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Extraction of Inula Viscosa *Essential Oil* From Two Different Regions: Quantitative and Qualitative Comparative Study

Allaoui Khalida [1]*, Bertouche Sadjia[1], Kadem Souhila[1], Sabba Nassila [1], Sahraoui Naima[1]

[1] Laboratory of Matter's valorization and recycling for sustainable development VRMDD, University of Sciences and Technology Houari Boumediene, Algeria.

*Corresponding author's email: a.khalida85@gmail.com

ABSTRACT

The objective of this work is a comparative study, on the one hand, between two methods of extraction of essential oils of *Inula viscosa*, namely a conventional process which is the training with water vapor (EV) and an innovative process that is the training of steam assisted by microwave (EVMO), and on the other hand, a qualitative and quantitative comparative study between essential oils of *inula viscosa* harvested in two different regions: Algiers and Boumerdes. The GC-MS analysis of two samples demonstrated the impact of the Microwave Assisted Steam Drive (EVMO) extraction method on the chemical composition and is considered the best process to preserve volatile compounds. The various tests and analyses have proven that the essential oils of the Boumerdes region give better results than those of the Algiers region in terms of yield and composition, this difference is probably due to the climate difference between the two regions.

Keywords: Essential oils, inula viscosa, steam training, microwave assisted steam training,

1 Introduction

Inula viscosa or dittrichia viscosa (amagramane) is a herbaceous plant that belongs to the family Asteraceae, widespread in Algeria, in rockeries and clay soils. It is considered «the queen of medicinal plants» in the Middle Ages, numerous phytochemical and biological studies have shown that it has anti-inflammatory, antibacterial properties, antifungal, antioxidant and that it is a certain antiseptic of the respiratory system.

2 Experimental

The parametric study carried out for the conventional process (EV) focuses on the influence of water vapour flow and mass on the essential oil yield of inula viscosa of the two regions, as for the innovative process (EVMO) it focuses on the influence of microwave power on the essential oil yield of inula viscosa with the optimal flow and mass obtained by EV.

The characteristic analyses of the two samples were carried out using an ABBE refractometer, a PH paper, and gas chromatographic techniques coupled with mass spectrometry (GC-MS) for the identification of the chemical composition of the essential oils of the two studied species.

3 Results and discussion

The parametric study showed that the inula viscosa picked at Boumerdes gives a yield superior to that of Algiers with the two processes used (EV and EVMO): 0.2401% and 0.1647% respectively in the EV and 0.1753% and 0.1641% respectively in the EVMO.

The results of the tests and analyses carried out showed that the Boumerdes HE is the most viscous, and the refractive index measurement confirms this ($I_{Boumerde}$=1,5136; I_{Alger}=1,4896), as well as the highest value of the hydrogen potential ($_{PH}$ Boumerdes$_{= 5,}$ $_{PH}$ Algiers=4).

Regarding the analysis (GC-MS) of the HE extracted by the EV, the results showed that both samples had the same number of compounds **(40 components)** and the same nature. They

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also have almost the same majority compounds with different percentages. The main component of the HE for both samples is (6,9,12,15-Docosatetraenoic acid, methyl ester): (41,918%) for the Algiers sample and (6,275%) for the Boumerdes sample.
For the two extracts obtained from the EVMO extraction, different components were recorded, 59for the Boumerdes sample and 50 for the Algiers sample. The analyses show that HE of both samples is highly rich in Spiro [tricyclo[4.4.0.0(5.9)]decane-10,2'-oxirane],1-methyl-4-isopropyl-7,8-dihydroxy-, (8S) with a percentage of (70.7400%) for that of Algiers and (23.892%) for the Boumerdes sample.

4 Conclusion

Our comparative study shows that:

- The sample of the wilaya of Boumerdes recorded the best yields compared to the sample of the wilaya of Algiers by the two extraction methods, We can also see that the best yields are obtained by extraction by steam drive.
- The best yield for both samples is obtained at optimal operating conditions of Mass = 65g and Q = 8g/min.
- The essential oils of Boumerdes extracted by the EVMO contain more chemical components than that of Algiers extracted by the same process, and these two samples contain more chemical components than the essential oils of the two regions extracted by the conventional process (EV). This proves that EVMO is the best method for the conservation of volatile compounds.

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