

Enzymatic solution for fruit processors

with a focus on yield improvement, process facilitation,
and waste stream valorization

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01

dsm-firmenich in a Nutshell

Three dynamic markets, two iconic names, one foundational purpose

We bring progress to life

We're a trusted partner to global companies operating in high-growth and resilient markets. We're innovators in nutrition, health, and beauty.

~30,000

passionate, talented,
and diverse people in
our global team

**150+
years**

of combined
scientific discovery
and innovation
heritage

€12+ bn

combined revenue

A global group with regional roots

88

Manufacturing sites

78

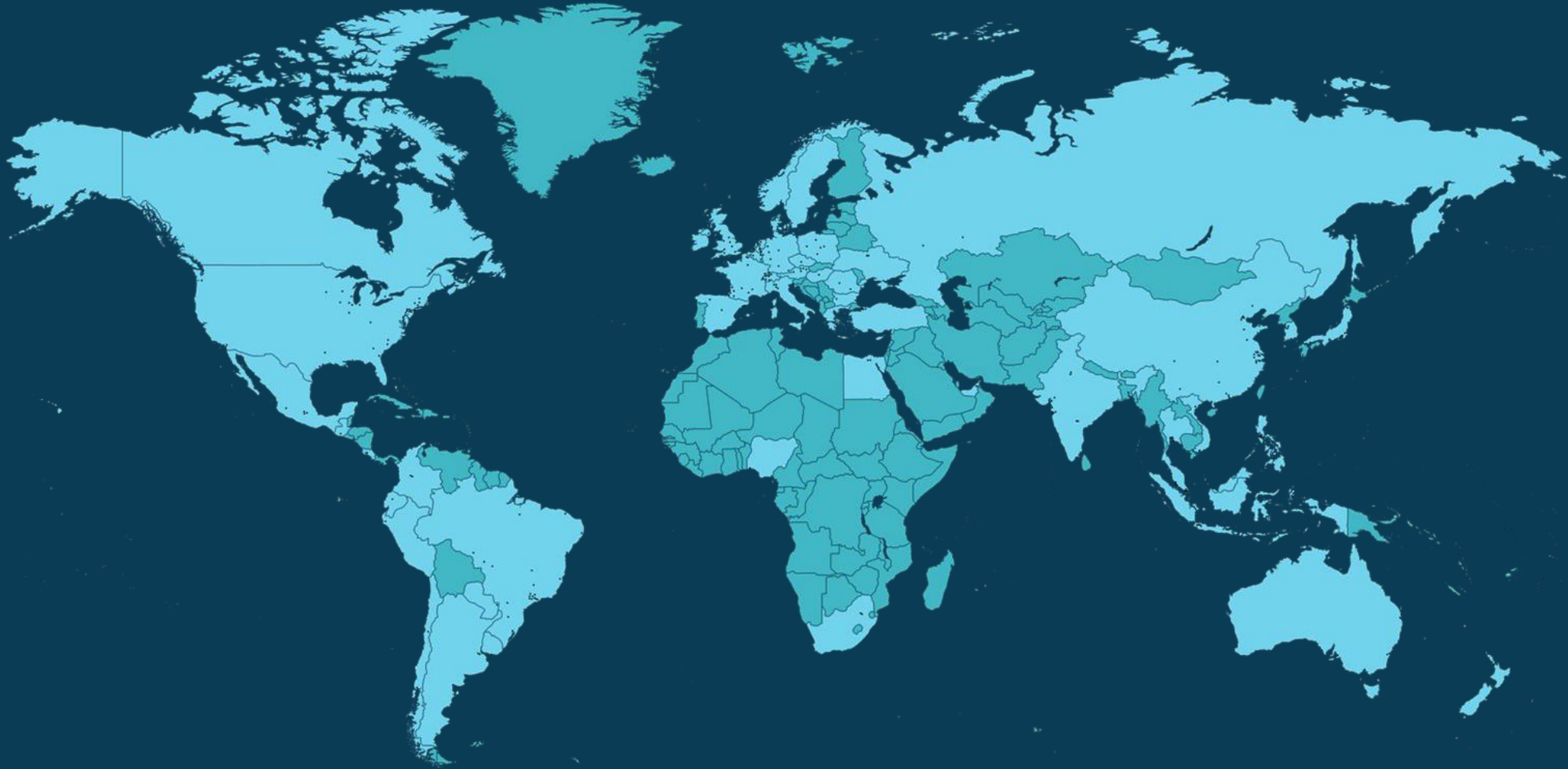
Application labs

40

Creation centers

70

Premix sites



Our portfolio of Taste and Ingredients Solutions

Integrated Solution of Taste, Texture and Health

Taste

Tonality solutions

- Flavors
- Flavouring oils & extracts

Functional flavor solutions

- Sugar reduction/ replacement and boosting solutions
- Dairy fat mouthfeel solutions
- Flavors with masking properties
- Salt & umami enhancement

Texture

- Cultures & probiotics
- Enzymes
- Hydrocolloids (pectin, gellan & other blends)
- Fibers & bulking

Health

- Nutritional lipids
- Plant proteins
- Nutritional premixes
- Vitamins and carotenoids
- Technical antioxidants



02

Enzymes Driving Innovation in Modern Fruit Processing

Why enzymes matter in modern fruit processing

The power of enzymes in the fruit industry

Efficiency & Yield



- Disrupt plant cell walls to release more juice and valuable solids.
- Enhance pressing performance and reduce residual waste in pomace.

