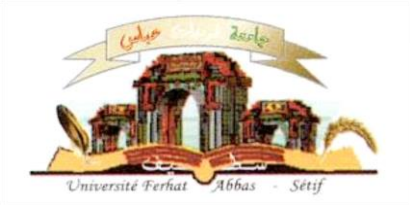
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Essential oil composition of “LAVANDULA STOECHAS” in Algeria (Jijel)

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Summary

The aim of this research is to calculate the yield of extracted oils of *Lavandula stoechas* L along with analyzing the chemical properties of these extracted oils using FTIR spectroscopy technology. The active ingredients were extracted from different parts of the plant (leaves, flowers, and aerial parts), and then the extraction yield and essential oil yield were measured to determine the amount of extract in different parts. The results showed that there is a variation in the yield according to the plant part, meaning that the number of materials obtained from the different parts varies in quantity. Infrared radiation (FTIR) was used to analyze the extracts in order to determine the chemical functional groups present in them. Through the obtained spectra, there are different signals related to different organic compounds such as O–H, C–H, and C=O bonds, which means the presence of organic compounds that lead to the chemical properties of the extracts. Through this study, it was shown that the extraction and production of essential oils differ according to the plant part, and the use of FTIR technology helped in determining the chemical composition of the extracts.

Keywords: *Lavandula stoechas* L.; Essential oil; Hydrodistillation; Extraction yield; FTIR spectroscopy.

الملخص

الهدف هذا البحث لحساب عائد الزيوت المستخلصة ل *Lavandula stoechas* L إلى جانب تحليل الخصائص الكيميائية لهذه الزيوت المستخلصة باستخدام تقنية التحليل الطيفي.FTIR تم استخلاص المكونات الفعالة من أجزاء مختلفة من النبات (الأوراق والزهور والأجزاء الهوائية)، ومن ثم تم قياس إنتاجية الاستخلاص وإنتاجية الزيوت العطرية لتحديد كمية المستخلص في أجزاء مختلفة. ومن خلال النتائج تبين وجود تباين في المحصول حسب الجزء النباتي، أي أن كمية المواد المتحصل عليها من الأجزاء المختلفة تختلف في الكمية تم استخدام الأشعة تحت الحمراء (FTIR) لتحليل المستخلصات بهدف تحديد المجموعات الوظيفية الكيميائية الموجودة فيها. ومن خلال الأطياف التي تم الحصول عليها، هناك إشارات مختلفة تتعلق بمركبات عضوية مختلفة مثل الروابط ،O–H و ،C–Hو ،C=Oمما يعني وجود مركبات عضوية تؤدي إلى الخصائص الكيميائية للمستخلصات ومن خلال هذه الدراسة تبين أن الاستخلاص وإنتاج الزيوت العطرية يختلفان باختلاف الجزء النباتي، كما ساعد استخدام تقنية FTIR في تحديد التركيب الكيميائي للمستخلصات.

الكلمات المفتاحية:*Lavandula stoechas* L. الزيت العطري؛ التقطير المائي؛ مردود الاستخلاص؛ مطيافية الأشعة تحت الحمراء بتحويل فورييه(FTIR) .

Résumé

Le but de cette recherche est de calculer le rendement des huiles extraites de *Lavandula stoechas* L ainsi que d'analyser les propriétés chimiques de ces huiles extraites en utilisant la technologie de spectroscopie FTIR. Les principes actifs ont été extraits de différentes parties de la plante (feuilles, fleurs et parties aériennes), puis le rendement d'extraction et le rendement en huile essentielle ont été mesurés afin de déterminer la quantité d'extrait dans différentes parties. Les résultats ont montré qu'il existe une variation du rendement selon la partie de la plante, ce qui signifie que la quantité de matières obtenues à partir des différentes parties varie en quantité. Le rayonnement infrarouge (FTIR) a été utilisé pour analyser les extraits afin de déterminer les groupes fonctionnels chimiques présents en eux. À travers les spectres obtenus, il existe différents signaux liés à différents composés organiques tels que les liaisons O–H, C–H et C=O, ce qui signifie la présence de composés organiques conduisant aux propriétés chimiques des extraits. Grâce à cette étude, il a été démontré que l'extraction et la production des huiles essentielles diffèrent selon la partie de la plante, et l'utilisation de la technologie FTIR a aidé à déterminer la composition chimique des extraits.

Mots-clés : *Lavandula stoechas* L. ; Huile essentielle ; Hydrodistillation ; Rendement d'extraction ; Spectroscopie FTIR.

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Introduction

Introduction

Plants produce a vast variety of chemical constituents contributing to their biological functions and beneficial effects. Among them the genus *Lavandula* is of particular interest because of the rich composition of phytochemicals such as essential oils, phenolic compounds, triterpenes and sterols (El Hamdaoui et al., 2020).

These bioactive compounds are responsible for many of its pharmacological in addition to these effects, *Lavandula* species have several other therapeutic properties, primarily attributed to their essential oils. Also, phenolic compounds, triterpenes and sterols have an important role in the enhancement of their biological activities (El Hamdaoui et al., 2020).

This genus represents a valuable source of natural bioactive molecules widely studied in pharmacology and phytochemistry (El Hamdaoui et al., 2020).

The species *Lavandula stoechas* is widespread throughout Southern Europe, North Africa, and Western Asia (Upson & Andrews, 2004). Among the many aromatic and medicinal plants, there are the species of *Lavandula stoechas L.* which is alternatively known by the common names butterfly lavender. (Benabdelkader, 2012). It is a much-branched shrub bearing purple flowers and is primarily located in the northern part of the nation.It is found in many parts of the Mediterranean area and has been used for different medicinal applications owing to the components found in the essential oil. It has been used for the treatment of ailments such as diabetes, cramps, pain during menstruation, and also as an insect repellant (Skoula et al., 1996).

It has also been traditionally used for the management of hyperlipidemia and the symptoms of cancer and has anti-septic characteristics. Besides that, lavender essential oil has been widely used in cosmetics and aromatherapy industries (Kırmızıbekmez et al., 2009). *Lavandula stoechas* is highly adaptive to semi-arid conditions, thus its resilience and low cost of cultivation (Domingues et al., 2023). Historically, *Lavandula stoechas* has been utilized for culinary, medicinal, and cosmetic purposes because of the presence of essential oils and secondary metabolites, particularly phenolics (Domingues et al., 2023).

Studies carried out recently have revealed that the oil from this plant is made up of mostly monoterpenoids and oxygenated monoterpenoids, which contribute to its physiological and aromatic nature. (Domingues et al., 2023)

The composition of the oil depends on many factors such as environmental factors, geographical locations, plant part, and growth stage of the plant. This has aroused much scientific interest in this plant especially in the areas of phytochemistry and natural biologically active compounds. (Domingues et al., 2023)

The objective of this current investigation is to assess the productivity and chemical components of the *Lavandula stoechas* obtained from the Babour Mountains of Jijel, Algeria. The investigation has been organized into three main sections, namely, Materials and Methods, Results, Discussion, and Conclusion.