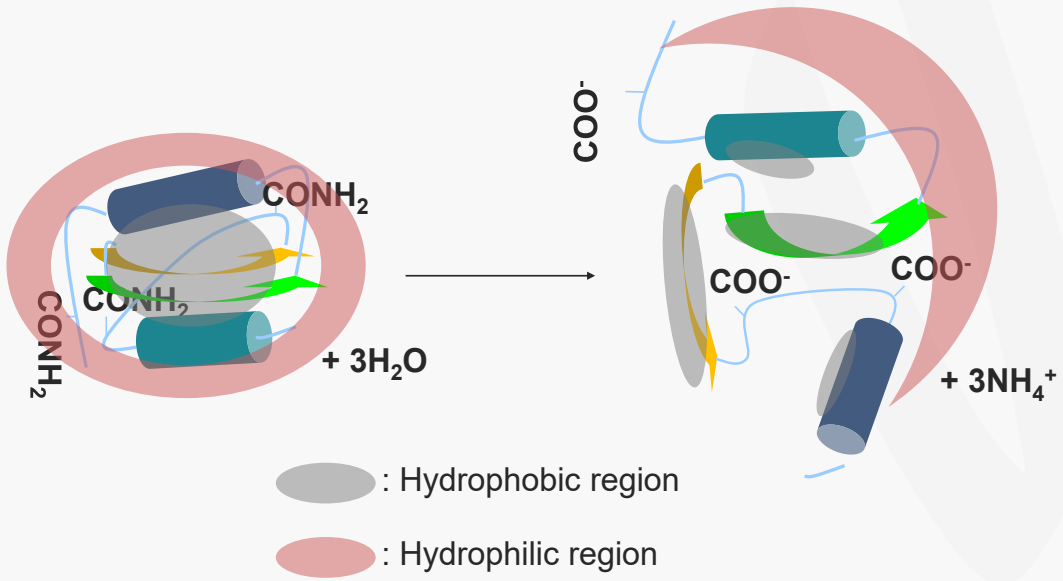
How PG-500 Works (Unlike Traditional Proteases)

- Newly formed (negatively charged) carboxyl groups
- Intra/inter molecular electrostatic repulsion
- Protein structure unfolding

Applications (68 Amano’s patent)

- Enhances solubility, emulsification, and foaming
- No formation of bitter peptides
- Simple to control and easy to scale in production

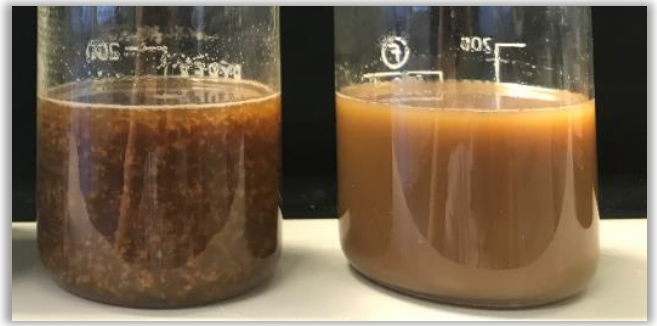
Deamidation of side-chain amide of glutamine



No More Curdling of Non-Dairy Beverages in Coffee

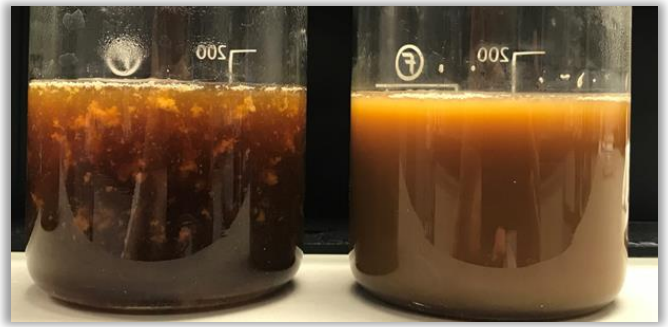
Stability in Coffee—No Matter the Plant Base

Hemp drink* (protein content 1.0%)



Soymilk* (protein content 3.6%)

Peanut drink* (protein content 2.0%)



Pea drink* (protein content 3.2%)

anti-curdling effect based on 2% instant coffee* solution (control vs enzyme-treated sample)

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AMANO Amano Enzyme

PLANTS UNLIMITED™

Perfect Foam, Every Time

High-Quality Foam in Plant-Based Drinks

PG500 enzyme helps retain higher protein content in the final product while improving protein solubility — key factors that contribute to enhanced foam quality and stability in barista-style applications

Almond Drink

PG-500 Control

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Master the Art of Sweetness

How Sweet is Europe?

