

**DEVELOPMENT AND CHARACTERIZATION OF NANOEMULSIONS FROM ESSENTIAL OILS
FROM THE AMAZON**Castro, S. R.^{*1}; De Paula, E.²; Santos, M. F.³, Takeara, R³¹Academic Department of Chemistry, Environment and Food, Federal Institute of Amazonas,
Manaus - AM, Brazil²Department of Biochemistry and Tissue Biology, State University of Campinas, Campinas –
SP, Brazil³Institute of Exact Sciences and Technology, Federal University of Amazonas, Manaus -AM,
BrazilEmail: simone.castro@ifam.edu.br**Keywords:** nanoemulsion. essential oils. Amazonian oils

This project works with two plants that are well-known and used in the Amazon region due to their numerous biological activities. *Piper marginatum* Jacq., popularly called capeba, malvarisco, pimenta-do-mato, etc., and *Mansoa alliacea*, known as cipo-alho, are species native to the Brazilian Amazon region and contain essential oils rich in substances with antimicrobial, antifungal, antitumor, and antioxidant potential^{1,2,3}

Table 1: Performance of the essential oils of *Piper marginatum* and *Mansoa alliacea*

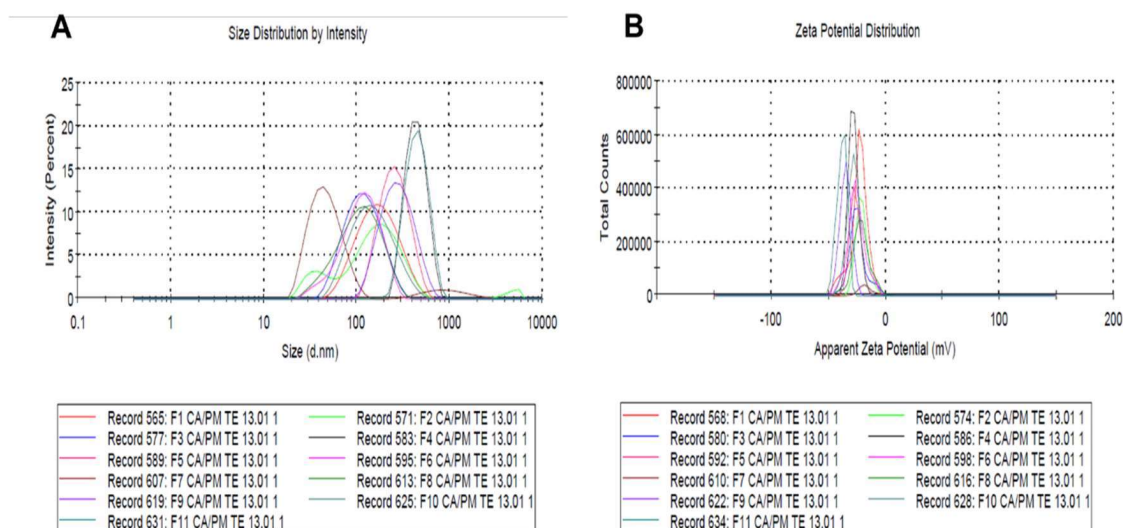
<i>Mansoa alliacea</i>	Performance (%)	<i>Piper marginatum</i>	Performance (%)
19/06/2023	0,175 %	14/06/2023	8,4 %
19/06/2023	0,312 %	14/06/2023	10,4 %
20/06/2023	1,14 %	24/06/2023	8,4 %
20/06/2023	0,7 %	24/06/2023	10,16 %
19/07/2023	12,56 %	09/07/2023	6,86 %
19/07/2023	12,98 %	14/07/2023	6,31 %
20/07/2023	8,8 %		
20/07/2023	6,4 %		

Therefore, our objective was to prepare and characterize nanoemulsions with natural oils from *P. marginatum* and *M. alliacea*, aiming at their future use in pharmaceutical formulations. First, the extraction of essential oils was carried out by the hydrodistillation method in June and July 2023, where *M. alliacea* obtained a yield between 0.175% -12.98% and *P. marginatum* 6.31% - 10.4% (**Table 1**). Then, the nanoemulsions were prepared by the emulsification-ultrasonication method and characterized by dynamic light scattering techniques. Initially, a 2³ factorial design was performed, whose variables were: Tween 80 = 1% - 5%, Essential oil (50% *M. alliacea* + 50% *P. marginatum*) = 1% - 9% and Sonication time = 4 - 10 min, resulting in a total of 11 formulations (**Table 2**).

Table 2: Results of dependent variables of factorial design 2³.

Formulation	Diameter (nm)	Polydispersity Index	Zeta Potential (- mV)
1	144,3±1,6	0,197±0,010	21,6 ±1,04
2	103,9±4,3	0,43±0,01	19,93±3,22
3	103,5±0,40	0,20±0,01	25,57±1,49
4	465,3±2,69	0,25±0,02	28,80±1,80
5	237,1±1,18	0,13±0,03	26,17±0,44
6	97,59±0,26	0,19±0,01	24,83±1,16
7	46,28±0,09	0,24±0,01	13,83±1,98
8	91,30±0,99	0,21±0,01	21,63±0,84
9	250,3±1,8	0,15±0,01	35,3±0,38
10	131,5±0,76	0,20±0,1	26,5±1,2
11	489,9±5,33	0,31±0,02	38,57±0,49

The nanoemulsions presented sizes between 46.28 - 489.9 nm, low polydispersity (PDI 0.134 - 0.428) and negative zeta potential (ZP 13.1 - 38.6 mV) (Figure 1 A and B). And through the nanoparticle tracking technique, the suspension concentration of 10¹² nanoparticles/mL and stable at 5 °C for 6 months. Therefore, the formulations show promise for biological testing.

Figure 1: Size, polydispersity index and zeta potential analyze by DLS.

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