OPEN ACCESS Freely available online

ISSN: 1948-5948
Journal of Microbial & Biochemical Technology

Commentary

Roles of Microbes and Wooden Barrels in Fermentation and Maturation of Lambic Beer

Jordi Tebe*

Department of Microbiology, Dalhousie University, Halifax, Canada

DESCRIPTION

Yeast starter cultures are frequently used in the manufacturing of beer on an industrial scale to ensure stable and repeatable results [1]. Some beers, such as sour ales, are still created by a spontaneous fermentation and maturation process. Traditional lambic and lambic-based beers, which are made without the intentional inoculation of yeasts or bacteria, are particularly well-known in Belgium. These acidic Belgian beers are becoming more and more well-known throughout the world as symbols of traditional craftsmanship [2]. Lactic acid, acetic acid, ethyl esters, acetoin, and phenolic chemicals, which are crucial for the fresh acidic, sharp acidic, fruity, buttery, and Brett-flavor notes, respectively, make up their distinctive flavor profile [3]. Traditional Belgian lambic beers are made by allowing an aqueous mixture of barley malt, unmalted wheat, and aged dry hops to spontaneously ferment in horizontal hardwood barrels. *Saccharomyces cerevisiae*, *Saccharomyces kudriavzevii*, *Acetobacter lambici*, *Pediococcus damnosus*, *Dekkera bruxellensis*, and *Brettanomyces custersianus* are among the yeast and bacteria that participate in this fermentation and maturation process, which can last up to three years and involves four distinct phases. The first-boiled lambic beer wort is allowed to cool overnight in an open cool ship, where it can be inoculated with airborne microbes. Following this, the cooled wort is fermented and let to mature in wooden barrels, which adds to the process's traditionalism [4].

Many alcoholic drinks, including wine, whisky, and cider, are aged in wooden casks to enable some oxygen ingress and flavor creation by extracting typical wood chemicals, such as polyphenols and tannins. Yet, it is uncertain why wooden barrels are typically employed in the manufacturing of lambic beer. Also, due to their physical inertness and porosity, which make them difficult to disinfect, hardwood surfaces present a microbiological danger [5]. As an alternative, it has been demonstrated that the resident microbiota, which is found on the interior surfaces of barrels, serves as an inoculant and functional component during the development of spontaneous lambic beers. For instance, the interior surfaces of wooden lambic beer barrels have been used to isolate and study *P. damnosus*, *D. bruxellensis*, and *Dekkera anomala*, which are thought to be essential microorganisms for effective lambic beer processes. This AAB species has not yet been discovered in any other niches and was initially isolated from developing lambic beer wort [6].

These fermentation and maturation-related bacteria probably come from earlier lambic beer productions because the same wooden barrels are used repeatedly for lambic beer batch productions and are only briefly cleaned with high-pressured water between subsequent production batches [7]. In addition to cleaning the barrels with high-pressure water, sulphuric dioxide is another typical sanitation method.

A simple technique for assessing all microorganisms present, including Viable but Non-Culturable (VBNC) includes culture-independent, DNA-based tests [8]. Up to this point, only one study has used whole-community amplicons-based high-throughput sequencing of DNA throughout the fermentation and maturation of lambic beer wort in a single cask. Although these two studies used cutting-edge DNA-based approaches to look into the microorganisms involved in the fermentation and maturation of lambic beer wort in a single wooden barrel, it is not obvious how much variability using several wooden barrels of the same kind adds to the production of lambic beer that comes from the same cool ship batch [9].

The current study sought to determine the impact of individual wooden barrels on lambic beer production methods. As a result, two parallel lambic beer operations were carried out in a Belgian traditional lambic brewery using virtually identical wooden barrels of wine origin and began with wort from the same coolship batch. A systematic and multiphasic analytic approach was used to track these productions over time. This included a high-throughput microbiological investigation, molecular identification of isolates selected from selective agar plates, and shotgun metagenomics of whole-community DNA in conjunction with an expanded metabolite target study. Because the cooled fermentation transferred to the casks still lacked most

Correspondence to: Jordi Tebe, Department of Microbiology, Dalhousie University, Halifax, Canada, Email: jordit@gmail.com

