



Comparison of different methods and extraction times on essential oil yield of *Piper gaudichaudianum* leaves (Piperaceae) from Paraná State, Brazil

Diones Krinski¹, Ana F. Godoy², Michele Trombin-Souza¹, Mireli Trombin-Souza¹,
Cícero Deschamps¹, Luís A. Foerster^{1,3}

¹ Graduate Program in Agronomy, Federal University of Paraná (UFPR), Curitiba/PR, Brazil

² Graduate Program in Plant Protection, São Paulo State University (UNESP), Botucatu/SP, Brazil

³ Graduate Program in Zoology, Federal University of Paraná (UFPR), Curitiba/PR, Brazil
dioneskrinski@gmail.com

Keywords: bioprospecting, *Piper* species, extraction protocols of essential oils.

Species of the Piperaceae family are widely used for medical purposes and, among the relevant biological activities described for these plants, various properties can be emphasized, such as antitumor, antimicrobial, hypotensive, antiseptic, analgesic and insecticide. Therefore, the essential oil of this family has been used in different sectors of the pharmaceutical, chemical and cosmetic industries. However, studies to optimize the extraction methods of essential oils from this plant group are still scarce and commonly follow protocols established for other botanic families. Thus, the aim of this study was to test different times and extraction methods to obtain the highest yield of essential oil of fresh leaves from *Piper gaudichaudianum*. The plants were collected in São José dos Pinhais/PR on July 12th 2015 and were identified in the herbarium of Botanical Garden of Curitiba/PR. For essential oils extraction of *P. gaudichaudianum* from the leaves three methods were used: whole leaves, chopped leaves (with scissor), and triturated leaves (with blender). We also tested different extraction times for each type of leaf preparation (1h00m, 1h30m, 2h00m, 2h30m, 3h00m, 3h30m and 4h00m). Three extractions (repetitions) were performed per treatment (extraction time x leaf type). Each extraction consisted of 100 grams of leaves into 1 L of water placed in a glass flask of 2 L. All essential oils were obtained using a modified Clevenger-type apparatus. A completely randomized design with treatments in a factorial scheme (3x7) was used. We tested the interaction between type of leaves (x:1) and extraction times (x:2). Data were submitted to variance analyses (ANOVA), normality and Tukey tests at 5% probability. The average yield of essential oils varied between 0.68% for triturated leaves with 1-hour extraction and 1.84% for chopped leaves with 4 hours of extraction. The results showed no interaction between the tested factors (Df= 12; F= 1.4214, P= 0.1945; C.V.= 14:56%). However, there was significant difference for the isolated factors (extraction time - Df= 6; F= 20.3300, P< 0.001 and type of leaves - Df= 2, F= 10.2917, P= 0.0001). Whole and chopped leaves yielded statistically more essential oils than the triturated leaves. From 2h30m and more there was no significant increase in essential oil yield. This data is important because it reduces almost in half the extraction time commonly used for Piperaceae species (4 hours). However, the compounds identification present in extracted oils should be performed to verify if all the compounds present in leaves are available in the oils obtained after 2h30m extraction. Considering these results, we suggest that for *P. gaudichaudianum* use of chopped leaves and extractions time of 2h30m, because they provided the best yield (oil quantity). In addition, we highlight the necessity of studies for compare the main chemical constituents obtained in these extraction methods, and verify if the quality of the extracted oils are significantly similar between the different processing of leaves and extraction times.

Acknowledgements: UFPR, CNPq, CAPES.