10th Brazilian Conference on Natural Products
XXXVI RESEM
4-7 November 2025, Belo Horizonte, MG, Brazil

Section: 05

FORMULATION OF A STABLE NANOEMULSION WITH THE ESSENTIAL OIL OF *PIPER BRACHYPETIOLATUM*

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Plant species of the Piperaceae family stand out for the commercial and pharmacological potential of their essential oils, recognized for antimicrobial, antioxidant, and insecticidal activities. However, the high volatility of these compounds limits their use. As an alternative, nanoemulsions have emerged to improve stability, bioavailability, and efficacy. This study aimed to develop and evaluate nanoemulsions containing the essential oil of *Piper brachypetiolatum*, given its potential biological activities, in order to enhance its bioactive properties and broaden its biotechnological and pharmaceutical applications[1]. The leaves of *Piper brachypetiolatum* were subjected to hydrodistillation using a Clevenger apparatus, and the chemical profile of the essential oils was analyzed by GC-MS. The yield of *P. brachypetiolatum* essential oil was 0.85%, and GC-MS analysis revealed 12 compounds, mainly sesquiterpenes (50.0%) and oxygenated sesquiterpenes (25%). Nanoemulsions containing the essential oil of *Piper brachypetiolatum* were prepared according to established protocols[2]. A total of 0.1 g of essential oil was diluted in 0.1 g of Tween 20 and 0.2 g of Tween 80, used as emulsifying agents. The mixture was subjected to mechanical stirring for 5 minutes, with 3-minute intervals between cycles. This process resulted in the formation of a stable nanosystem, in which the essential oil was efficiently incorporated into nanometric-sized particles. The formulations were subsequently characterized for particle size and zeta potential using a Zetasizer (Malvern, UK). The average particle diameter was 114.4 nm, within the typical range for nanoemulsions (20–200 nm), with a polydispersity index (PI) of 0.293, indicating a relatively homogeneous distribution. The zeta potential (–59.8 mV) suggested high colloidal stability, with low aggregation tendency and strong physicochemical stability of the system.

Keywords: Colloidal systems, polydispersity, emulsifiers, Piperaceae.

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