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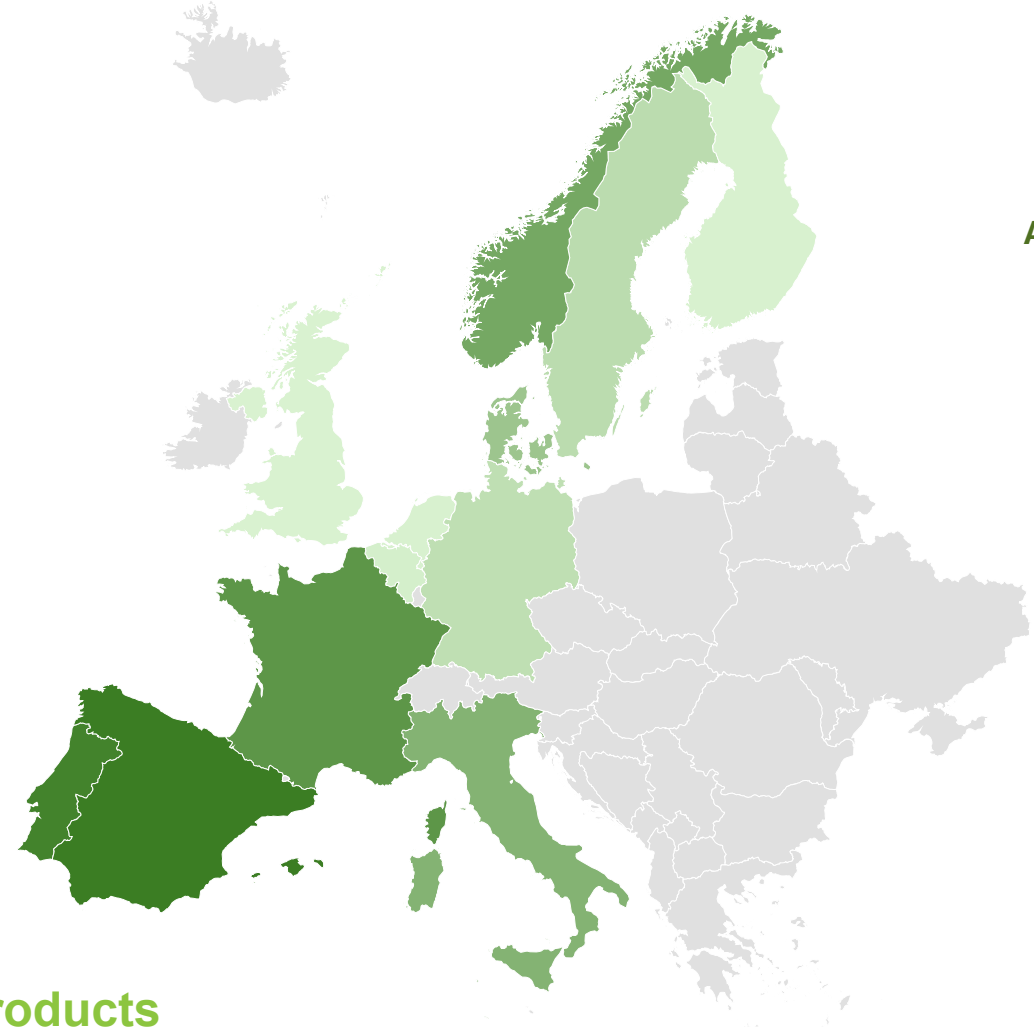
Sugar Levels in Oat Drinks By Country



Average sugar content (g/100ml)

