



Correlation between the chemical and genetic characteristics of wild populations of *Lychnophora pinaster* Mart. (Asteraceae)

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Lychnophora pinaster is a vegetal species endemic to the Cerrado of the State of Minas Gerais, Brazil, with strong cultural importance due to its use as an anti-inflammatory, painkiller, and healer in the traditional medicine. In the essential oil of southern populations, substances with important biological activities were detected, such as the anti-inflammatory agents (*E*)-caryophyllene and α -humulene, and the antimicrobial agents (*E*)-methyl cinnamate, α -pinene, and β -pinene (1). The chemical composition of essential oils is affected by environmental factors and can be correlated with the genetic differentiation of populations (2). However, this relationship has not been previously addressed in *L. pinaster* and a study has been conducted in order to investigate such interaction. Leaves of three populations (75 individuals) from three different sites were collected in the summer and winter 2012. The essential oil of the leaves of each individual was extracted by hydrodistillation in a Clevenger-type apparatus for 2 h, and the chemical composition analyzed by GC/MS, GC/FID, and multivariate statistics. The genetic variability was analyzed using SSR markers, and a correlation between genetic and chemical computed using a Mantel test with 10,000 permutations. All evaluated populations showed similar chemical composition, and presented (*E*)-methyl cinnamate (summer average: 57.8-80.0 %; winter average: 66.3-80.3 %) as the major component. However, the comparison of the chemical composition by Discriminant Analysis allowed separation of the essential oils of each population into three distinct groups, correlated to the production of monoterpenes (α -pinene, β -pinene, limonene, α -terpinene, γ -terpinene, *p*-cimene, and santalone, called Group 1), sesquiterpenes (cedreanol, (*E*)-caryophyllene, α -humulene, and caryophyllene oxide, called Group 2) and (*E*)-methyl cinnamate (called Group 3). The *p*-valor of the Wilks' Lambda was 0.0001 ($\alpha=0.05$), and it is an indication of existence, in quantitative terms, of a significant intraspecific chemical differentiation in the essential oil of *L. pinaster*. Furthermore, the comparison of the chemical and genetic UPGMA trees revealed no obvious relation between genetic and chemical differentiation, which was reinforced by the Mantel test of relationship between the genetic and chemical distances (winter and summer data) of the populations, where an insignificant correlation was detected, $r_{\text{summer}}=0.02233$, $p=0.1981$ and $r_{\text{winter}}=-0.009669$, $p=0.3795$. Since neutral markers are expected to reflect the demographic and (neutral) genetic history of the populations, the essential oils divergence observed in populations of *L. pinaster* studied tends to be a result of natural selection according to local environmental factors.

1. Silva, P.S.S. Dissertação FCA, Universidade Estadual Paulista, 2013, 167p.

2. Melito, S. et al. Plosone, 2013, **8**, 1-11.

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