foods

MDPI

Article

Biopreservation of Fresh Sardines (*Sardina pilchardus*) Using *Lactiplantibacillus plantarum* OV50 Isolated from Traditional Algerian Green Olives Preparations

Nassima Mohellebi [1], Samia Hamma-Faradji [1,*], Kamel Bendjeddou [1], Amel Ait Meddour [1], Yassine Benchikh [2,3], Farida Bendali [1], Yanath Belguesmia [4] and Djamel Drider [4,*]

[1] Université de Bejaia, Faculté des Sciences de la Nature et de la Vie, Laboratoire de Microbiologie Appliquée, 06000 Bejaia, Algeria; nassima.mohellebi@univ-bejaia.dz (N.M.); kamel.bendjeddou@univ-bejaia.dz (K.B.); ait_meddour_amel@yahoo.fr (A.A.M.); farida.bendali@univ-bejaia.dz (F.B.)
[2] Université de Bejaia, Faculté des Sciences de la Nature et de la Vie, Laboratoire de Biochimie Appliquée, 06000 Bejaia, Algeria; yassine.benchikh@umc.edu.dz
[3] Laboratoire de Biotechnologie et Qualité des Aliments, Institut de la Nutrition, de l'Alimentation et des Technologies Agro-Alimentaires (INATAA), Université Constantine 1 Frères Mentouri, 25000 Constantine, Algeria
[4] Unité Mixte de Recherche (UMR) Transfrontalière BioEcoAgro1158, Univ. Lille, INRAE, Univ. Liège, UPJV, YNCREA, Univ. Artois, Univ. Littoral Côte D'Opale, ICV—Institut Charles Viollette, 59000 Lille, France; yanath.belguesmia@univ-lille.fr
* Correspondence: samia.hamma@univ-bejaia.dz (S.H.-F.); djamel.drider@univ-lille.fr (D.D.)

Abstract: *Lactiplantibacillus plantarum* OV50 is a novel strain that was isolated from Algerian olives. Prior to its use as a natural biopreservative, OV50 underwent characterization for various functions. OV50 shows no proteolytic, lipolytic, or hemolytic activity. In addition, it is non-cytotoxic to eukaryotic cells and does not exhibit acquired antibiotic resistance. OV50 was tested with *Pseudomonas aeruginosa* ATCC 27835, *Staphylococcus aureus* ATCC 6538, *Escherichia coli* ATCC 8739, and *Vibrio cholerae* ATCC 14035 in a sardine based-medium at 37 °C and 7 °C. At 37 °C, OV50 completely inhibited the growth of these foodborne pathogens for a maximum of 6 h. At 7 °C, it suppressed their growth for a maximum of 8 days, except for *S. aureus* ATCC 6538, whose growth was reduced from 4 to 2 log CFU/mL. Microbiological counts, total volatile basic nitrogen (TVB-N), and peroxide values (PV) concentrations were determined in fresh sardines inoculated with OV50 and kept at 7 °C for 12 days. The inoculated sardines showed a significant reduction in TVB-N levels at D8 (34.9 mg/100 g) compared to the control (59.73 mg/100 g) and in PV concentrations at D4 (6.67 meq/kg) compared to the control (11.44 meq/kg), as well as a significant reduction in the numbers of *Enterobacterales*, Coliforms, *Pseudomonas* spp., *Vibrio* spp., and *S. aureus* At D8 and D12 compared to the control. Taken together, these results indicate that OV50 can improve the microbiological safety, freshness, and quality of sardines.

Keywords: lactic acid bacteria; *Lactiplantibacillus plantarum* OV50; biopreservation; coculture; sardines

Citation: Mohellebi, N.; Hamma-Faradji, S.; Bendjeddou, K.; Ait Meddour, A.; Benchikh, Y.; Bendali, F.; Belguesmia, Y.; Drider, D. Biopreservation of Fresh Sardines (*Sardina pilchardus*) Using *Lactiplantibacillus plantarum* OV50 Isolated from Traditional Algerian Green Olives Preparations. *Foods* **2024**, *13*, 368. https://doi.org/10.3390/foods13030368

Academic Editor: Aurelio López-Malo

Received: 18 December 2023
Revised: 12 January 2024
Accepted: 19 January 2024
Published: 23 January 2024

1. Introduction

Sardina pilchardus is a sardine found in the Mediterranean Sea and is widely traded and consumed in the region [1]. This small pelagic fish is rich in proteins, minerals, and polyunsaturated fatty acids, especially Ω-3 [2,3]. Sardines have a short and limited shelf life due to their delicate structure, neutral pH, and chemical composition [2]. As a result, fresh sardines rapidly perish even under refrigerated storage conditions. Their quality may deteriorate rapidly due to microbial activity, autolysis, and oxidation occurring during the storage conditions [2,4]. In addition, post-harvest activities within the fish chain have often been neglected in rural community development projects. However, fish deserves more attention than it currently receives [5]. Post-harvest fish losses (PHFL) are a major