Characterization of edible films from croaker (*Pseudotolithus senegalensis*), tilapia (*Oreochromis niloticus*) and mullet (*Mugil cephalus*) scale gelatin

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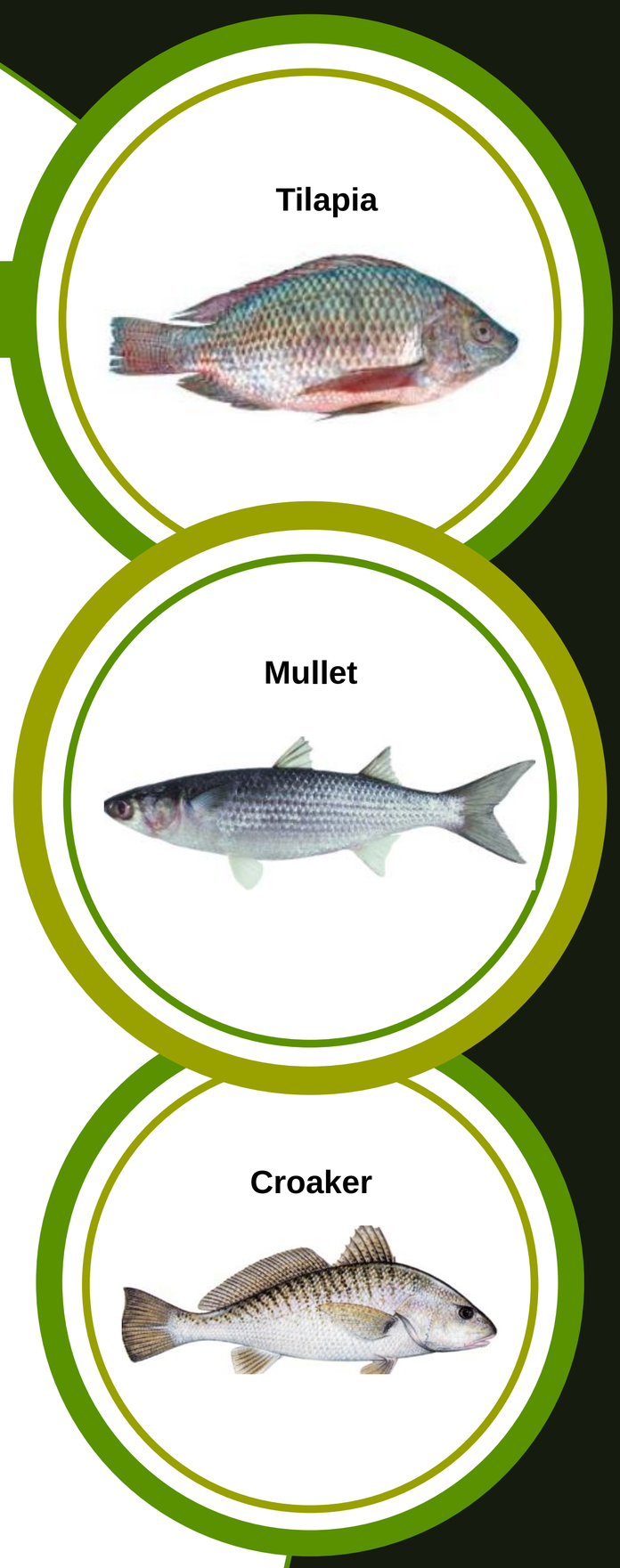
Introduction

Edible films from fish gelatin have gained attention due to their biodegradability and potential as sustainable alternatives to synthetic packaging.

Fish species for gelatin production



Objective

To characterise edible films derived from the scales of croaker, tilapia, and mullet, focusing on their physicochemical and mechanical properties.

Methodology

Fish scale gelatin extraction: Gelatin was extracted from the scales of croaker, tilapia, and mullet using an acid extraction method.

Film Formation: Gelatin solutions were cast into films after combining extracted gelatin with starch and glycerol and dried at ambient temperature (26±2oC)

Characterisation

Thickness: Measured with a micrometer

Water Vapour Permeability (WVP): desiccator method.

Transparency: UV-visible spectrophotometer at 600 nm

Morphological, thermal and structural properties: SEM, FTIR, DSC

Results

Gelatin yield from croaker, tilapia, and mullet scales were 9.10, 20.38 and 8.19%, respectively.