4.7

3.1

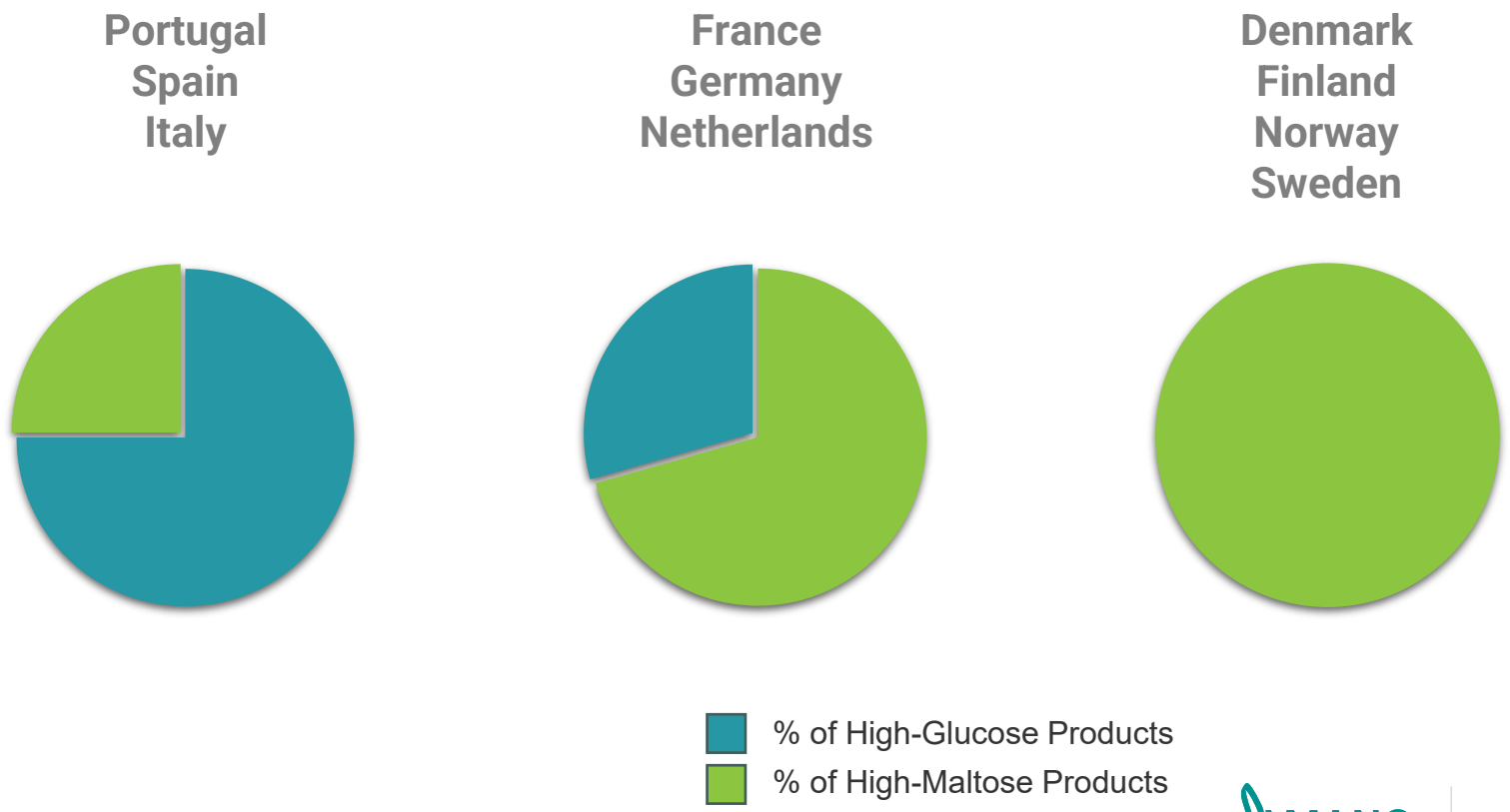
Total sugars = Mono and Di-saccharide

355 products

MANO Amano Enzyme

Sugar Profile of Plant-based drinks In Europe Market

Europe's Sugar Line: Glucose South, Maltose North



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AMANO Amano Enzyme

Sugar Profile

Plant-based drinks manufacturers are increasingly customising sugar profiles to enhance sweetness and flavor, aligning with consumer preferences in their target markets

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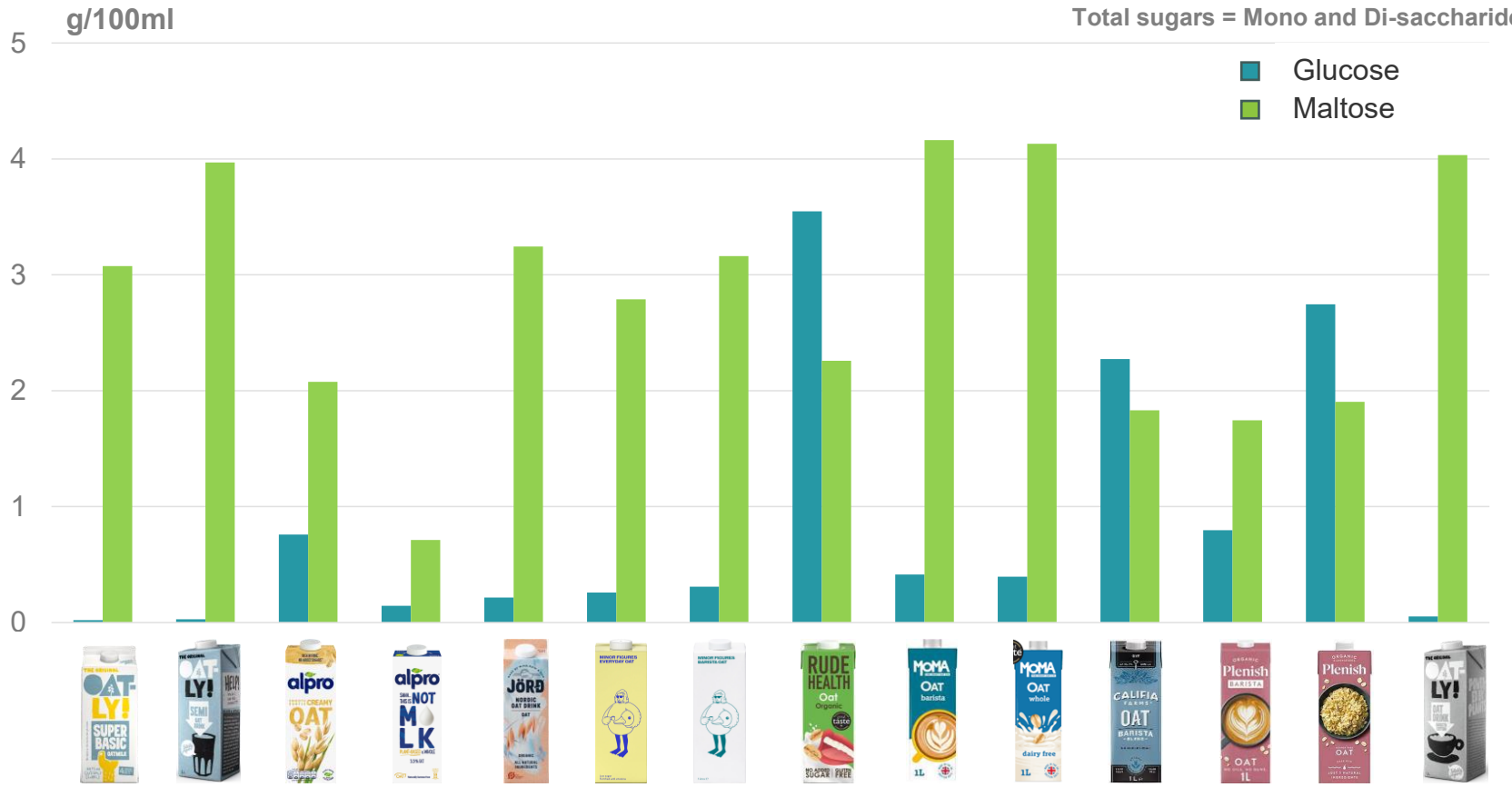
Maltose Leads Among Major Brands



