

Morphological Differentiation and Temporal Variability in Essential Oil Yield and Composition among *Origanum vulgare* ssp. *hirtum* L., *Origanum onites* L. and *Origanum x intercedens* from Ikaria Island (Greece)

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Abstract : Greece, due to its geographical location and the particular climatic conditions, presents high biodiversity of Medicinal and Aromatic Plants. Among them, the genus *Origanum* not only presents a wide distribution, but it also has great economic importance. After extensive surveys in Ikaria Island (Greece), 3 species of the genus *Origanum* were identified, namely, *Origanum vulgare* ssp. *hirtum* (Greek oregano), *Origanum onites* (Turkish oregano) and *Origanum x intercedens* (hybrid), a naturally occurring hybrid between *O. hirtum* and *O. onites*. The purpose of this study was to determine their morphological as well as their temporal variability in essential oil yield and composition under field conditions. For this reason, a plantation of each species was created using vegetative propagation and was established at the experimental field of the Agricultural University of Athens (A.U.A.). From the establishment year and for the following two years (3 years of observations), several observations were taken during each growing season with the purpose of identifying the morphological differences among the studied species. Each year collected plant (at bloom stage) material was air-dried at room temperature in the shade. The essential oil content was determined by hydrodistillation using a Clevenger-type apparatus. The chemical composition of essential oils was investigated by Gas Chromatography-Mass Spectrometry (GC - MS). Significant differences were observed among the three oregano species in terms of plant height, leaf size, inflorescence features, as well as concerning their biological cycle. *O. intercedens* inflorescence presented more similarities with *O. hirtum* than with *O. onites*. It was found that calyx morphology could serve as a clear distinction feature between *O. intercedens* and *O. hirtum*. The calyx in *O. hirtum* presents five isometric teeth whereas in *O. intercedens* two high and three shorter. Essential oil content was significantly affected by genotype and year. *O. hirtum* presented higher essential oil content than the other two species during the first year of cultivation, however during the second year the hybrid (*O. intercedens*) recorded the highest values. Carvacrol, p-cymene and γ -terpinene were the main essential oil constituents of the three studied species. In *O. hirtum* carvacrol content varied from 84,28 - 93,35%, in *O. onites* from 86,97 - 91,89%, whereas in *O. intercedens* it was recorded the highest carvacrol content, namely from 89,25 - 97,23%.

Keywords : variability, oregano biotypes, essential oil, carvacrol

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