Received: 02-Feb-2023, Manuscript No. JMBT-23-20292; **Editor assigned:** 06-Feb-2023, Pre QC No. JMBT-23-20292 (PQ); **Reviewed:** 20-Feb-2023, QC No. JMBT-23-20292; **Revised:** 27-Feb-2023, Manuscript No. JMBT-23-20292 (R); **Published:** 06-Mar-2023, DOI: 10.35248/1948-5948.23.15:543

Citation: Tebe J (2023) Roles of Microbes and Wooden Barrels in Fermentation and Maturation of Lambic Beer. J Microb Biochem Technol. 15:543.

Copyright: © 2023 Tebe J. This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original author and source are credited.

fermentation and maturation microorganisms, the casks likely aided in the establishment of a stable microbiota of yeasts, LAB, and AAB by acting as an additional inoculation source of the necessary microorganisms, minimizing batch-to-batch variations. Furthermore, based on the stable microbiota collected, it is clear that the oak casks employed supplied the ideal micro aerobic environment for the fermentation and maturation of lambic beer wort. They most likely aided in preventing excessive AAB development and, as a result, excessive formation of acetic acid and action, high amounts of which may cause flavor aberrations in lambic beer [10].

CONCLUSION

A functional inquiry found that the A. lambici MAG lacked genes associated in sucrose and maltose/maltooligosaccharide intake, as well as the glyoxylate shunt, but did have genes implicated in numerous acid tolerance processes. Some common *P. damnosus* properties, such as hop tolerance, ropy phenotype, and biogenic amine synthesis, were likely plasmid-based, and the *P. damnosus* MAG also possessed a ferulic acid decarboxylase, which contributed indirectly to lambic beer flavour development. The absence of a target gene glycerol 3-phosphate phosphatase in the *D. bruxellensis* and *B. custersianus* bins revealed that glycerol was unable to be produced, the requirement for alternative external electron acceptors for redox balancing.

REFERENCES

1. Poustforoosh A, Nematollahi MH, Hashemipour H, Pardakhty A. Recent advances in Bio-conjugated nanocarriers for crossing the Blood-Brain Barrier in (pre-) clinical studies with an emphasis on vesicles. J Control Release. 2022; 343:777-797.
2. Kimmey JM, Stallings CL. Bacterial pathogens *versus* autophagy: Implications for therapeutic interventions. Trends Mol Med. 2016;22(12):1060-1076.
3. Weddle E, Agaisse H. Spatial, temporal, and functional assessment of LC3-dependent autophagy in Shigella flexneri dissemination. Infect Immun.2018;86(8):134-218.
4. Leung Y, Ally S, Goldberg MB. Bacterial actin assembly requires toca-1 to relieve N-wasp autoinhibition. Cell Host Microbe. 2008;3(1):39-47.
5. Baxt LA, Goldberg MB. Host and bacterial proteins that repress recruitment of LC3 to Shigella early during infection. PloS One. 2014;9(4):94653.
6. Campbell-Valois FX, Sachse M, Sansonetti PJ, Parsot C. Escape of actively secreting Shigella flexneri from ATG8/LC3-positive vacuoles formed during cell-to-cell spread is facilitated by IcsB and VirA. mBio. 2015;6(3):2567-2514.
7. Quan Wang. Fabrication of an allyl-β-cyclodextrin based monolithic column with triallyl isocyanurate as co-crosslinker and its application in separation of lipopeptide antibiotics by HPLC. Microchem. J. 2021; 168:319-328.
8. Jessica Tan. Separation and quantitation of eight isomers in a molecule with three stereogenic centers by normal phase liquid chromatography. J. Chromatogr. A. 2018; 1538:108-111.
9. Thomas AS, Hanauer S, Wang Y. Immune checkpoint inhibitor ent erocolitis *vs* idiopathic inflammatory bowel disease. Clin Gastroenter ol Hepatol. 2022 (18):48-56.
10. Solomon M, Loeck M, Silva Abreu M, Moscoso R, Bautista R, Vigo M, et al. Altered blood-brain barrier transport of nanotherapeutics in lysosomal storage diseases. J Control Release. 2022; 349:1031-1044.