Microbial Diversity and Dynamics in the mother of Vinegar Revealed by Metagenomics

Gloria Beatriz Molina Valdés[1], José Carlos Parada Fabián[1], Carlos Ramón Vázquez Quiñones[1], Elsa Irma Quiñones Ramírez[1], Natividad Bonifacio Iván[1], Hernández Robles Marcos Francisco[1], Carlos Vázquez Salinas[2], Ana Karen Álvarez Contreras[1]

[1]Escuela Nacional de Ciencias Biológicas-IPN Santo Tomás, Manuel Carpio, Plutarco Elías Calles, Miguel Hidalgo, C.P. 11350 CDMX.
[2]Universidad Autónoma Metropolitana - Iztapalapa, San Rafael Atlixco 186, Leyes de Reforma 1A Sección, Iztapalapa, C.P. 09310 CDMX.
E-mail: gloria.02.10.2000@gmail.com

The production of artisanal vinegars can be carried out using controlled methods, such as submerged cultures in bioreactors, or spontaneous methods, like Orleans system[1]. In the latter, the fermentable substrates such as wine, juice, or a molasses solution are added, and upon contact with the liquid in the bioreactor, the fermentation process begins. During this process, Acetic Acid Bacteria (AAB) are responsible for the biotransformation of ethanol into acetic acid [2], forming a biofilm known as the "mother of vinegar," which acts as a starter culture and a microenvironment for other AAB, Lactic Acid Bacteria, and yeasts.

METHODOLOGY. To observe the microbial diversity and shifts in the population throughout the fermentation process, population dynamics were evaluated by counting viable cultivable microorganisms on days 0 and 7 of fermentation, using MRS and standard agar media with the pour plate technique. In addition, DNA was extracted from the mother of vinegar on the same fermentation days, and amplification of the 16s and 18s ribosomal genes was carried on for metagenomic analysis.

CONCLUSION. Given that microorganisms involved in fermentation often require specific nutritional conditions and produce a variety of metabolites, traditional media are of limited use. In this context, metagenomics proves to be an effective tool for studying microbial diversity and population dynamics in fermented products.

1. Román-Camacho, J. J., García-García, I., Santos-Dueñas, I. M., García-Martínez, T., & Mauricio, J. C. (2023). Latest Trends in Industrial Vinegar Production and the Role of Acetic Acid Bacteria: Classification, Metabolism, and Applications-A Comprehensive Review.

2. Tran, T., Roullier-Gall, C., Verdier, F., Martin, A., Schmitt-Kopplin, P., Alexandre, H., Grandvalet, C., & Tourdot-Maréchal, R. (2022). Microbial Interactions in Kombucha through the Lens of Metabolomics. *Metabolites*, *12*(3), 235.