

MICROBIOLOGICAL QUALITY AND SAFETY OF FARMED EDIBLE SEAWEED *ALARIA ESCULENTA* AND ATLANTIC SALMON CO-CULTURED IN INTEGRATED MULTITROPHIC AQUACULTURE SYSTEM

A. Lytou ^{*1}, D. Lymperi¹, J. Casserly², F. Kane², E. Panagou¹ and G-J. Nychas¹

¹ Laboratory of Microbiology and Biotechnology of Foods, Department of Food Science and Human Nutrition, Agricultural University of Athens, Athens, Greece

² Marine Institute, Ireland

E-mail: alytou@gmail.com

Introduction

Although advantages and limitations of Integrated Multi-trophic Aquaculture (IMTA) have been widely reported, few studies have focused on the effect of IMTA on the microbiological quality and safety of involved products (Califano et al., 2020). In the present work, the spoilage potential as well as the presence of pathogenic bacteria in two different species (salmon and seaweed *Alaria esculenta*) cultured in IMTA system were investigated. Moreover, several nutritional parameters were evaluated so as to provide a preliminary view about the nutritional quality of such products.

Methods

Brown algae *Alaria esculenta* and Atlantic salmon co-cultivated at the west coast of Ireland in IMTA system and harvested by Marine Institute research group in 2020 (June). The collected samples were subsequently packaged and sent to the Laboratory of Food Microbiology and Biotechnology (Agricultural University of Athens, Greece). The received samples were placed in polystyrene trays and stored at different temperatures (0, 5, 10, 15°C – seaweed, 0, 4°C - salmon) for specific time intervals. Microbiological analysis was performed on the day of their arrival at the lab and at certain days of storage, for the estimation of Total Viable Counts (TVC), *Pseudomonas* spp., Lactic acid bacteria, Enterobacteriaceae, *Bacillus* spp., *B. thermosphacta*, *Vibrio* spp., *Aeromonas* spp., yeast and moulds, *E. coli*, *Salmonella*, *Listeria monocytogenes* and *Staphylococcus aureus*. Nutritional analyses, including the determination of protein, fat, carbohydrate, ash and moisture content, were performed on the day of samples' arrival at the lab.

Results and Discussion

Representative microbial populations of salmon samples (0 and 4°C) are presented in Fig. 1. Products were of acceptable microbial quality (TVC < 7.0 log CFU/g) and safe for human consumption up to day 12 and 8 after storage at 0 and 4°C. The respective time period for seaweed samples (Fig. 2) was 8 and 4 days for 0 and 5°C, respectively, while initial microbial load was in accordance with findings reported by Blikra et al. (2019). It should be noted that bacteria of Enterobacteriaceae family which are considered as hygiene indicator, were at low levels -even below enumeration limit- in both species, while all the examined pathogenic bacteria were absent both at the beginning and at the end of storage. Although there are still issues to be investigated regarding quality and safety of IMTA products such as the promotion of antibiotic resistant microbial strains, these preliminary findings provide significant information about the overall microbiological quality of IMTA products. As far as the nutritional quality of the tested samples is concerned, specific nutritional parameters (such as protein, fat and carbohydrate content) were found to be similar to reference values for the same species (non-IMTA).

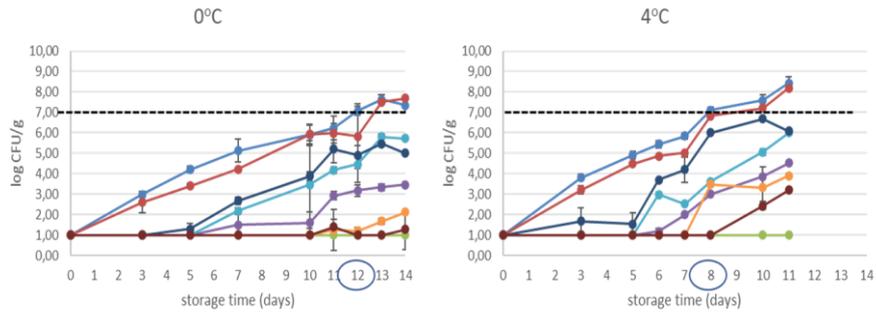


Fig 1. Microbial populations of salmon throughout storage at 0 and 4°C

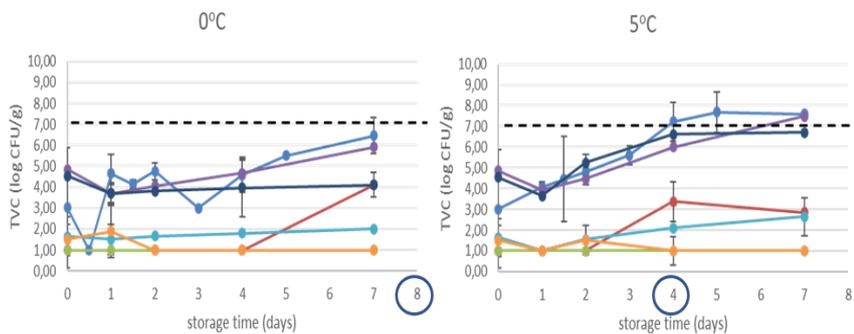
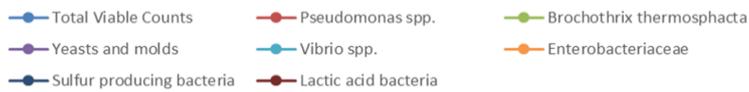


Fig 2. Microbial populations of seaweed *Alaria esculenta* cultivated in IMTA and stored at 0 and 5°C



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References

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