Sugar profile by design

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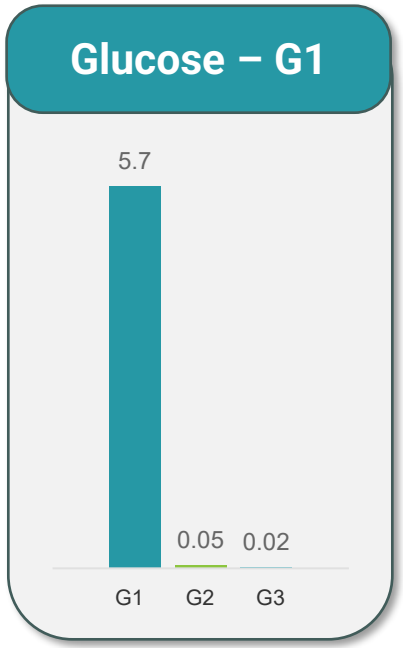
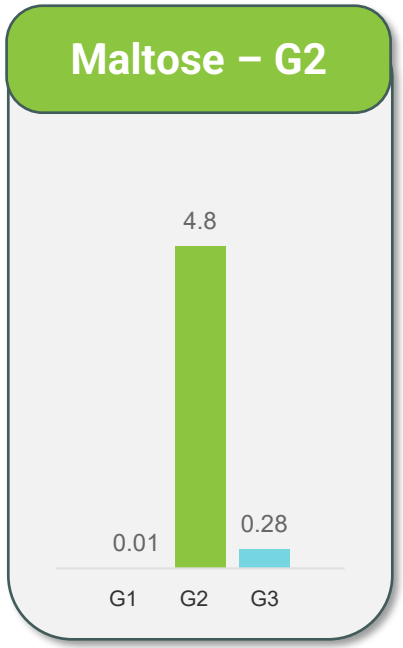
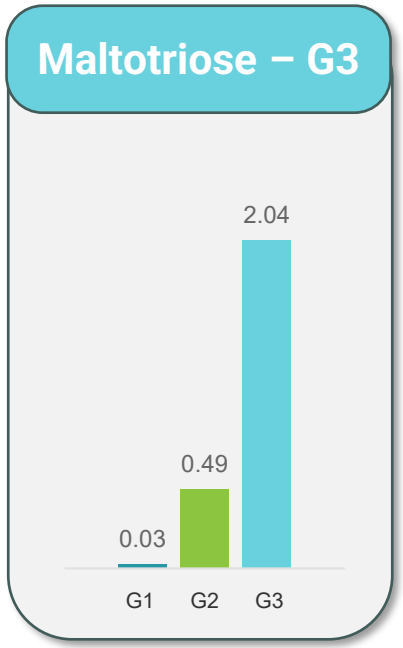
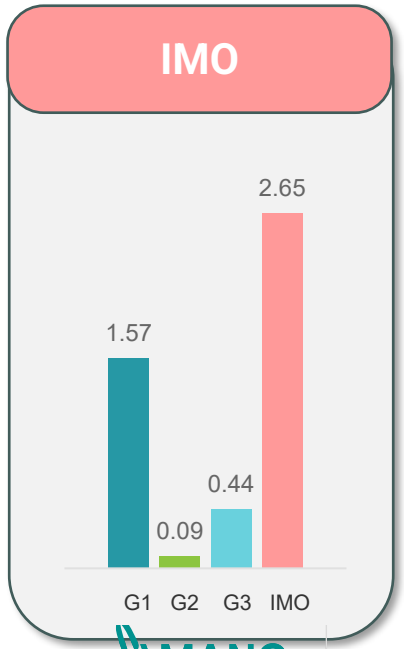
Designing Sugar Profiles with Precision

Enzymes enable the precise design of sugar composition, optimise sweetness, and unlock new flavor dimensions with sugars like maltotriose and isomaltooligosaccharides.









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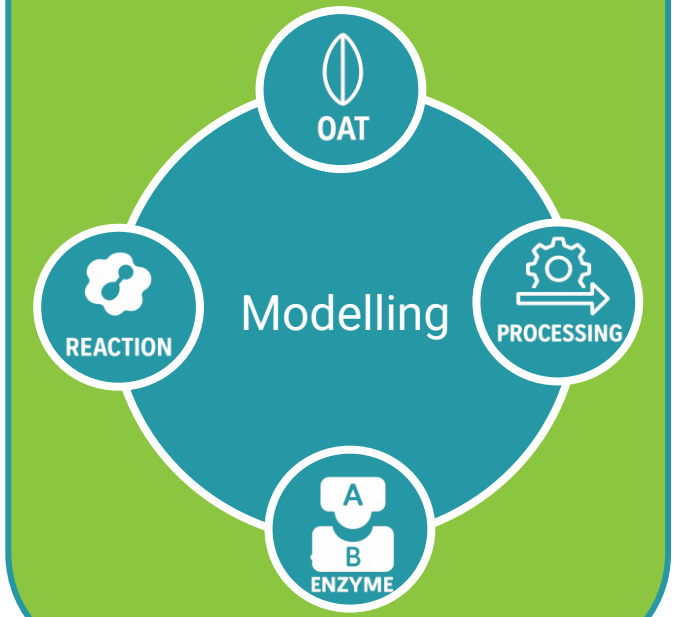
Design sugar profile with precision

