CHEMICAL COMPOSITION AND ANTIOXIDANT ACTIVITY OF THE ESSENTIAL OIL OF *RUTA GRAVEOLENS* GROWING WILD IN SOUTH EAST ALGERIA

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Introduction :

Ruta belongs to the familia Rutaceae. There may be 8 to 40 species spread all over the world. There are 5 species in Algeria: R. gravelolens, Ruta angustifolia, R. chalepensis, R. tuberculata, R. montana **[1 . 2]**.

whereas in Tunisia and Iran there are only two species of Ruta namely R. chalepensis and R. graveolens **[3 . 4]**.

It is a herbaceous perennials plant, a wild and horticultural herb of the Rutaceae family, widely distributed on the Mediterranean basin .

Through our short description of *Ruta. G*and its medicinal qualities and uses came the interest in studying this specie for other unknown qualities mainly its antioxidant properties which have not been uncovered yet.

Résultats :

Chemical composition

the spectrum of GC-MS is shown in figure 1 displays. The rates and the RI of the branded elements are recorded inTable1 according to their extraction order on the HP device column.GC-MS of the studied plant *(Ruta.G)* essential oil helped identify twenty-five (25) components , about 91.99 % of the total oil. The essential oil income eluted from the aerial organs was 0. 85%.

Table1 shows also the Five components with a predominance of : Nonanone<2-> (22.381%),Undecanone<2->(21.711%), 2-Heptanol acetate (14.828%) , Camphor (9.629%), Acetylacetophenone<p->(8.777%), respectively which correspond to about77.326% of 86.044% and express the various chemical groups with a supremacy of other compounds (74.914 % of the total rate of volatile oil), ensued by Oxygenated monoterpene (10.988%), and Monoterpene hydrocarbon (0.626%) , and Sesquiterpenehydrocarbon (0.516%) respectively as shown in Figure 2.

Table 1: The chemical composition of the *Ruta G* (RI) and perercentages of essential oil composition.

N0	IR_A	IR_{cal}	compounds	%	M+	The most important fragments
1	932	931	α- Pinene	0.094	136	93,121,105, ,77,41
2	946	945	Camphene	0.446	136	93,121,107,79,67,53,41
3	988	993	Octanone<2->	0.213	128	43,71,58
4	1024	1028	Limonene	0.086	136	68,121,107,93,79,53,41
5	1087	1100	**Nonanone<2->**	**22.381**	142	43,127,71,58
6	1100	1107	Nonanal<n->	1.215	142	41,98,82,70,57
7	1141	1145	**Camphor**	**9.629**	152	95,108,81,69,55,41
8	1165	1168	Borneol	1.359	154	95,110,67,55,41
9	1165	1178	Nonanol<n->	0.271	144	41,97,83,70,56
10	1190	1195	Decanone<2->	1.752	156	43,71,58
11	1239	1243	**2-Heptanol acetate**	**14.828**	158	45,69,55
12	1285	1285	Pregeijerene	0.811	162	79,105,94,53
13	1293	1301	**Undecanone<2->**	**21.711**	170	58,85,71,43
14	1301	1307	Undecanol<2->	0.504	172	45,83,69,55
15	1389	1397	Dodecanone<3->	0.588	184	57,155,85,72,43
16	1417	1415	Caryophyllene<(E)->	0.253	204	41,161,133,105,93,79,69,55
17	1444	1438	**Acetylacetophenone<p->**	**8.777**	162	147,162,119,91,50,43
18	1452	1450	Humulene<α->	0.093	204	93,147,121,80,67
19	1495	1498	Tridecanone<2->	0.562	198	43,85,71,58
20	1505	1509	Farnesene<(E,E)-α>	0.088	204	41,119,107,93,79,69,55
21	1522	1521	Cadinene<&->	0.082	204	161,134,119,105,91,
22	1548	1550	Elemol	0.247	222	59,161,121,107,93,43
23	1685	1686	Bisabolol<α->	0.054	222	43,119,109,93,69
24		1949	Unknown	**2.491**		
25		2163	Unknown	3.455		

IR_{cal}: calculatedIR_A: (Adams, 2007)