Clarity & Stability



- Enzymes rapidly break down haze-forming compounds, enabling fast and efficient clarification.
- Improve filterability and shelf-life stability.

Texture & Viscosity



- Control viscosity for targeted product textures (purées, nectars, smoothies).

Natural & Sustainable Processing



- Reduce reliance on mechanical or chemical steps.
- Enable cleaner label and energy-efficient processes.
- Improve pomace dewatering for lighter, drier waste that's easier and cheaper to manage.

Enzymes at work

Tailored enzymatic solution across applications

Application	Key Enzymes	Benefits
Apple & Pear	Pectinase, hemicellulase, amylase	Yield, clarification, filterability
Red Fruits	Pectinase, protease	Color extraction, clarification
Citrus	Pectinase, cellulase, pectin lyase	Viscosity reduction, side stream valorization, clarification
Tropical fruits	Amylase, pectinase, cellulase	Viscosity control, haze removal, side stream valorization, filterability
Vegetables	Cellulase, hemicellulase, pectinase	Color extraction, process facilitation, yield

03

Challenges and Opportunities in the LATAM Fruit Industry

Challenges & opportunities in the LATAM fruit industry

That can be addressed with enzyme solutions

Key Challenges	Transformative Opportunities
Climate stress & crop diseases	Build resilient process with higher yield & quality
Inefficient juice recovery from pulp and peels	Maximize extraction with targeted and optimal enzyme solution
Instability in clarity & texture	Achieve clean and shelf-stable juices
Limited value addition	Valorize fruit products

Let's explore four real-world cases where enzymatic innovation addresses these exact challenges across Latin America.