Customer needs

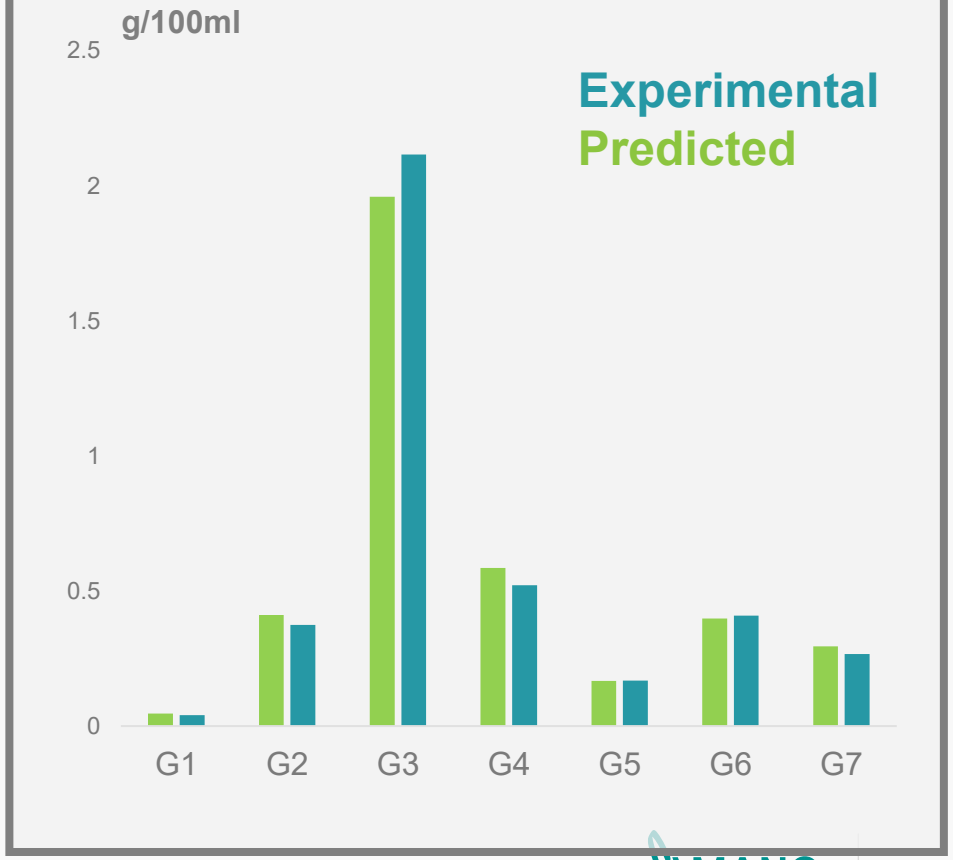
Market trend

Targeted Sugar composition

Data driven formulation



Enzyme Tool



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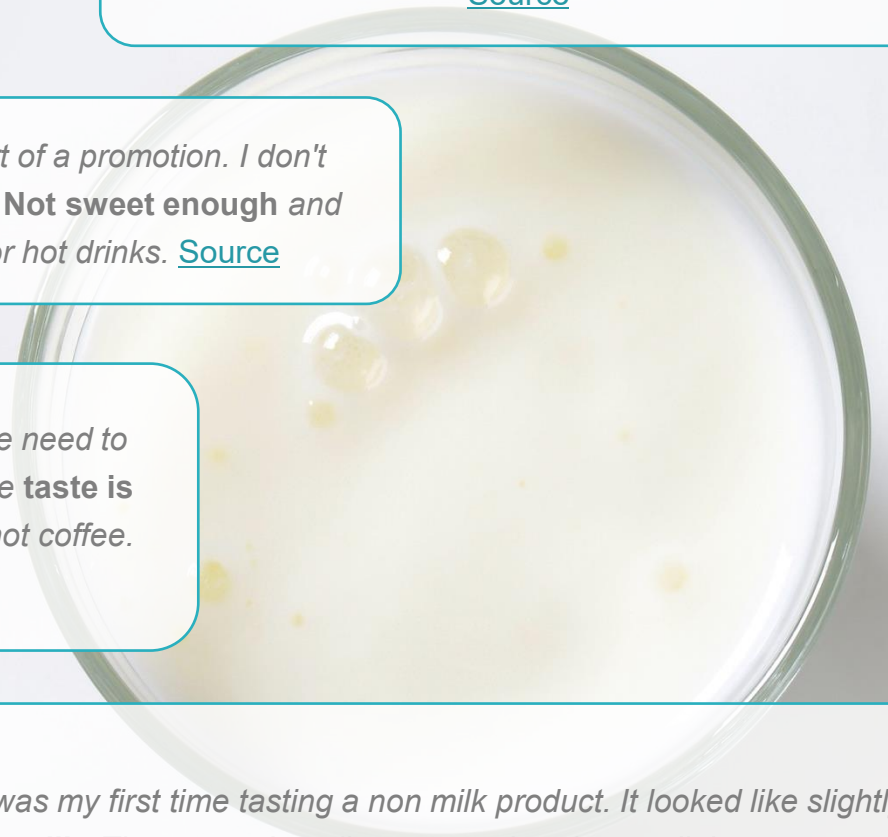
No Sugars
No Compromises