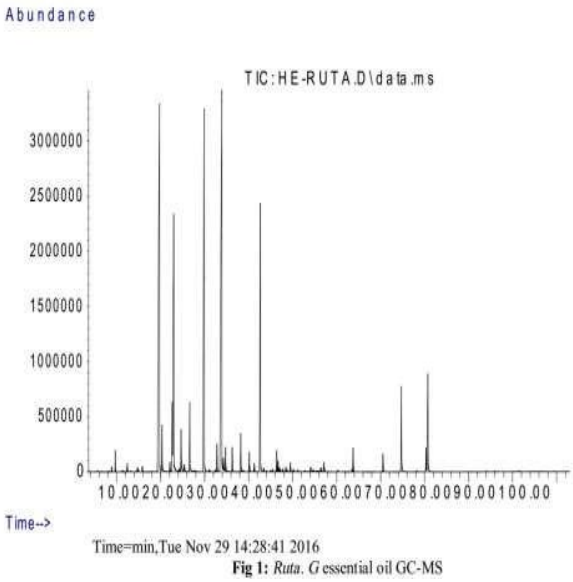
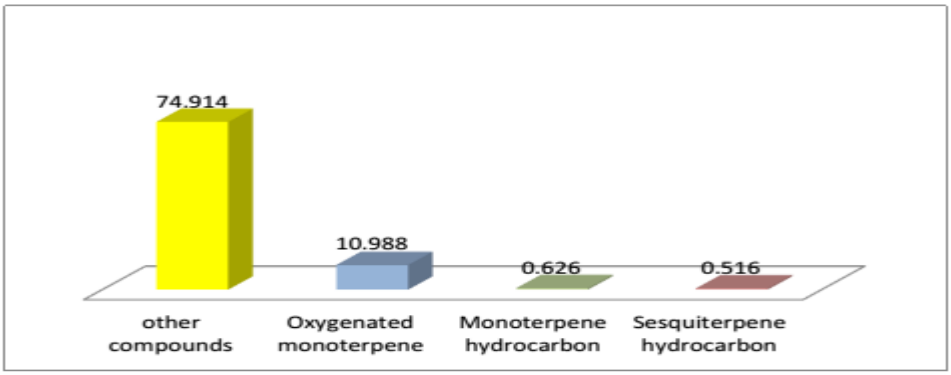


Fig 1: *Ruta. G* essential oil GC-MS

Fig 2: The chemical groups of *Ruta. G* essential oil



Radical scavenging assay (DPPH)

We studied the antioxidant capacity of *Ruta. G* essential oil with two- components references, namely BHT and Vit. E, the study has been achieved via free radical DPPH trapping, which has been explained previously. The absorbance measurement of this radical was done at the length of a 517nm wave of the ethanolic solution at different concentrations of the sample with a three times repetition for each concentration yielding absorbance rate at the end. The results are described below. we fix the inhibitory concentration of the rate 50% of the DPPH free radical for each studied sample by the projection on the concentration axis. The findings are shown as following.

From the previous tables, it is shown that the inhibition ratio I(%) is increasingly growing with the increase of the inhibitory sample concentration. It is also noted that from the Table 4 of the reference components that the inhibitory rate changes are high at low concentrations, which shows the antioxidant capacity of these materials that can be arranged according to their strength as follows Vit. E and BHT. However, we note that for the essential

oil inhibition ratio increases when the changes in concentrations are significant, indicating the weakness of the antioxidant capacity of this essential oil for *Ruta. G*

Table 4: *Ruta. G* lowest inhibitory concentration IC50 and the two references BHT and Vit. E.

	IC_{50} (µg/ml)
Ruta .G	**64000**
BHT	180
Vit. E	15

Conclusion :

Essential oil chemical composition of the *Ruta. G*, yielded from Algeria, is significantly different from that brought from other countries . This can be attributed to several factors like soil, climate, water quality…etc .The findings showed that the essential oil major components rates were: Nonanone<2-> (22.381%),Undecanone<2->(21.711%), 2-Heptanol acetate (14.828%) ,Camphor (9.629%), Acetylacetophenone<p->(8.777%). Antioxidant ability is exclusive to our work since our study is pioneer concerning *Ruta. G* . Our results showed a low antioxidation ability for this latter in comparison with the reference compounds and other plants antioxidation ability. This is essentially due to the presence of phenols that redox free radicals.

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