Mullet gelatin-based films showed lowest values for thickness (0.10 mm) but highest for swelling (207%) and opacity (5.73). Film transparency ranged from 10.87 to 27.00 for all samples, whereas, tilapia gelatin-based film had highest hydrophilicity as depicted by its high WVP. However, the SEM, DSC and FTIR showed distinct variations in structural morphology and functional groups with preserved film integrity. The films showed varied antibacterial and antifungal activities.

Table 1. Thickness, opacity and swelling power of fish gelatin edible films

Sample	Thickness	Opacity	Swelling	Film Transparency (600 nm)
Croaker	0.222 ± 0.005[b]	3.699 ± 0.032[a]	70%	15.17 ± 0.90[a]
Tilapia	0.104 ± 0.002[a]	4.492 ± 0.246[b]	172%	32.80 ± 0.29[c]
Mullet	0.102 ± 0.000[a]	5.727 ± 0.117[c]	207%	25.10 ± 0.15[b]

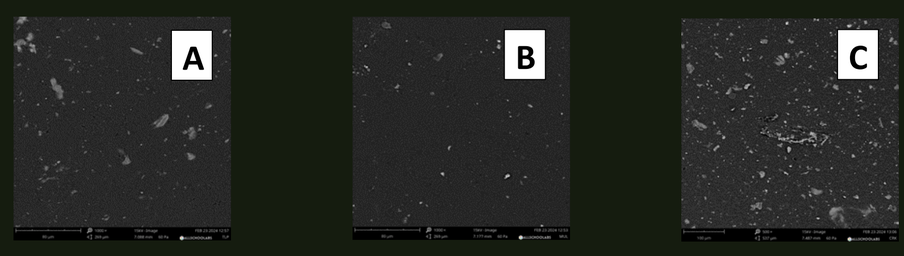


Fig. 1 Scanning electron micrograph of croaker, mullet and tilapia scale gelatin-based edible films

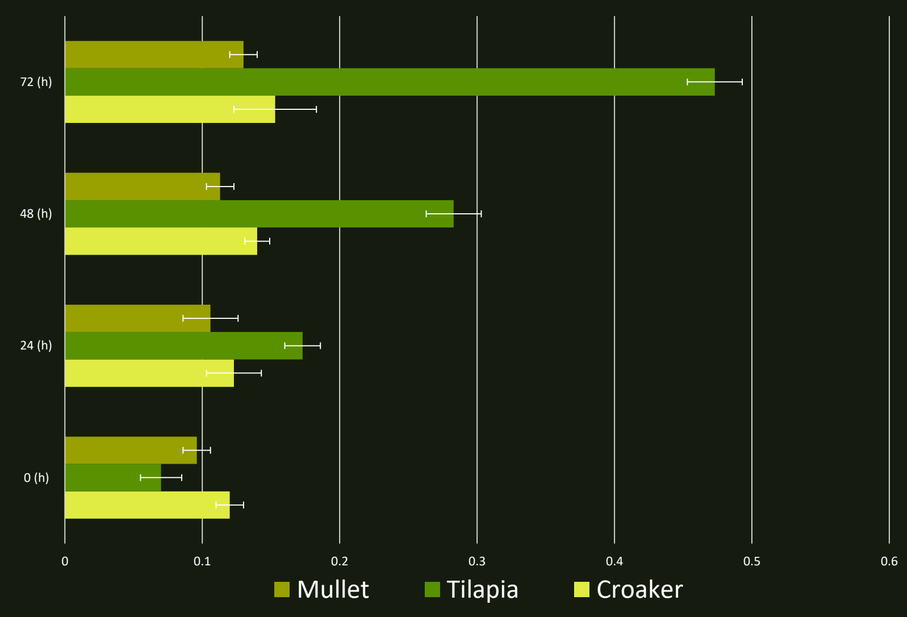


Fig. 2 Water vapor permeability of croaker, mullet and tilapia scale gelatin-based edible films

Conclusion

The produced edible films offer sustainable packaging alternatives, with acceptable transparency, water vapor barrier properties, and microbial stability for food preservation, showing promise in enhancing food preservation while promoting environmental sustainability

References

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