

# SPOILER INVESTIGATION - BLOATED FRUIT JUICES

How to reduce customer complaints by more than 50% in 6 months

Facing rising customer complaints due to bloated juice bottles in several batches, an international beverage company partnered with bioMérieux.

The objective was to **identify the microorganisms responsible for the issue and trace their origin** within the production process.

**Leveraging the SMARTBIOME™ platform**, bioMérieux helped the customer **identify the root cause of the problem** and implement **targeted corrective and preventive measures**.



## METHODOLOGY - POWERED BY SMARTBIOME™

A three-step approach combining metagenomics and risk-based monitoring

1

**SPOT:** Investigation to identify the spoilers in finished product

2

**ACT:** Root cause analysis and implementation of corrective and preventive actions

3

**PREVENT:** Validation of the effectiveness of the applied measures and risk monitoring

## OUTCOMES

### SPOT - Spoilage Investigation

The metagenomic analysis, conducted using next-generation DNA sequencing, bioinformatics and data science, uncovered the presence of highly fermentative yeast species within the finished juice products. Notably, species such as *Pichia kluyveri*, *Pichia kudriavzevii*, and *Hansenia* were identified.

These yeasts are known for their robust fermentative capabilities, which can significantly influence the biochemical composition of the juice. Their activity may affect key product attributes including flavor profile, aroma development, and shelf stability, suggesting a **potential impact on both product quality and consumer experience**.

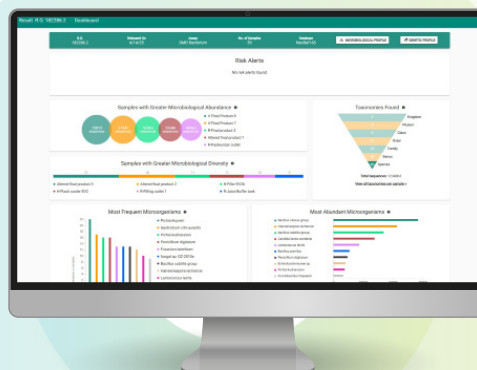


Fig. 1: Illustrative screenshot of the software showing microbiome distribution, diversity and abundance.

To identify contamination origin and understand the microbiome distribution in the factory, **several critical points were investigated upstream and downstream of pasteurization.** Sampling across the factory and process was performed from raw materials to filling machines.

**The root cause was identified as being a hygiene failure in the filling equipment.**

Yeasts were detected in juices before pasteurization and in filling machines after sanitation; however, in-process juices after pasteurization did not show the presence of these yeasts.

The investigation not only revealed the presence of yeasts, but also a diversity of *Enterobacteria*, lactic acid bacteria, and molds in raw materials and in rinse water from extractors and tanks after CIP, representing an additional source of beverage contamination.

The SMARTBIOME™ knowledge base provided the **microbial profile of the detected microorganisms** (spoilage impact on defined product type, potential source of contamination, growth conditions and potential resistance).

The investigation and findings resulted in the **implementation of corrective actions** (revising cleaning protocols, revising sampling plan, implementing targeted sanitation) and **preventive actions** (raw materials + environmental monitoring, routine metagenomic surveillance).

The implemented action plan empowered the customer to **clearly identify and map out the most critical areas** contributing to the issue. This strategic clarity enabled them to **take targeted, effective measures** that addressed the immediate problem and ensured a sustainable resolution.

Leveraging the advanced capabilities of the SMARTBIOME™ platform, the customer transitioned from a reactive problem-solving approach to a **preventive strategy**. By continuously monitoring the operational health of their factory, based on the risk levels associated with various critical control points, they were able to anticipate potential issues and intervene proactively, thereby enhancing overall process reliability and product safety.

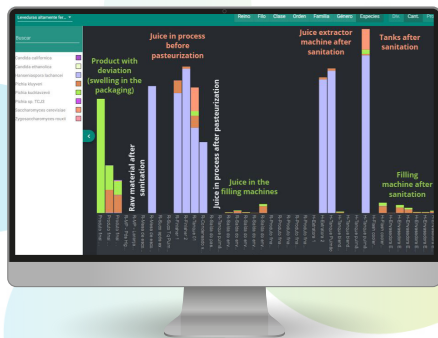


Fig. 2. Illustration of the SMARTBIOME™ microbiological spoiler profiles detected across the process



Fig. 3. Illustrative example of the factory map before corrective actions were implemented.



Fig. 4. Illustrative example of the factory map after corrective actions were implemented.

## CONCLUSION & CREATED VALUE

The customer observed a **significant reduction in complaints —over 50%—** within six months of implementing the solution and decreased investigation time by adopting a preventive, data-driven quality model. This approach not only improved product stability but also increased customer trust and reduced production losses

**Our Augmented Diagnostics approach helped this beverage producer determine the root cause of the issue but also uncovered improvement opportunities, such as identifying groups of spoilage microorganisms that survived the production process.**



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Learn more about our  
Augmented Diagnostics Approach