

Isolation of several bacterial species from seafood and their inhibition by different natural edible compounds

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Introduction

Seafood is a great source of nutrients, indispensable to a healthy diet, ranging from proteins and fatty acids to vitamins and minerals. (Özoğul, 2019) Due to their nutritional characteristics and composition, seafood products are highly perishable foods. (Özoğul, 2019) The application of non-toxic, natural, and edible preservatives as a coating to extend the shelf life and inhibit bacterial proliferation of several foods has been a hot topic. (Mørseth et al., 2016).

This work aimed to perform the microbiological characterization of squid and shrimp skewers during their shelf-life and to evaluate the susceptibility of isolated microorganisms to several natural edible compounds.

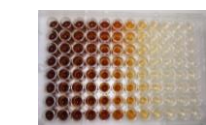


Microbiological characterization of squids and shrimps skewers over 5 days of storage

Methodology



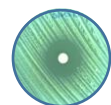
Identification of 100 isolates by 16S rRNA sequencing



Minimum inhibitory concentration of Citrox®

Natural compounds:

- (4) Chitosan (3% v/v)
- (2) Propolis ethanolic extract (10% w/v)
- Olive leaf extract (1,5% w/v)
- Carvacrol (0,05% v/v)
- Limonene (0,05% v/v)
- Citrox® (50% v/v)



Antimicrobial activity

Results

- No *Escherichia coli* or *Listeria monocytogenes* were detected on the analyzed samples.
- One hundred bacterial isolates were identified through rRNA 16s sequencing (Table 1).
- The antibacterial activity of Carvacrol, Olive Leaf Extract, Limonene, different Chitosans, Ethanolic Propolis Extracts, and Citrox® was evaluated by the agar diffusion method against the 100 isolates identified.
- Minimum inhibitory concentration was determined only for Citrox® (1.69% v/v) since only this compound could inhibit all the isolates.

Conclusions

Although preliminary, this study showed evidence that Citrox® has the potential to be used as a natural preservative in these seafood products, improving food safety while reducing waste. However, further studies are required, such as the development of a Citrox®-based coating and its application on this matrix to validate its antimicrobial effect.

References

- [1] – Özoğul, Y., 2019. Innovative technologies in seafood processing. 1st ed. Boca Raton, Florida, EUA: CRC Press, p.1.
- [2] - Mørseth, T., Moen, B., Heir, E., Hansen, A., & Langsrud, S. (2016). Contamination of salmon fillets and processing plants with spoilage bacteria. International Journal of Food Microbiology, 237, 98-108. <https://doi.org/10.1016/j.ijfoodmicro.2016.08.016>

Table 1. Identification of isolates by 16S rRNA sequencing

Identification	% of isolates	16S rRNA sequencing similarity (%)
<i>Hafnia alvei</i>	5.00	99.40 - 99.90
<i>Klebsiella oxytoca</i>	2.00	99.90 - 100.00
<i>Lactobacillus sakei</i>	6.00	99.90 - 100.00
<i>Lactococcus garvieae</i>	2.00	99.90 - 100.00
<i>Lactococcus piscium</i>	2.00	99.40 - 99.90
<i>Leuconostoc gelidum</i>	1.00	99.90
<i>Leuconostoc mesenteroides</i>	1.00	100.00
<i>Leuconostoc mijkimchii</i>	12.00	99.10 - 99.90
<i>Morganella morganii</i>	3.00	99.80
<i>Obesumbacterium proteus</i>	1.00	99.90
<i>Pantoea brenneri</i>	1.00	98.50
<i>Pseudomonas endophytica</i>	1.00	99.70
<i>Pseudomonas fragi</i>	1.00	99.70
<i>Pseudomonas helleri</i>	3.00	99.80 - 100.00
<i>Pseudomonas helmanticensis</i>	1.00	99.80
<i>Pseudomonas marginalis</i>	1.00	100.00
<i>Pseudomonas orientalis</i>	1.00	99.80
<i>Pseudomonas paraloctis</i>	6.00	99.80 - 100.00
<i>Pseudomonas psychrophila</i>	3.00	99.70 - 99.90
<i>Pseudomonas trivialis</i>	4.00	99.70 - 99.90
<i>Pseudomonas welthenstephanensis</i>	2.00	99.60 - 99.90
<i>Rahnella aquatilis</i>	4.00	99.60 - 99.90
<i>Rahnella inusitata</i>	10.00	99.80 - 99.90
<i>Serratia fonticola</i>	2.00	99.90
<i>Serratia liquefaciens</i>	20.00	99.40 - 99.90
<i>Serratia nematodiphila</i>	1.00	100.00
<i>Weissella beninensis</i>	1.00	97.60
<i>Weissella fabalis</i>	3.00	97.10 - 98.10

Acknowledgments

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