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EXTRCTION , ANTIOXIDANT ACTIVITY OF PHENOLIC COMPOUNDS AND GC/MS ANALYSIS OF ESSENTIAL OIL , MINERALS ANALYSIS OF LAURUS NOBILIS

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01 Abstract

The aim of this work is the valorization of *Laurus nobilis* by chemical characterization, study of the antioxidant and the mineral analysis of the extracts and essential oils. The content of total phenols was determined using Folin-Ciocalteu reagent, whereas aluminum chloride colorimetric method was used for flavonoid determination. The total antioxidant capacity was estimated by the scavenging of free radicals DPPH● and ABTS•+ ,the phosphomolybdenum assay and by the FRAP (Ferric reducing /antioxidant power), expressed as IC50, TCEAC and VEAC. The essential oil composition of the leaf of *Laurus nobilis* was investigated by Gas chromatography-Mass spectrometry (GC-MS). Thirty four constituents were identified corresponding to 99.97 % of the total oil. The major components are 1,8-cineole (44.13 %), α-Terpinyl acetate (17.33 %) .Mineral and heavy metal concentration of *Laurus nobilis* were determined using Atomic Absorption Spectroscopy , A total of 7 elements Ca , K, Mg, Fe, Mn , Cu and Zn have been measured. Therefore, this plant is rich in some essential minerals, especially Ca, K, Fe and Mg .

Keywords: GC-MS , FRAP, ABTS, DPPH, Phosphomolybdenum, minerals analysis

02 MATÉRIELS ET MEHODES

❖ **Determination of total phenols and Flavonoids** :Total phenolics were determined using Folin-Ciocalteu reagent as described by Slinkard and Singleton . (1977) and Flavonoids was identified as described by Ahn et al. (2007)

❖**Antioxidant activity**

▪**Phosphomolybdenum assay:** The total antioxidant capacity of different fractions was evaluated by the method of Prieto, Pineda, and Aguilar. (1999)

▪**Ferric-reducing antioxidant power assay (FRAP) :** the ferric reducing antioxidant power method of Oyaizu . (1986) was adopted to measure the reducing capacity.

▪**ABTS radical cation scavenging activity** : The $ABTS^{\bullet+}$ method was based on the procedure described by Dorman and Hiltunen .(2004)

▪**DPPH radical-scavenging capacity :** Free radical scavenging activity of different plant fractions against stable DPPH was determined spectrophotometrically by the slightly modified method of Brand Williams et al. (1995)

❖ **Minerals analysis :** Determination of Ca, Mg, K, Na, Cu, Fe, Mn and Zn in previously mineralized samples was performed using a Solaar 969 atomic absorption–emission spectrometer (Carbonell et al., 2002)

❖**Chromatographic analysis** : The chromatographic analysis of the plant extracts (isolation and identification of the volatile compounds) were performed on a Shimadzu GC-17A gas chromatograph - mass spectrometer (GC–MS) coupled with a Shimadzu mass spectrometer detector QP-5050A

03 RÉSULTATS

Table 1: les teneurs en polyphénols totaux et flavonoïdes dans les extraits de ***L.nobilis***

plant	Total phenol (Folin) (mg GAE/g DW)	Flavonols and flavones (mg CE/g DW)
L. nobilis extracts	25.70 ± 0.861	12.11±0.430

Table 2 : Concentrations of mineral elements (mg kg^{-1} dry weight, dw) in *L. nobilis* leaves.

Mineral	L. nobilis leaves
Macro-elements (mg kg^{-1} dw)	
Calcium (Ca)	7959 ± 248†
Magnesium (Mg)	1606 ± 34
Potassium (K)	6666 ± 495
Micro-elements (mg kg^{-1} dw)	
Iron (Fe)	162 ± 17
Zinc (Zn)	32.9 ± 1.8
Copper (Cu)	20.4 ± 1.8
Manganese (Mn)	11.0 ± 0.3