CONSUMER CONCERN:
No Sugars Options Are Watery

Understanding the issues faced by consumers

Very weak - I shook the carton before opening but it was still extremely **watery and flavourless**. Source

I purchased this as part of a promotion. I don't think I would buy again. **Not sweet enough** *and not good in cereal or hot drinks.* Source



While this has low sugar, I do not see the need to add a lot of sunflower oil to the mix as the **taste is not pleasant** *when heated or added to hot coffee. It tastes like burnt oil.* Source

Not good, **very watery and tasteless**—*its not good. It's way too watery and it's flavourless.* Source

This was my first time tasting a non milk product. It looked like slightly **watery milk**. *There wasn't really a taste other than a slight sweetness. I prefer milk to non milk substitutes so I would not switch to Oak Milk.* Source

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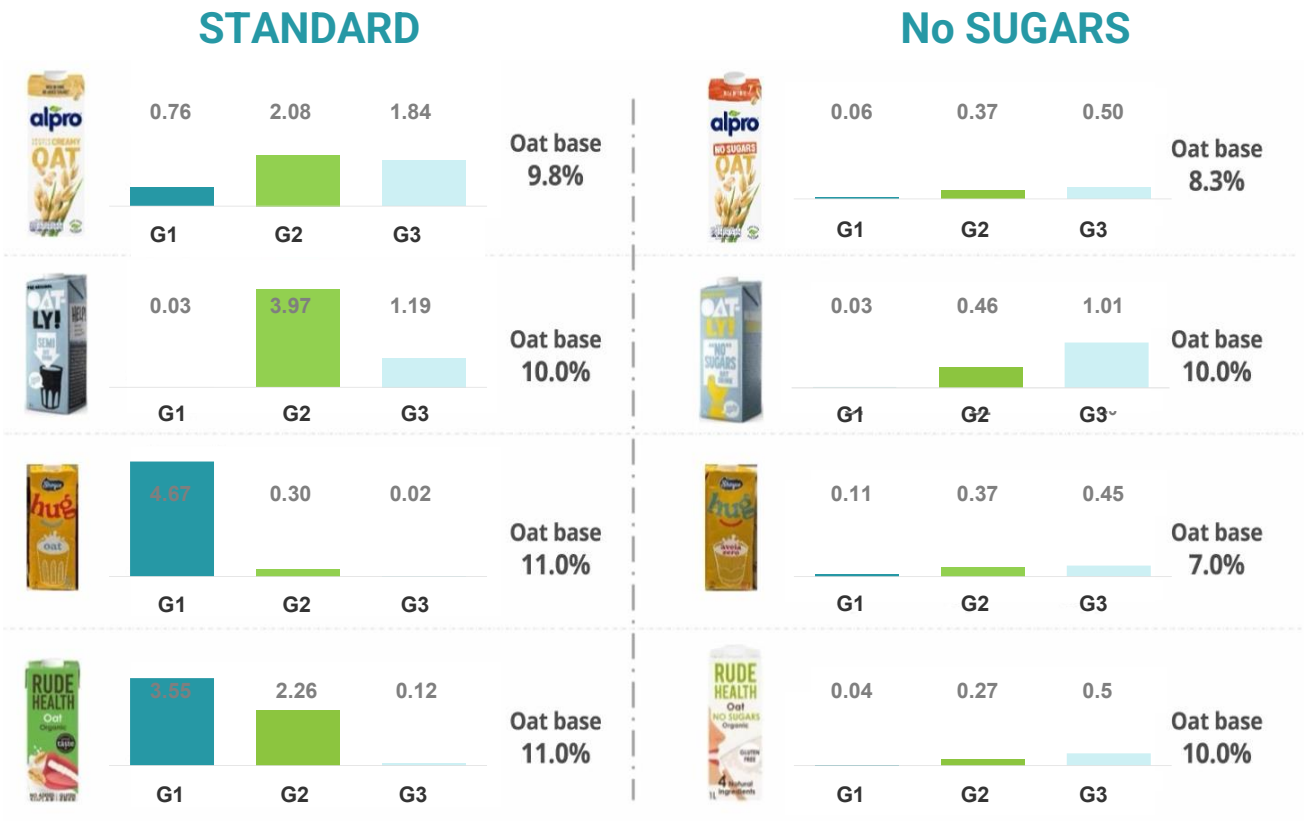
AMANO Amano Enzyme

Standard vs. No Sugars: What's Really Inside?



