

# ORGANIC PROPOLIS FROM URUGUAY: DEVELOPING A METHODOLOGY TO ANALYZE ITS VOLATILE COMPONENTS

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## Abstract

Propolis volatile components (PVCs) not only contribute to the product's pleasant aroma but also exhibit a wide range of biological activities, including antimicrobial, immunomodulatory, and cytotoxic effects against human cancer cells [1]. Additionally, the volatile composition of propolis serves as an indicator of its botanical and geographical origin, making it a key parameter for quality control [1]. In this ongoing project, we outline the initial steps in developing an analytical methodology to study PVCs. To date, only one previous study has reported PVCs from Uruguayan samples, using static headspace sampling, but without specifying the origin or production conditions [2]. In the present work, we analyze samples from an organic apiary in Rocha Province, eastern Uruguay, using sampling best practices in accordance with official recommendations [3]. Headspace sampling of 0.03 g of ground propolis was conducted at 50°C for 30 minutes [2] using two different SPME fibers (1, DVB/PDMS/Carboxen; 2, Polyacrylate). The extracted PVCs were then directly desorbed in the injector port of a GC-MS instrument. Two stationary phases (Rxi-5MS and Stabilwax-MS) were selected for conventional analysis, using an optimized oven program. Identification of PVCs was carried out by comparing mass spectra with commercial libraries and calculating linear retention indices (LRIs) using a C<sub>8</sub>-C<sub>20</sub> alkane solution [4]. Additionally, separation of chiral monoterpenes was achieved via eGC-MS with an Rt- $\beta$ DEXsm column (stationary phase composed of a modified  $\beta$ -cyclodextrin as chiral selector). Over 100 PVCs were detected, predominantly phenylpropanoids, benzenoids and terpenic compounds. Some key PVCs identified include  $\alpha$ -pinene, benzyl alcohol, terpinen-4-ol, guaiacol, benzyl benzoate, spathulenol and  $\beta$ -selinene. The detection of *trans*-nerolidol suggests *Baccharis dracunculifolia* (Asteraceae) as the botanical origin of the samples, like Brazilian Green Propolis [5]. Further studies on the chiral patterns of selected PVCs could enhance quality control, define potential markers and support origin certification of this product in Uruguay.

**Key Words:** Propolis, Volatile Components, Organic Production, HS-SPME, GC-MS, eGC-MS.

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