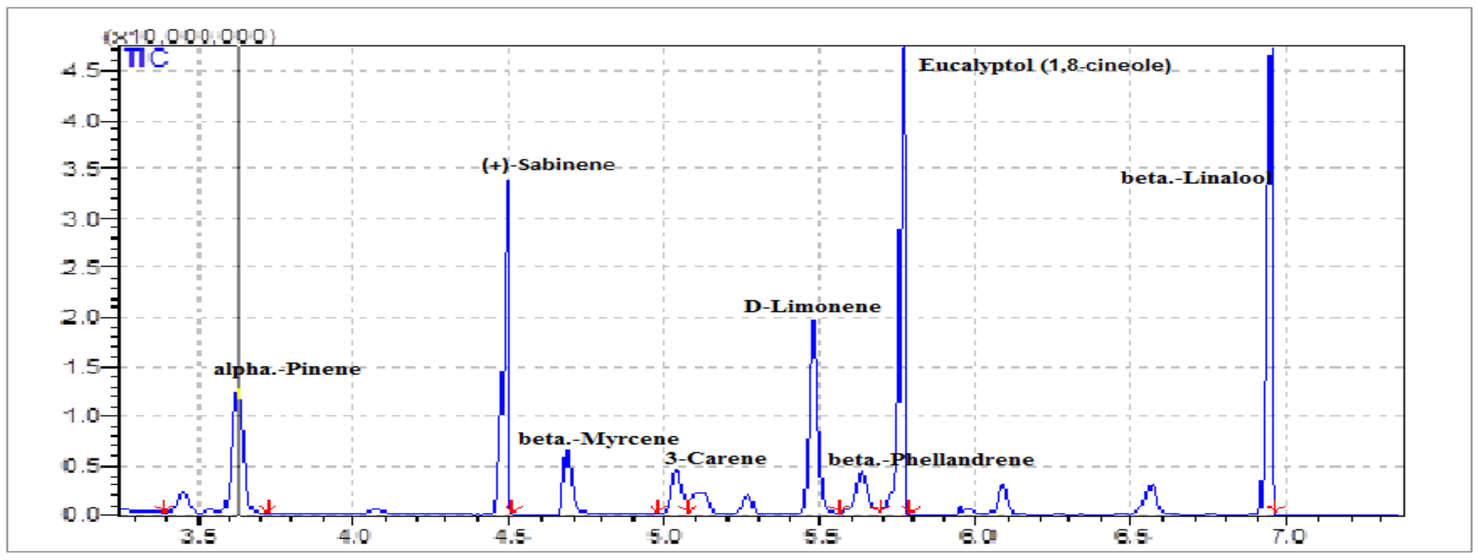

Fig. 1. The chromatogram of the different compounds obtained from *L. nobilis*

Table 3 : Antioxidant activity of hydro-alcoholic extracts and essential oils of *L. nobilis* plants

Extract/ oil essantial	phosphomolybdenum	Reducing power	ABTS	DPPH
L. nobilis extracts	0,211±0.016	0.157±0.007	0.006 ± 0,018	0.024±0.003
L. nobilis oil	0.099 ± 0.021	0.036 ± 0.0015	0.071± 0,0019	0.494±0.030
Ascorbic acid	1.00	1.00	ND	0.006±0.00003

04 DISCUSSION

The total phenols, and flavonoids content was observed in extract from L.nobilis (25.70 ± 0.86 mg GAE g^{1}dw and 12.11 ±0.43 mg CE g^{-1} dw respectively)

Thirty four constituents were identified corresponding to 99.97 % of the total oil. The major components are 1,8-cineole (44.13 %), α-Terpinyl acetate (17.33 %), Methyl eugenol (6.53%) and Sabinene (5.25 %)

Laurus nobilis extract and oil essantial showed interesting antioxidant activity with respect to the ABTS test (IC50 = 0.006 ± 0.001; 0.071± 0,0019 mg / ml) and phosphomolybdate (VCEAC = 0,211± 0.016 ; 0.099 ± 0.021 M) , on the other hand the Laurus nobilis extract also showed a high activity with IC50 = 0.024 ± 0.003 : mg / ml) For the DPPH test and Reducing power (VCEAC = 0.157±0.007 ; 0.036 ± 0.0015 M) .

Atomic absorption spectroscopy showed high levels of Ca, K, Mg and Fe, and trace amounts of Zn, Cu and Mn in *Laurus nobilis* extracts

05 CONCLUSION

The results of this study indicated that *Laurus nobilis* has a high antioxidant activity determined by ABTS , DPPH and low antioxidant activity determined by FRAP, phosphomolybdenum . *L.nobilis* may be a good source of minerals (Ca , K, Fe, Mg, Mn , Zn, Cu) to treat number of diseases that are mainly caused due to the deficiency of those minerals