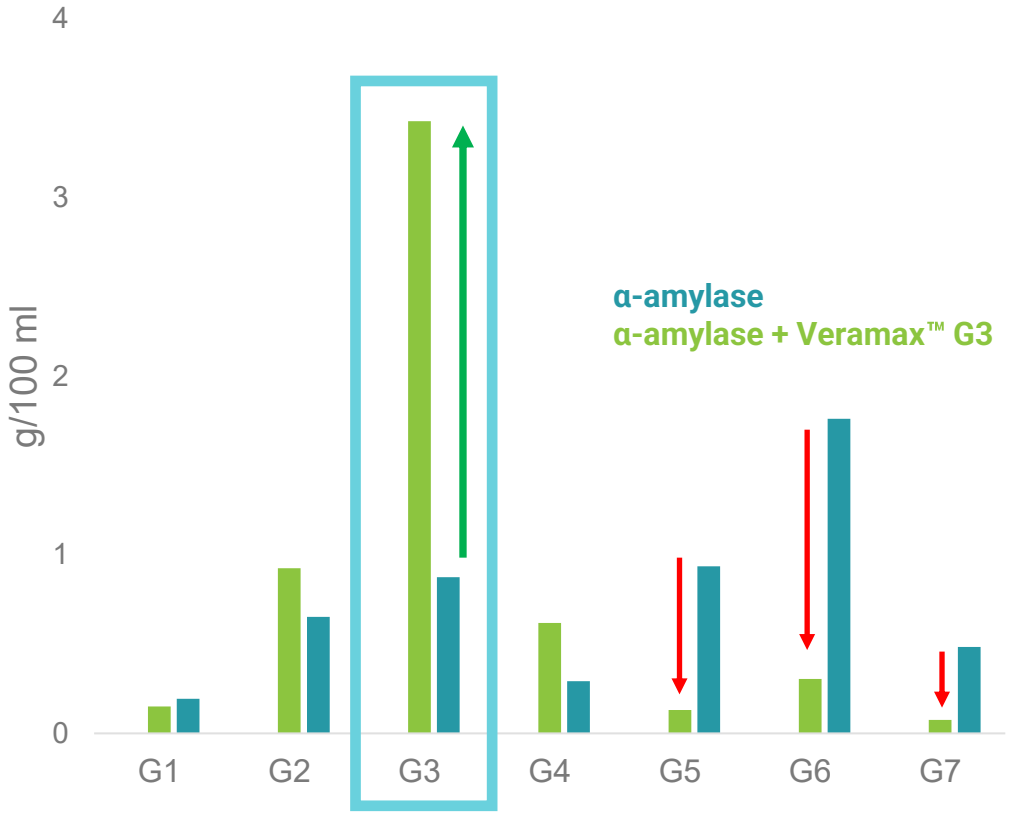
G1= Glucose; G2= Maltose ; G3 = Maltotriose – g/100ml

Products labeled “no sugars” contain less than 0.5% sugar by weight.

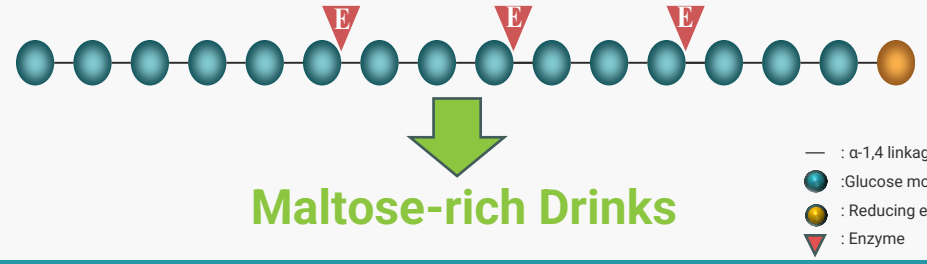
Achieving this requires careful control over the enzymatic reaction and, in some cases, may also involve reducing the oat content in the final formulation.

