

What is the most effective method for reducing the microbial load in date paste?

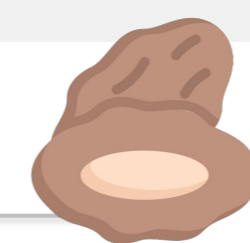
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Introduction



Date paste's high moisture and sugar content, which nourishes microorganisms such as bacteria and molds, makes it **susceptible to microbial contamination**. These conditions are inherent to its composition and processing methods (Zamir et al., 2018, Muñoz-Tebar et al., 2023).

Ensuring **low microbial load** in date paste is crucial for safety, compliance, and quality (Zamir et al., 2018). Contamination can cause illnesses, alter taste, and shorten shelf life, affecting consumer satisfaction and market competitiveness (Muñoz-Tebar et al., 2023). Therefore, implementing adequate microbial control strategies, such as optimized processing, hygiene protocols, controlled storage and **effective microbial load reduction strategies**, is vital for safety, quality, and market acceptance.

Objectives

To evaluate the effectiveness of different methods, namely autoclaving, sonication and water bath treatments applied at different time intervals and temperatures, in reducing microbial contamination in date paste.



Methods

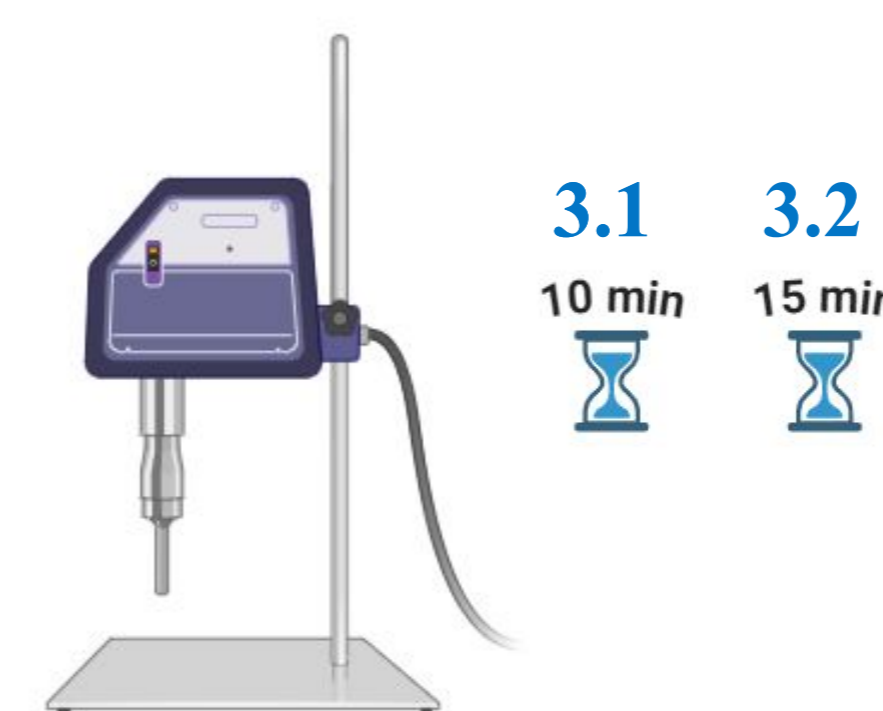
Method 1: Autoclaving



Method 2: Water bath



Method 3: Sonicator



Microbial load assessment through Colony-Forming Units (CFU) enumeration



Results

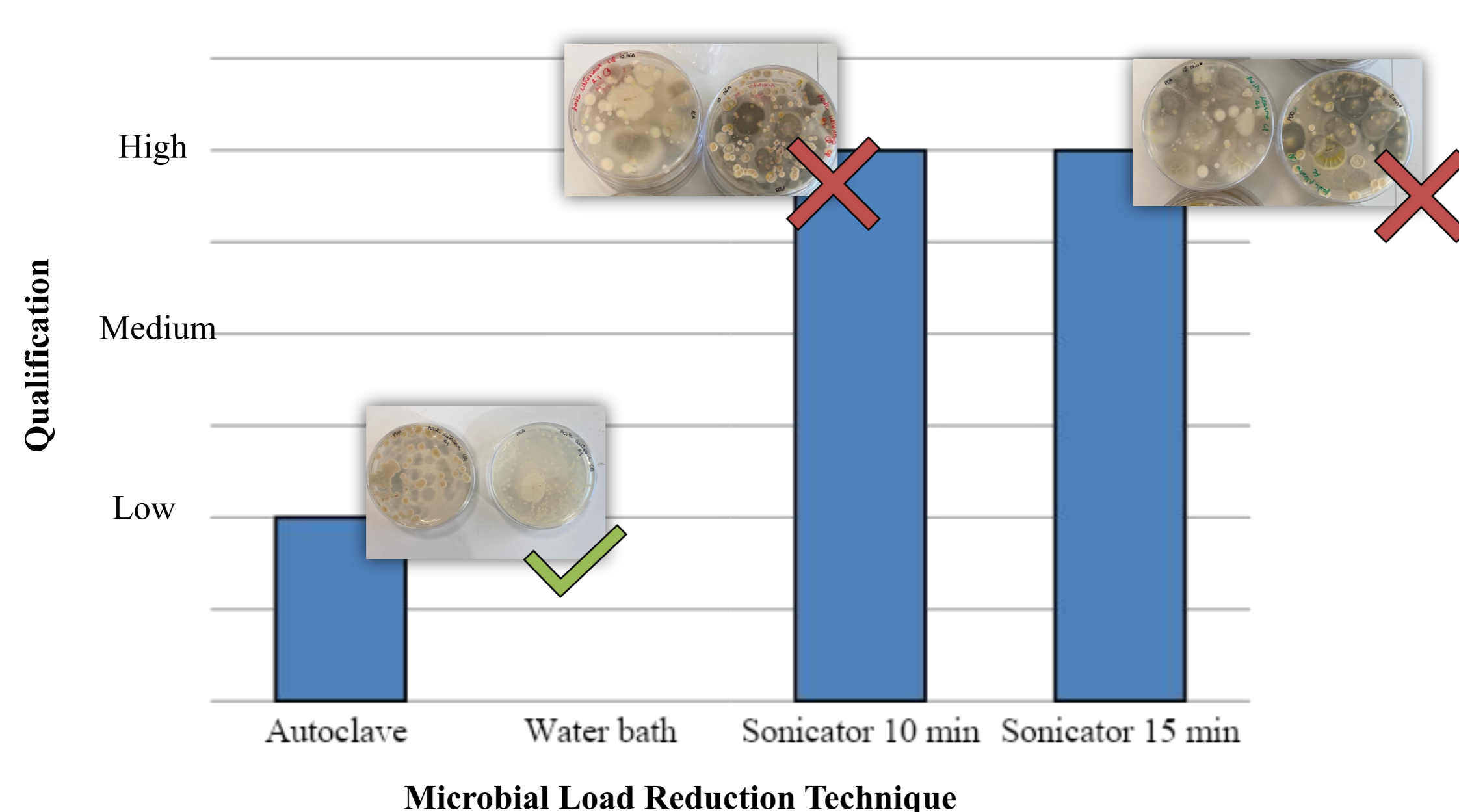


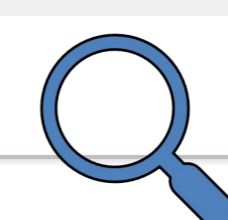
Figure 1 – Microbial load qualification after exposure to the different treatments.

Qualification of the results was performed as follows:

Low (less than 100 CFU/g); Medium (100 – 300 CFU/g); High (>300 CFU/g)

