

Improving the Quality of Lao Fermented Bamboo Shoot (*Nor Mai Som*) Using Probiotic *Lactiplantibacillus Plantarum* BBS13 as Starter Culture

Viengvilaiphone Botthoulath¹, Ida F. Dalmacio², Nacita B. Lantican², Lucille C. Villegas²,
Francisco B. Elegado³, Maria Genaleen Q. Diaz⁴ and Lawrence Yues Cheng Uy¹

¹Graduate School, UPLB, College, Laguna 4031 Philippines / Vientiane, Laos, vbotthoulath@up.edu.ph

² Microbiology Division, Institute of Biological Science, UPLB, College, Laguna 4031 Philippines,
ifdalmacio@up.edu.ph; nblantican@up.edu.ph; lcvillegas1@up.edu.ph;

³ Biotechnology for Industry, Energy and the Environment Program, National Institute of Molecular Biology and
Biotechnology (BIOTECH), University of the Philippines Los Baños (UPLB), College, Laguna 4031
Philippines, fbelegado@up.edu.ph

⁴Molecular Biology and Biotechnology, Institute of Biological Science, UPLB, College, Laguna 4031
Philippines, mqdiaz@up.edu.ph

Extended Abstract

Lactic acid bacteria (LAB) are used as starter cultures in many fermentation processes because, aside from their potential probiotic properties, they are known to improve the nutritional value of food by enhancing their organoleptic properties and stability [1]. Bamboo shoots are one of the most popular foods in Lao PDR and many ASEAN countries. Adding probiotic bacteria to the natural fermentation process of foods such as bamboo shoots, can enhance their nutrient value and reduce health risks from contamination. This aligns with the Sustainable Development Goals (SDGs) 1, 2, and 3 (No Poverty; Zero Hunger; and Good Health and Well-being, respectively). Effective fermentation can also reduce wastage and agriculture's footprint, supporting SDGs 12 and 15 (Responsible Consumption and Production; and Life on Land, respectively) [3].

During fermentation of bamboo shoots, LAB occur naturally as the predominant microorganism, making the product acidic and helpful for digestion. Fermenting bamboo shoots increases their flavour, aroma, texture, appearance, nutritional value and shelf-life [2]. However, the traditional fermentation process is time-consuming and can harbour pathogenic microorganisms, leading to safety concerns. To address these issues, a probiotic strain isolated from Lao traditional fermented bamboo shoots was screened for gut health-promoting properties and employed as a starter culture in fermentation. Out of a total of 20 LAB isolates, BBS13 was selected and preliminarily screened for antagonistic activity via an agar-well diffusion assay against several indicators. Species identification using the 16S rRNA gene and whole genome sequence analysis found *Lactiplantibacillus plantarum* BBS13. This strain showed antibacterial activity against both Gram-negative and Gram-positive bacteria. Pre-screened for cyanide resistance, BBS13 exhibited the ability to grow in HCN-containing MRS broth. In *in vitro* tests for probiotic properties, BBS13 indicated tolerance under simulated gastrointestinal tract conditions, and the bacterial adhesion to xylene and chloroform was 39.54 and 49.33%, respectively. Strain BBS13 also demonstrated DPPH radical scavenging activity at 77.44%. An evaluation of BBS13's safety revealed that it was sensitive to various antibiotics and had no hemolytic activity. Inoculation of the BBS13 as a starter culture in *Nor mai som* reduced cyanide content by 14.21 µg/kg and significantly reduced the level of enterobacteriaceae after day 1, compared to natural fermentation. The findings indicated that BBS13 holds potential as a probiotic starter culture to develop products that are safe and promote well-being beyond basic nutrition.

Keywords: *Lactiplantibacillus plantarum* BBS13, Lao traditional fermented bamboo shoot, probiotic bacterium.

References

- [1] Y. Qi, L. Huang, Y. Zeng, W. Li, D. Zhou, J. Xie, Q. Tu, D. Deng and J Yin, “*Pediococcus pentosaceus*: Screening and Application as Probiotics in Food Processing”. *Front Microbiol*, 2021, pp 3827.
- [2] P. Singhal, S. Satya and S. N Naik, “Fermented bamboo shoots: A complete nutritional, anti-nutritional and antioxidant profile of the sustainable and functional food to food security”. *Food Chem: Mol Sci*, 2021, vol 3, pp 100041.
- [3] United Nations available at (<https://sdgs.un.org/goals>)