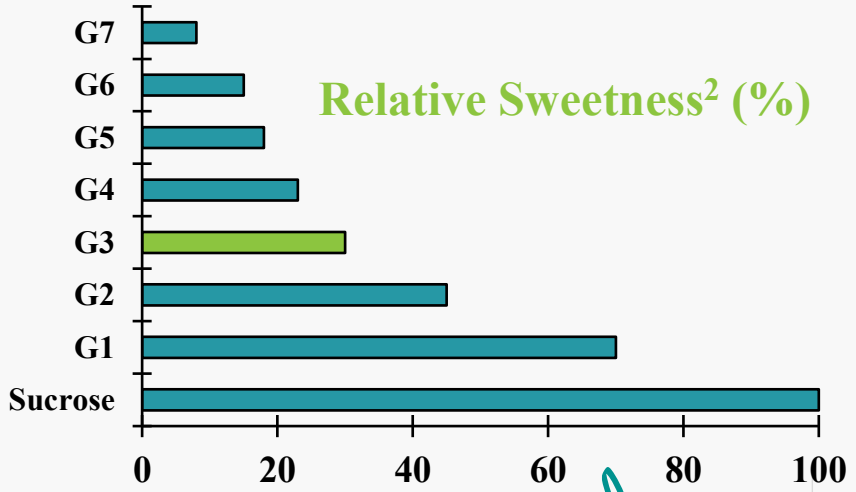
Veramax™ G3

Maltotriose-forming amylase



It produces maltotriose by (endo-type) hydrolysis of α-1,4 starch molecules

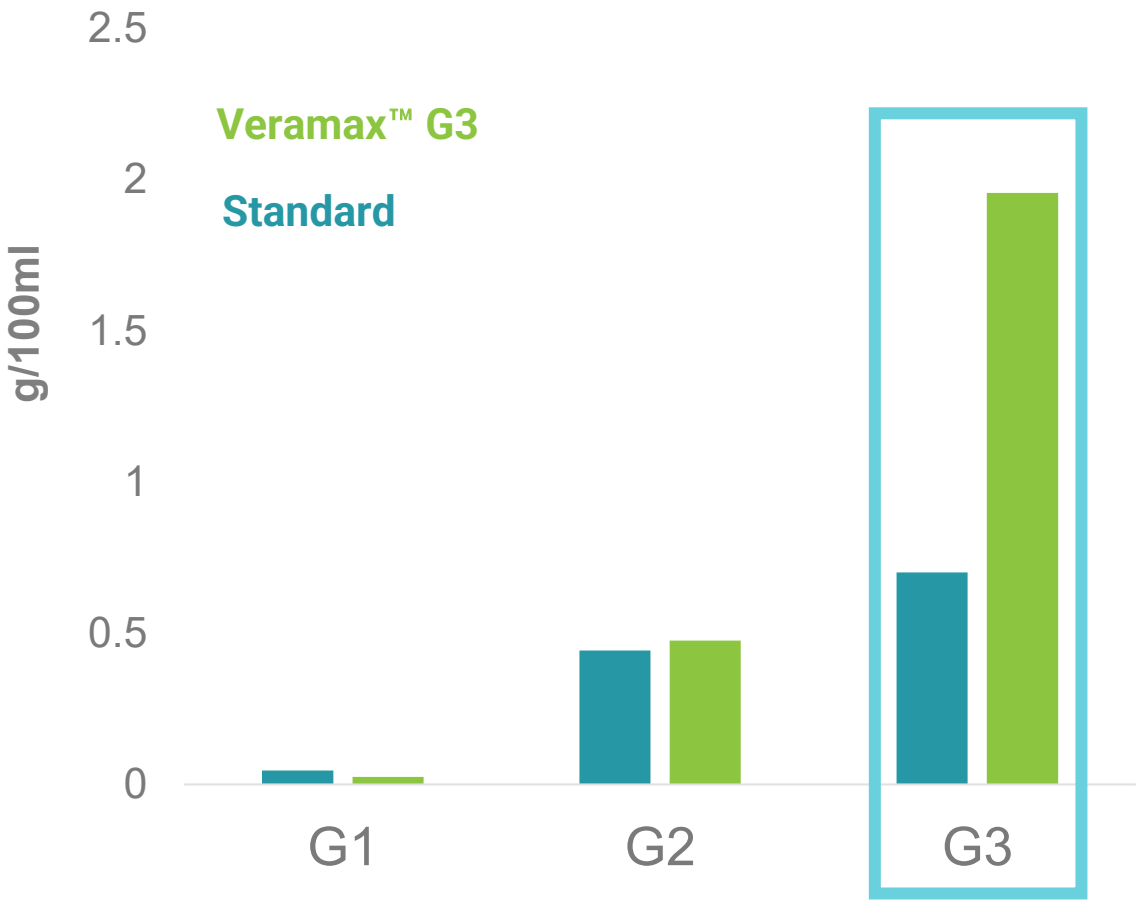




Nakakuki, T. Properties and Uses of Oligosaccharides, Journal of Applied Glycoscience, 1995

Veramax™ G3

Enzyme Tool for No-Sugars Innovation



Customers, aim to maximize sweetness and mouthfeel without compromising on no-sugars labeling (<0.5%).

This specific amylase selectively produces maltotriose, adding sweetness and a fuller body, while still meeting the labeling requirement for 'No sugars'

KEY TAKEAWAYS

Enzymes, like PG-500 and Veramax™, are powerful tools that enable tailored innovation—whether it's adjusting sugar profiles or improving protein performance.

Nature still holds the key. The more we understand our raw materials—and the enzymes that interact with them—the better and more effective our products will be.

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AMANO Amano Enzyme

About Us

Established in 1899 in Japan, a country rich in fermentation culture, Amano Enzyme now manufactures and sells enzyme solutions for customers all over the world.

Japanese Enzyme Manufacturer

Since 1948, our company has been dedicated to enzyme production, refining traditional biotechnology techniques such as screening and breeding microorganisms from the natural world.

Leveraging Japan's rich fermentation culture and diverse microbial enzymes, we combine biotechnology to create global value

1899

Ennosuke Amano started a household medicine distribution business

1948

Established Amano Pharmaceutical Co., Ltd. and started enzyme production

1960

Inaugurated General Enzyme Research Center

PLANTS UNLIMITED™

1996

Shifted resources to enzyme business

2000

Opened Gifu R&D Center

2000

- Changed corporate name to Amano Enzyme, Inc.
- Focus on speciality enzymes

2024

Began exploring speciality enzymes for every industry

Delivering innovation for over 120 years

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Amano Enzyme

PLANTS UNLIMITED™

Shaping the Future of Non-Dairy Beverages

Explore Unlimited Possibilities.

Discover how Amano Enzyme's solutions can transform your products.

[1] Mintel, Milk and Non-dairy Milk - US – 2024
[2] Innova Market Insights, Trends in Zero Sugar Dairy Alternative Drinks February 2025
[3] The Good Food Institute, 2022 State of the Industry Report, 2023
[4] Grand View Research, Dairy Alternatives Market Size To Reach $66.91 Billion By 2030, August 2024