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Chemical Composition of Volatiles Emitted from Ziziphus jujuba Miller Collected during Different Growth Stages

Authors : Rose Vanessa Bandeira Reidel, Bernardo Melai, Pier Luigi Cioni, Luisa Pistelli

Abstract : Ziziphus jujuba Miller is a common species of the Ziziphus genus (Rhamnaceae family) native to the tropics and subtropics known for its edible fruits, fresh consumed or used in healthy food, as flavoring and sweetener. Many phytochemicals and biological activities are described for this species. In this work, the aroma profiles emitted in vivo by whole fresh organs (leaf, bud flower, flower, green and red fruits) were analyzed separately by mean of solid phase micro-extraction (SPME) coupled with gas chromatography mass spectrometry (GC-MS). The emitted volatiles from different plant parts were analysed using Supelco SPME device coated with polydimethylsiloxane (PDMS, 100µm). Fresh plant material was introduced separately into a glass conical flask and allowed to equilibrate for 20 min. After the equilibration time, the fibre was exposed to the headspace for 15 min at room temperature, the fibre was re-inserted into the needle and transferred to the injector of the CG and CG-MS system, where the fibre was desorbed. All the data were submitted to multivariate statistical analysis, evidencing many differences amongst the selected plant parts and their developmental stages. A total of 144 compounds were identified corresponding to 94.6-99.4% of the whole aroma profile of jujube samples. Sesquiterpene hydrocarbons were the main chemical class of compounds in leaves also present in similar percentage in flowers and bud flowers where (E, E)-α-farnesene was the main constituent in all cited plant parts. This behavior can be due to a protection mechanism against pathogens and herbivores as well as resistance to abiotic factors. The aroma of green fruits was characterized by high amount of perillene while the red fruits release a volatile blend mainly constituted by different monoterpenes. The terpenoid emission of flesh fruits has important function in the interaction with animals including attraction of seed dispersers and it is related to a good quality of fruits. This study provides for the first time the chemical composition of the volatile emission from different Ziziphus jujuba organs. The SPME analyses of the collected samples showed different patterns of emission and can contribute to understand their ecological interactions and fruit production management.

Keywords : Rhamnaceae, aroma profile, jujube organs, HS-SPME, GC-MS
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