

## Essential Oils Chemotypes: A Less Known Side

Nacim Zouari\*

Higher Institute of Applied Biology of Medenine, 4119 Medenine, Tunisia

Medicinal and Aromatic Plants (MAP) have always been part of human life, as they were used for food and medicine. Researches on the benefits of MAP are still valid, and whose applications are various, such as in medicine, phytopharmacy, cosmetics and food industries. Currently, there is a marked interest for natural products, considered to have very few side effects, as compared to chemicals. Furthermore, the modern pharmaceutical industry is still based largely on the diversity of plant secondary metabolites to find new interesting molecules. MAP seems to be an inexhaustible source, since only few plant species have been investigated in terms of phytochemical and pharmacological properties. Consequently, there is a growing scientific interest focused on MAP and their derivatives, such as essential oils, known for their fragrances, and also by their many interesting biological properties.

During the last decade, an important number of studies in the field of MAP were published. As compared to traditional subscription publishing model, open access journals in this field are able to add to the literature by publishing high quality peer reviewed articles, and to provide free unrestricted access to the papers for scientific community. However, in a large number of publications studying essential oils and contrary to investigation on biological properties, there is often a lack of information concerning the plant harvest, and particularly, the chemical profiles of essential oils with statistically significant analysis.

Essential oils are formed by the MAP as secondary metabolites, and are very heterogeneous mixtures that may contain dozens of compounds at different concentrations. In fact, each essential oil is characterized by some major compounds which can reach high levels, as compared to other compounds present in trace amounts. However, for a given species, natural factors may be at the origin of the variability of the chemical composition of these essential oils, and a subsequent variability in their quality. These factors may be intrinsic, related to the plant or extrinsic, such as the plant environment, which causes the occurrence of several chemical races or chemotypes within the same species.

The fact that essential oils are natural products, they should not be

considered as common ingredients without any side effects. Indeed, for a given species, the study of the chemical variability of essential oils and the determination of its chemotypes are of prime importance, because they can determine not only different bioactivities of these extracts, but also very different signs of toxicity. For this reason, the analysis of the chemical composition of the essential oil should not be limited to one or a few plant samples derived from a single geographical location, which is very common in many publications in this field.

In the literature and in most cases, only the main constituents of essential oils have been considered for the chemotypes determination. However, it is worth noting that minor compounds can play a very important role in the chemical polymorphism of a given species. In addition, the biological activity of an essential oil may be due to a synergistic action of some minor compounds. In this way, an essential oil is defined not only by its major compounds, but rather by a majority of all its compounds. To highlight the existence of chemotypes among several populations of a given species, the linear discriminant analysis and cluster analysis (dendrogram) generated from the Euclidean distances performed on the essential oils compounds, are interesting statistical tools.

It can be concluded that biological properties of essential oils must take into account different parameters and factors, which can significantly affect results of these studies (phenological stage, plant harvest, ecological factors and environmental conditions). Thus, the chemical profile of each plant species will be expressed differently depending on these factors. We should focus our efforts in considering and valorizing our vegetal patrimony, to identify new attractive natural compounds with therapeutic potential devoid of toxicity, or at least less toxic than synthetic ones. Consequently, more scientific research on chemical analysis, biological and toxico-clinical investigations should be conducted on PAM and their derivatives. Another challenge for the rational exploitation of essential oils by relevant industries is their quality control, as well as the legislation texts regarding their applications.

**\*Corresponding author:** Dr Nacim Zouari, Higher Institute of Applied Biology of Medenine, 4119 Medenine, Tunisia, Tel: +216 75633919; Fax: +216 75633918; E-mail: [znacim2002@yahoo.fr](mailto:znacim2002@yahoo.fr)

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