04

Strategic Enzyme Applications in LATAM Fruit Processing

Unlocking value from citrus: yield, clarity & functional ingredients

Enzymatic Solutions in Citrus Processing

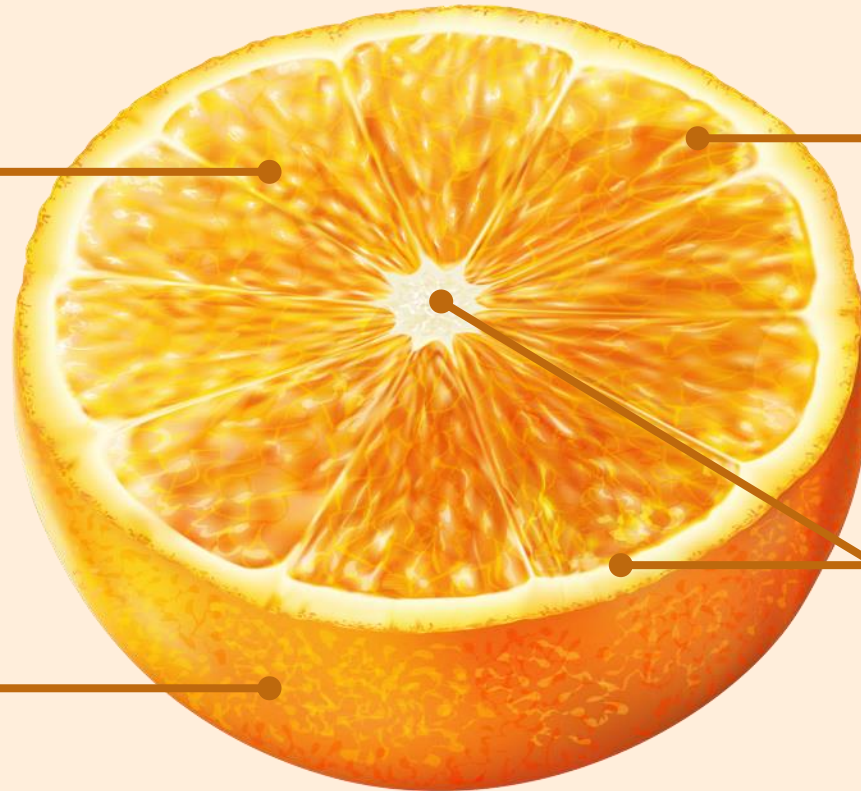


Pulp wash

Boost total yield (4-7%) by extracting more from pulp side streams with enzyme support — enabling up to 20% more soluble solids recovery by breaking down pectin in second extraction

Essential oil

+8-10% essential oil yield
Cleaner phase separation → drier sludge & easier oil collection
Brighter oil, better clarity, higher value



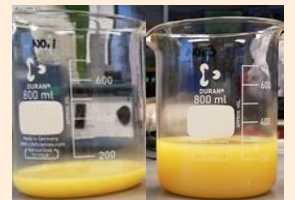
Cloudy/Clear juice, concentrate

From clear to cloudy enzymes deliver stable high-Brix concentrates (65 °Bx)



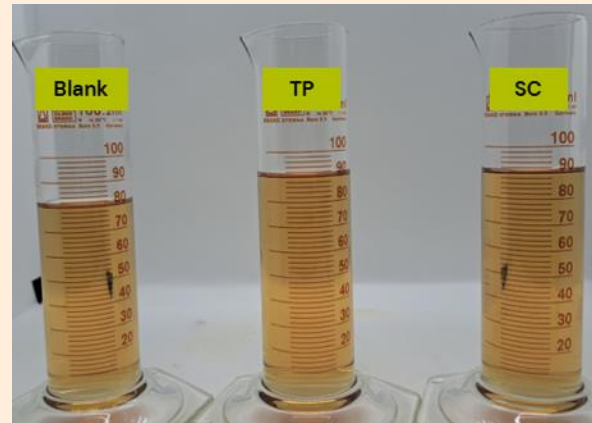
Natural cloudifier (peel extract)

2.7x more cloudifier yield
stable, clean-label, and gel-free

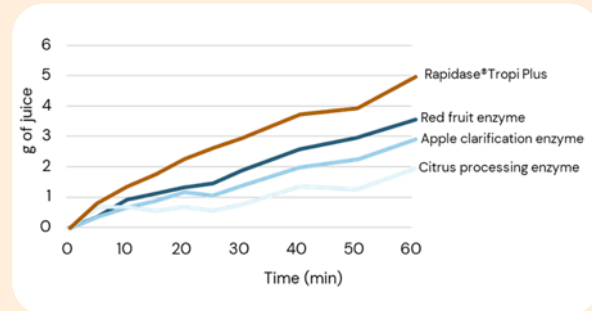


Not all enzymes are equal – maximize yield with the right choice

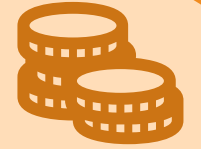
Optimized enzyme unlocks superior clarity, higher juice recovery, and profit from pineapple peel



