

## Application of plant-based biodegradable film with yerba mate extract (*llex paraguariensis*) on chilled tilapia

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**Abstract** — The study investigated the application of a biodegradable, plant-based, active, and intelligent film developed from an aqueous extract of yerba mate (EYM) to preserve refrigerated tilapia fillets. The film, approximately 15 x 10 cm in size, was used to wrap fish fillets and vacuum-seal them. Tilapia samples, in films with and without the incorporation of EYM, were stored at  $4 \pm 0.3$  °C for up to 16 days, and subjected to analyses (pH, total volatile bases, total mesophilic bacteria, and coloration), conducted on days 0, 4, 8, 12, and 16. The change in the color of the films indicated variations in the pH of the fish, with the film becoming more opaque, yellowish, and slightly greenish as the pH increased, indicating its intelligent property. The analyses revealed that the film with EEM significantly (p<0.05) slowed down the deterioration of the fish, reducing the count of microorganisms and the levels of total volatile bases (TVB). On the 12th day, samples with EEM film showed mesophilic counts of approximately 2.8 log CFU/mL, compared to 11.4 log CFU/mL in the control samples. The film extended the shelf life of tilapia from 8 to 12 days, demonstrating the effectiveness of yerba mate extract as an active agent. It is concluded that the developed material has the potential for application in food preservation, contributing to the sustainable development of biodegradable, edible, active, and intelligent packaging.

Index Terms: *llex paraguariensis*, materials technology, biodiversity, sustainability, packaging, food preservation.