- 1. Autoclave: Effective reduction** of microbial load of date paste. The chosen sterilization temperature of 90°C did **not result in major appearance alterations**.
- 2. Water bath at 90°C:** The sample **failed to reach the desired temperature of 90°C** through water bath heating due to the high sugar content. The strategy was deemed to be ineffective.
- 3.1. Sonication for 10 min:** The high density of the matrix inhibited the propagation of frequency, resulting in a lack of reduction in microbial load.
- 3.2. Sonication for 15 min:** An increase in sonication time did **not result in a reduction of the microbial load**. The efficacy of sonication in reducing microbial load was deemed to be ineffective.

Conclusions



Among the tested methods, **autoclaving** was found to be the **most effective in reducing the microbial load** of the inherent date paste to viable cell numbers below 100 CFU/g. Treatments through **water bath heating** and **sonication** were deemed ineffective due to the **high density and high sugar content** of the matrix.

References

Zamir, R., Islam, A.B.M.N., Rahman, A., Ahmed, S., Omar Faruque, M., 2018. Microbiological Quality Assessment of Popular Fresh Date Samples Available in Local Outlets of Dhaka City, Bangladesh. *Int J Food Sci* 2018, 1–4. <https://doi.org/10.1155/2018/7840296>

Muñoz-Tebar, N., Viuda-Martos, M., Lorenzo, J.M., Fernandez-Lopez, J., Perez-Alvarez, J.A., 2023. Strategies for the Valorization of Date Fruit and Its Co-Products: A New Ingredient in the Development of Value-Added Foods. *Foods* 12, 1456. <https://doi.org/10.3390/foods12071456>

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