300 g pineapple peel	Juice obtained	NTU
Blank	80 ml	6.64
Rapidase® TropiPlus	90 ml	2.85
Std. Clarification enzyme	90 ml	4.95



+3%
Yield



\$200K
Annual Profit
/10K ton fruit



Better
Juice
Clarity

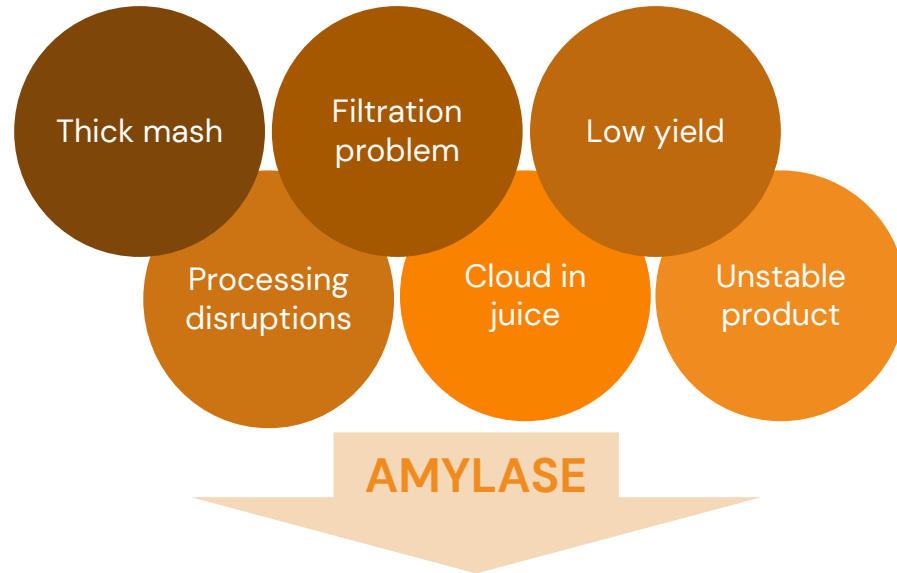


Higher
Filter
Flux

From “pudding” to clear juice

Starch challenges in tropical fruits

Starch: the hidden saboteur



- **Crystal-clear juice**
Ideal as a carrier for mixed fruit drinks and premium clear beverages
- **Easier, energy-efficient processing**
Lower viscosity = smoother pumping, less load on filters, faster throughput
- **Improved yield & filtration**
Less clogging, better extraction, higher product recovery
- **Stable product, no haze**
No retrogradation or sedimentation — better shelf-life
- **Process flexibility & product innovation**
Enables clear banana/mango juice, new formulations, and premium RTDs
- **More valorization from tropical fruit streams**
Turn previously hard-to-process fruit into high-value products

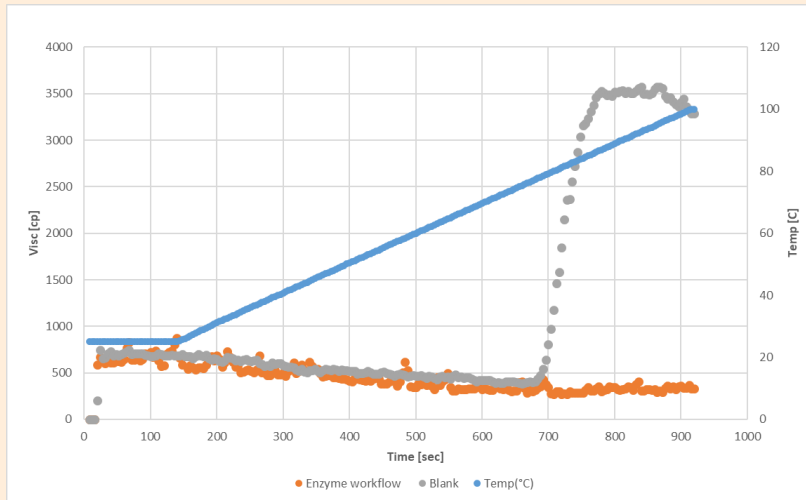


Clear, stable tropical juices – breaking the starch barrier with enzymes

Enzymes reduce viscosity and remove haze-forming compounds for high-yield, filterable tropical juices

