Application of block freeze-concentrated yerba mate extract in biodegradable food packaging, a review

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Abstract — Yerba mate (*Ilex paraguariensis* A. St. Hil.) (YM) is a widely consumed beverage known for its rich antioxidant content and bioactive compounds that offer various health benefits. Concentrating YM extract presents a valuable opportunity for industries such as food packaging (FP). Block freeze-concentration (BFC), a technology capable of concentrating food solutions while preserving their functional compounds, has shown promise in this context. Using biodegradable polymers and natural components derived from agricultural by-products like YM is gaining traction as part of the shift toward a circular economy. This study aims to review the literature on the potential application of concentrates obtained through BFC of YM extract in FP. Studies have consistently reported the antioxidant potential of yerba mate, attributing its significant activity mainly to its high polyphenol content. Studies have shown that freeze concentration improves the bioactive components and antioxidant activity of YM aqueous extract. Research indicates that YM infusion enhanced antioxidant properties when subjected to freeze concentration. These findings suggest that products derived from the BFC of YM can be used effectively in FP, such as films and coatings, to help extend the shelf life of foods that benefit from antioxidant preservation. Based on this literature review, it can be concluded that the concentrate obtained by BFC of YM extract is a potential technology for application in FP, representing a significant innovation in using biodegradable materials for food preservation.

Index Terms: *Ilex paraguariensis,* sustainability, food preservation, bioactive compounds, antioxidant.