Alpha-amylase

Viscosity Change of Banana Purée During Heating – RVA Method

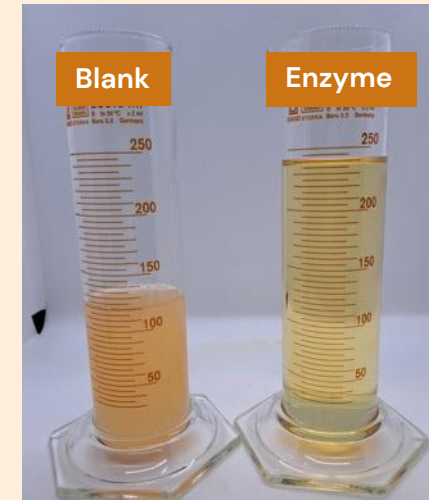


Visco at temp (°C)	Enzymatic workflow	Blank workflow
25	615 [cp]	625 [cp]
>80	323 [cp]	3233 [cp]

90% less viscosity at >80 °C enables easier processing

Pectinase + Glucoamylase

Banana Juice clarification trial

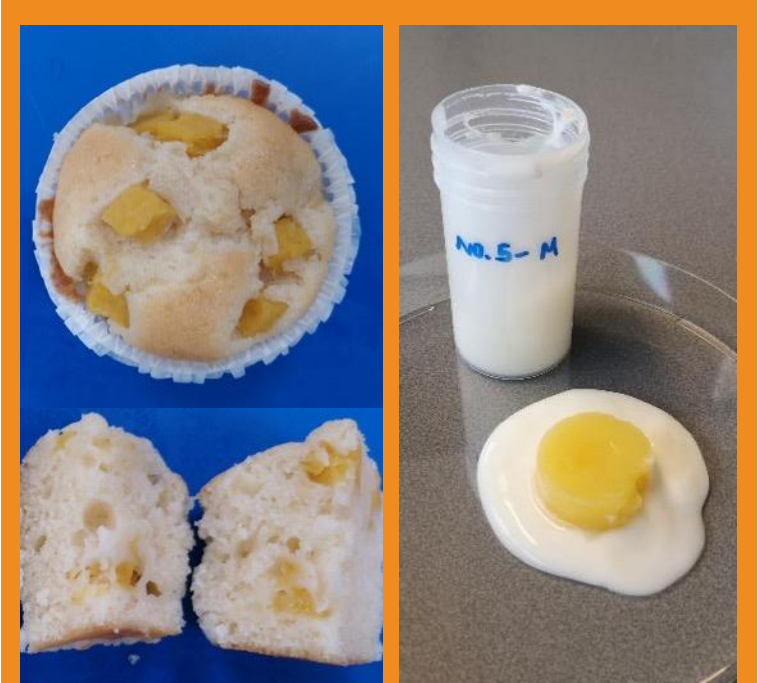
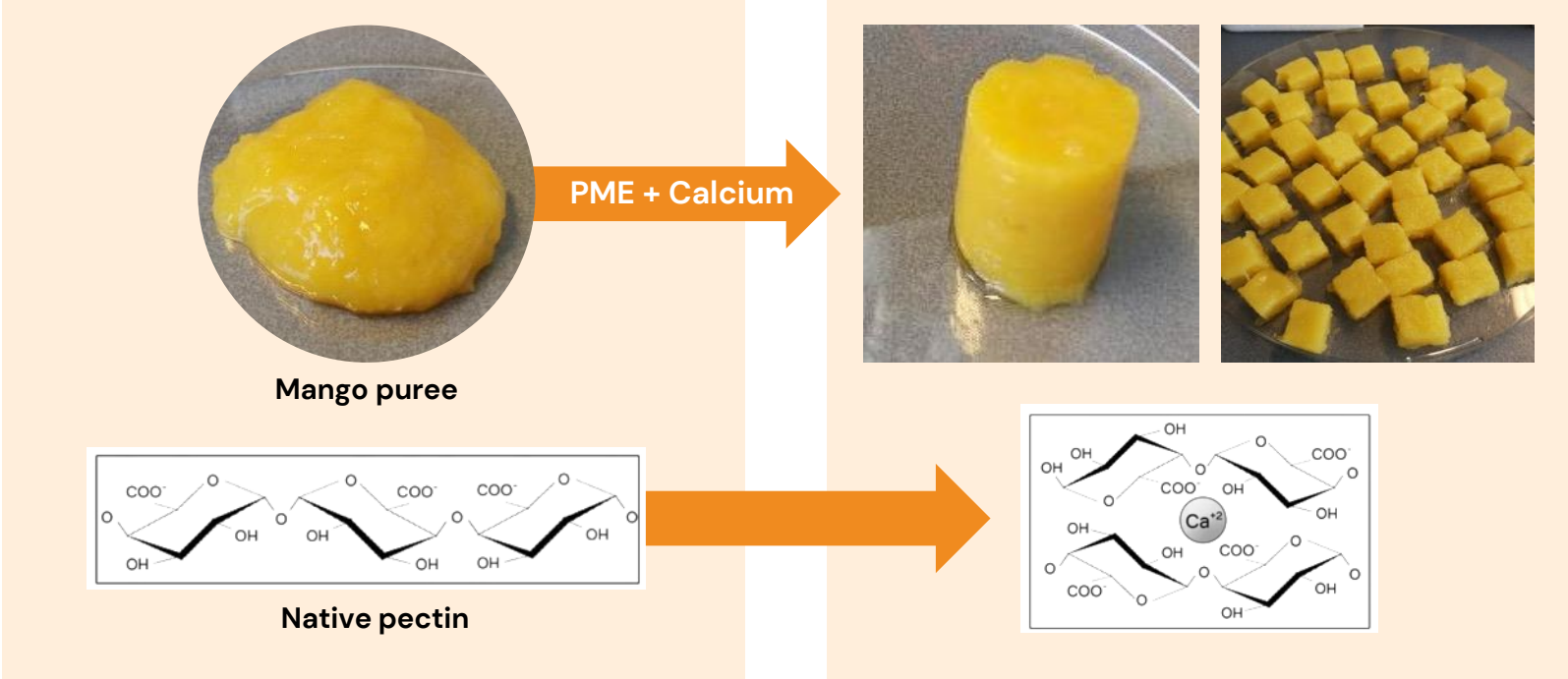


From 350kg puree	Crude juice (l)	Yield (%)	Filtered juice (l)	NTU
Blank process	240	68.5	120	471
Enzyme process	260	74.2	240	6.73

NTU reduction from 471 to 6.7
2x more filtrated juice

From soft to structured – enzymatic firming of tropical fruit preparations

700% viscosity increase in mango puree, stable at least 3 months



Baking at 200°C, 20 min One week after in yogurt

Ingredient list
Mango puree (99,9%),
calcium lactate

Also Applicable:

From clarity to texture, yield to valorization

Enzymes are reshaping what's possible in the fruit processing.

- Enzymes are not just tools — they're transformation enablers.
- The right enzyme strategy brings performance, sustainability, and profitability.
- Citrus and tropical fruits present challenges — and the opportunity to lead with innovation.
- Let's rethink what waste, clarity, or viscosity really mean in modern juice and purée production

Let's shape the future of fruit — together.

We bring progress to life



Priscila Porto
Regional Sales Director



Caroline Couri
Account Manager



Luiza Avezum
Technical Service Expert



Marcelo Graziani
Account Manager



Gabriel Leon
Account Manager

Let's shape the future of fruit — together.